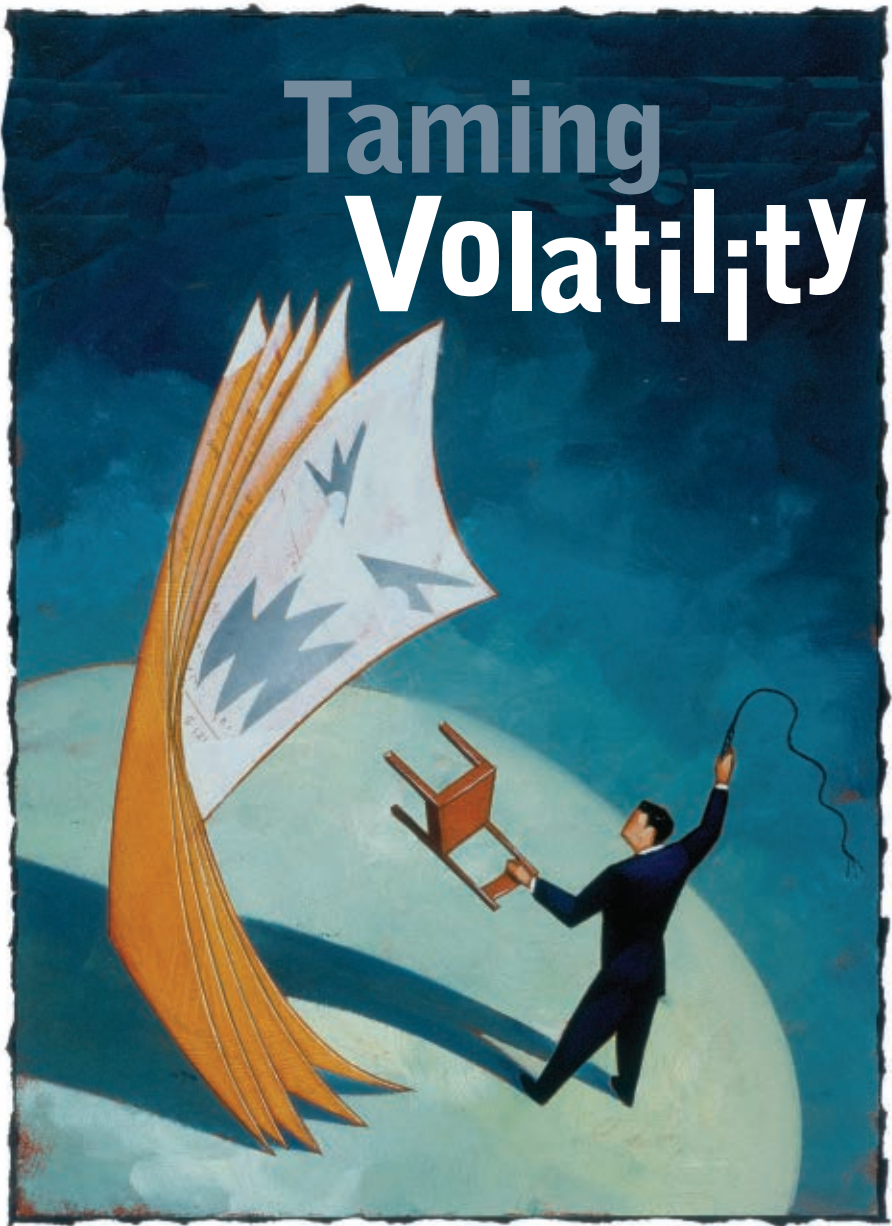


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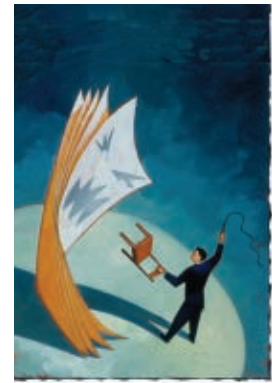
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FEATURES

8 The Supply Chain Top 25: Leadership in Action

The 2011 rankings of the Top 25 supply chains from Gartner Inc. are in. They include repeat winners and some new entrants. Perhaps even more important than the actual rankings, says Gartner Research Director Debra Hofman, are the lessons that can be learned from analyzing the leaders. This year, six specific qualities stand out.

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In 2007, *SCMR* ran an article on Walmart's sustainability program, focusing on eight specific initiatives being pursued. Four years later, the author of that original article, Erica Plambeck of Stanford, and colleague Lyn Denend revisit those initiatives to assess just how Walmart is doing on the sustainability front.

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A new global survey from PRTM confirms the importance of operational flexibility in supply chain success and identifies five levers that leaders employ to make it happen. The consultants report that the financial and performance advantages of improved flexibility can be profound. They outline five basic steps that companies can take to start realizing those benefits.

32 What's Your Mobility Index?

Mobile devices are everywhere these days. But what's the real potential of mobility in the key supply chain processes. And what's the best way to identify and tap into that potential? Sumantra Sengupta of EVM Partners says the first step in answering these questions is to carefully determine your "Mobility Index." This article tells how it's done.

40 The Case for Infrastructure Investment: Lessons from Medco and Staples

Smart investment in supply chain infrastructure—and in particular automated materials handling and distribution systems—can pay big dividends. Medco and Staples have proven that convincingly, as these case studies demonstrate. Their stories point to seven key takeaways that supply chains professionals in any business sector can learn from.

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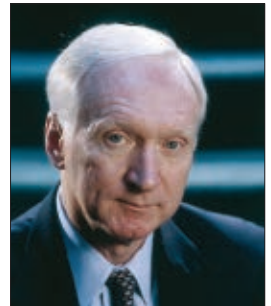
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Taming a Volatile Tiger



Frank Quinn, Editor
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Volatility has always been a factor in supply chain management. It just seems that the level of volatility we've been experiencing recently has been higher—and certainly a lot more persistent—than anything we've experienced in quite a while.

Those boring good old days of relative stability have been supplanted by economic turmoil and wild stock market swings; by monumental natural disasters like earthquakes, hurricanes, and tornados; by political upheavals around the globe; and by suppliers cutting way back on capacity or in some cases simply going out of business. These are among the major contributors to that sense of volatility that seems to haunt us daily.

No one company or individual can do much about the causes of volatility. But they can do a lot when it comes to anticipating and dealing with the effects.

Concepts like flexibility, agility, resilience hold the key here. The notion that these qualities can serve as a calming influence in a sea of volatility was first expressed (well, the first time I came across it anyway) in a 2004 *Harvard Business Review* article by Hau Lee in which he wrote about the “Triple A” supply chain. (Agility was the first A; adaptability, a first cousin to flexibility, was the second; and alignment was the third A.)

In this issue we see a similar line of thinking unfolding, albeit expressed in slightly different ways. In her analysis of the Top 25 supply chains, Debra Hofman of Gartner notes that the leaders excel at the more traditional things like speed, agility, and respon-

siveness. But there is also one emerging competency, she notes, that they're now enthusiastically embracing. And that is resiliency—the ability to deliver predictable results regardless of the external turmoil. Moreover, the best of the companies are helping their supply chain partners become more resilient as well.

As we learn from the article reporting on PRTM's annual global supply chain survey, operational flexibility is central to managing through whatever disruptive situations do arise. Noting that volatility has become the “new normal,” the PRTM consultants identify five levers that can enhance that needed flexibility. The levers identified—from focusing intently on supply assurance to bringing supply chain and product development closer together—can benefit any business, regardless of their current position on the flexibility curve.

Mobile devices, of course, can help you become more flexible, too. But before you make a huge investment in mobile capabilities for your supply chain, advises Sumantra Sengupta in his article, it's wise to determine your “Mobility Index.” He explains how it's done and what it means.

Flexibility, agility, responsiveness, resiliency... seems like a lot of competencies that you need to tame the volatility tiger. But that's what makes the supply chain job so interesting, right?

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Bowersox and Goldratt Leave Two Great Legacies

Don Bowersox and Eli Goldratt must be remembered for their lasting contributions to the art and science of supply chain management.

Since my last column, we've seen the passing of two luminaries in supply chain management (SCM)—Professor Donald J. Bowersox and Dr. Eliyahu (Eli) Goldratt. I did not know either of them personally and only met the latter at a Council of Supply Chain Management Professionals (CSCMP) conference several years ago. Despite that, they've radically shaped my supply chain thinking as well as industry's.

Don Bowersox: Driving the Evolution to SCM

I've always marveled at the logistical prowess of the Roman Empire. To cite just one accomplishment, the Romans built an extensive set of interconnecting roads that all led to Rome. That feat allowed information and goods to flow freely throughout the empire, fostering prosperity, growth and durability. Yet despite its importance in building and sustaining empires, logistics has only recently been acknowledged as a noteworthy profession and a worthy academic pursuit—the one notable exception being the military.

Before the 1970s, only a handful of institutions offered courses—let alone degrees—in logistics or supply chain management. That has changed dramatically. The July/August 2011 special supplement to *SCMR* titled “Capturing the Potential of Education” listed more than 30 universities and 10 professional associations that offer educational programs in supply chain and logistics. And that is just

a sampling of what's available in the U.S.

In parallel with this development and especially as global trade has mushroomed, SCM has evolved from a concept involving just manufacturing or physical distribution to the integrative end-to-end view we adopt today.

There at the beginning of this evolution was Don Bowersox of Michigan State University (MSU). Along with a handful of like-minded academic colleagues from the heartland of America, Bowersox legitimized logistics and turned it into a highly-regarded academic and professional pursuit. A true pioneer, he wrote the first textbook on the subject in 1961. He also was a founding member and second president of the National Council of Physical Distribution, established in 1963. This organization went on to change its name to the Council of Logistics Management and is now CSCMP.

I only heard Dr. Bowersox speak once, and that was over 30 years ago. He talked about the toilet paper supply chain without referring to it as such, since the term “supply chain” did yet not exist. He pointed out that while this product by its very nature should have flat consumption, it actually experienced volatile demand. The product was heavily promoted and at that time was available in a multitude of colors. These factors made what ought to have been a simple supply chain a very complex one to manage. I've repeatedly used Bowersox's prescient example to discuss the challenges stemming from the Bull Whip Effect in managing today's complex global supply chains.

Dr. Lapide is a lecturer at the University of Massachusetts' Boston Campus and is an MIT Research Affiliate. He welcomes comments on his columns at llapide@mit.edu.

Eli Goldratt:

It's All About Constraints

I encountered Eli Goldratt's influence in a variety of indirect ways. He stressed the importance of identifying and doing something about constraints in managing operations. I read his novel *The Goal* several years after its publication in 1984. It's a fictional account of a manager trying to take control of a problematic plant. The story illustrates Goldratt's Theory of Constraints (TOC) by chronicling how the manager tackled various problems that arose because of bottlenecks or "constraints" in the plant's operations. The moral of the story was that it is important to identify and work around constraints—and that is the premise of TOC as well as others manifestations of constraint-based concepts.

TOC is also referred to as the Drum-Buffer-Rope Method of managing operations. Bottlenecks dictate the "drumbeat" of an operation. These need to be decoupled from other activities to help ensure uninterrupted operations overall. (For example, buffer stocks should be deployed immediately preceding and following a bottleneck to minimize downtime from upstream disruptions and to ensure that downstream operations are minimally affected by its downtime). Lastly, the bottlenecks and other operations need to be "tied" or "roped" together to synchronize them.

As a supply chain analyst, I was briefed by a variety of vendors that incorporated TOC methods into their production scheduling software. Also, when we asked managers if they used the optimization functionality in their Advanced Planning System (APS), some said, "No, we are more interested in APS to identify material shortages." The APS information was being used to acquire more materials to relieve the shortages that their MRP systems couldn't identify. Consistent with Goldratt's constraint-based concepts, these managers (like the manager in *The Goal*) were working around and alleviating the constraints identified, not merely accepting them.

Constraint-based concepts were also reflected in the MIT Supply Chain 2020 Project research in which I participated. The project identified the importance of leveraging "tailored" rather than best practices to achieve supply chain excellence. A tailored practice leverages an operating principle to achieve objectives aligned to a competitive strategy. (See my column in the April 2006 issue of *SCMR* titled, "The Essence of Excellence.") One of those operating principles, Constraint Relaxation (CR), focuses on doing something about constraints,

similar to TOC. Under the CR principle, if a supply chain constraint is removed or relaxed, it can lead to more optimized operations.

One manifestation of the CR principle is the practice of never making a commitment that constrains an operation—unless absolutely necessary to do so. Cisco Systems, for example, leverages the principle when quoting order delivery lead times that are longer than expected. Cisco does this so it can accommodate any mishaps that might occur during fulfillment. This practice guarantees on-time delivery. And Cisco can adopt it because its customers are more interested in a precise, rather than a short lead time.

I'm saddened by the loss of two supply chain greats who in their own ways contributed so much to the advancement of supply chain management.

The Toyota Production System is another manifestation of the CR operating principle. Toyota constrains its manufacturing operations to run at less than full capacity so that it can use surplus capacity to meet unanticipated spikes in demand. This approach also significantly reduces the time needed to changeover production lines between model runs from an industry benchmark of days to hours. By relaxing the constraint in this manner, Toyota significantly increases its flexibility to meet unplanned demand spikes.

In my July/August 2009 column, "GM Was Out of Alignment," I postulated that a major reason for GM's troubles was that the demand and supply constraints forced onto the company caused it to be strategically misaligned for decades. The demand goals placed on GM by its dealer base were just too ambitious given the limited capabilities of the automaker's dated manufacturing plants and constricting workforce regulations. GM's situation demonstrated the downside of not recognizing and working around constraints for a long time.

In summary, I'm saddened by the loss of two supply chain greats who in their own ways contributed so much to the advancement of supply chain management. Professor Bowersox was instrumental in evolving SCM into the profession it is today, and Eli Goldratt helped us realize that identifying and doing something about constraints is better than making believe they don't exist!



Asia: The New Talent Management Model?

By Mahender Singh

Dr. Mahender Singh is Rector at the Malaysia Institute for Supply Chain Innovation and Research Director, MIT Center for Transportation and Logistics. He can be reached at msingh@mit.edu.

Building a talent pipeline to meet the profession's current and future needs is one of the most pressing challenges facing supply chain management. And nowhere is this challenge more visible than in Asia, where the demand for skilled professionals is acute and, in a number of ways, unique to the region.

Western companies that are expanding in Asia should be aware of these issues; simply duplicating HR practices that have served their organizations for many years is not a viable option. Managing supply chains in Asia requires specific skills and, to complicate matters further, the labor markets that provide these capabilities operate quite differently from those in the west.

More importantly, it can be argued that companies in more mature economies may, in fact, eventually have to adopt the employment models now being forged in Asia. At the moment, the labor markets in Europe and North America are less volatile, and persistent high unemployment is keeping a lid on staff turnover levels. However, current trends in the market suggest that a shortage of supply chain talent might become a serious issue in developed countries in the near future—and current talent turmoil in Asia may offer insights into the potential solutions that the profession needs.

Driven by Economic Growth

To gain a better understanding of the challenge, in this column we focus in particular on Southeast Asia, which captures the essence of the talent management problems that plague Asia in general. Interestingly, many of Southeast Asia's talent issues are rooted in the region's economic vibrancy. The Association of Southeast Asian Nations (ASEAN) comprises 10 nations (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam), with a combined population of 600 million and a GDP of \$1.5 trillion. The ASEAN nations gener-

ate \$1.7 trillion worth of trade annually, and are expected to maintain growth rates of around 5-6 percent over the next few years.

The growth in trade is not limited to a particular sector, but is increasing on several fronts. In addition to the continuing growth in trade with the West, Asia's expanding middle classes (and notably those in China and India) are stimulating demand for goods and services locally. Exports from ASEAN countries to China and India have almost tripled over the last decade. At the same time China is investing heavily in ASEAN countries to harness key natural resources such as coal, palm oil, and rubber.

Encouraged by their success, the ASEAN countries are aiming for a bigger global presence. Accordingly, by 2015 they plan to establish a single market, the ASEAN Economic Community. Such a community could eventually rival established economic zones such as the European Union. But to achieve these goals the region must build world class supply chains, and that requires skills that are a scarce commodity in these extremely dynamic economies. Since meeting the demand for supply chain talent in the ASEAN region is a multifaceted problem, it is necessary to first understand the underlying causes.

Poor practical skills

Varying educational standards and a general lack of supply chain expertise in the region mean that new recruits often lack the ability to apply the knowledge they acquired as students. "We are struggling to find people with adequate operations management skills," explains Roger Bloemen, Global Vice President Supply Chain, at international specialty chemical manufacturer Solutia. Headquartered in St Louis, the company has manufacturing plants in Malaysia, Japan and China, and is looking to further expand in Asia. In Bloemen's opinion, "students in the region

need more exposure to real-world applications of the analytical methods they learn at school.”

Skilled labor in high demand

Competition for talented professionals is intense in ASEAN economies. In this environment individuals are able to shop around for the best career opportunities; it is not uncommon for a mid-range supply chain manager to be able to double his or her salary in a single move from one company to another, for instance. As a result, finding and retaining top talent is a major challenge for companies.

Generational issues

The aspirations and attitudes of the new generation of employees are different in a number of ways from those of older employees. Many young recruits want to achieve a certain work/life balance, and expect to change jobs frequently. Data shows that the baby boomer generation held 10.5 jobs on an average, while future employees are expected to hold close to 30 jobs during their careers.

Special supply chain needs

The skills shortfall is exacerbated by Southeast Asia’s specific supply chain management demands. A certain breed of manager is required to thrive in an environment of constantly changing and complex tax regimes, a patchwork of regulations, organized theft and poor infrastructure.

Inter-regional differences

The west often lumps Southeast Asia into the same cultural basket, but this is a gross misrepresentation of the region. Profound cultural and language disparities separate ASEAN countries.

The profession’s low profile

Supply chain’s comparatively low status in the corporate world is a worldwide problem, but particularly severe in Southeast Asia. The profession is less mature in the region compared to the west, and there is low awareness of its strategic value. As a result, it is difficult to attract aspiring professionals to the supply chain field.

Lack of an educational infrastructure

The ASEAN region urgently needs more first-rate industrial/engineering supply chain schools. In some cases governments have rushed to fill the void by providing seed investment for new schools, though some of the investments were not well planned.

An encouraging trend is the emergence of alliances with top educational institutions in the west. MIT recently established

such a partnership with the government of Malaysia to create the Malaysia Institute for Supply Chain Innovation (MISI).

More Resilient Approach Needed

The all-important question is whether or not companies can overcome these obstacles even if they are afforded enough time to address the issues. Some of the solutions are well established in the west. Job rotation programs, for example, where individuals spend time in different departments, help to maintain interest levels and give employees opportunities to enhance their skills.

Ongoing education is particularly important in Southeast Asia, where there is an unquenchable thirst for new knowledge, so the importance of educational initiatives such as MISI cannot be underestimated. A core part of MISI’s charter is to address the region’s inadequate educational infrastructure, as well as the profession’s low profile and lack of

The concept of a resilient supply chain in an operational sense is well known in the profession; now we must develop talent-resilient supply chain organizations.

practical skills. MISI will offer a variety of courses and programs to achieve its goal. These will include executive education programs, which will be offered later this year, and master’s degree programs to be introduced in August 2012.

Above all, companies in Southeast Asia must develop employment models that are attuned to extremely dynamic labor markets. Rather than trying to swim against the tide and expect employees to stay with the same company for a long time, they need to accept that high staff turnover is, and will be, a fact of life. In response, enterprises must develop talent strategies that enable them to maintain the integrity of their supply chains in an uncertain talent-management environment.

The concept of a resilient supply chain in an operational sense is well known in the profession; now we must develop talent-resilient supply chain organizations. The sudden loss of a valued manager can be just as disruptive to operations as a supplier failure or a weather-related delay. And the principles behind the remedies are similar. For example, building flexibility and redundancy into organizational structures by training people to be multi-skilled and eliminating functional silos wherever possible offers a robust solution to the problem.

The work to develop this type of resilience has barely begun. But Southeast Asia—and the supply chain profession as a whole—must innovate and create new models to remain competitive in a world where talent is at a premium and career paths take many twists and turns.

The Top 25 Supply Chains: **LEADERSHIP IN ACTION**

By Debra Hofman

Debra Hofman is Research Vice President at Gartner, Inc. She can be reached at debra.hofman@gartner.com.

The 2011 Supply Chain Top 25 rankings from Gartner include repeat winners and some new entrants. Perhaps even more important than the actual rankings, though, are the lessons learned from examining just what makes the leaders stand out. This year, six specific tactics they embrace seem to point the way toward supply chain excellence.

Gartner recently published its 7th annual Supply Chain Top 25, a ranking of the world's leading supply chains. As in previous years, the 2011 ranking identifies those large companies with supply chains that come closest to an ideal we call the "Demand Driven Value Network." And while there are always new names on the list, the principles that separate the leaders from the rest remain largely consistent. (See accompanying sidebar for the 2011 list.) This article will highlight the trends we've seen this year from the leaders, and elaborate on the themes which differentiate them.

What Is the Definition of Excellence?

Our methodology is based on a composite score for each company that is made up of a set of financials combined with an opinion component. Three financial metrics—Return on Assets, Inventory Turns, and Revenue Growth—make up 50 percent of each company's score. The remaining 50 percent of the score is derived from polling a group of supply chain professionals (156 individuals this year) as well as 32 of our own analysts. The details of how these numbers are defined, sourced and normalized can be found in the full report or on the Gartner website (www.gartner.com). But what matters to this article is the definition of excellence that we ask voters to consider as they complete their ballots.

Exhibit 1, on page 10, captures the organizational ideal of demand-driven principles as applied to the global supply chain. This model has three overlapping areas of responsibility:

- **Supply management**—Manufacturing, logistics, and sourcing.
- **Demand management**—Marketing, sales, and service.
- **Product management**—R&D, engineering, and product



Astrid Dinunno

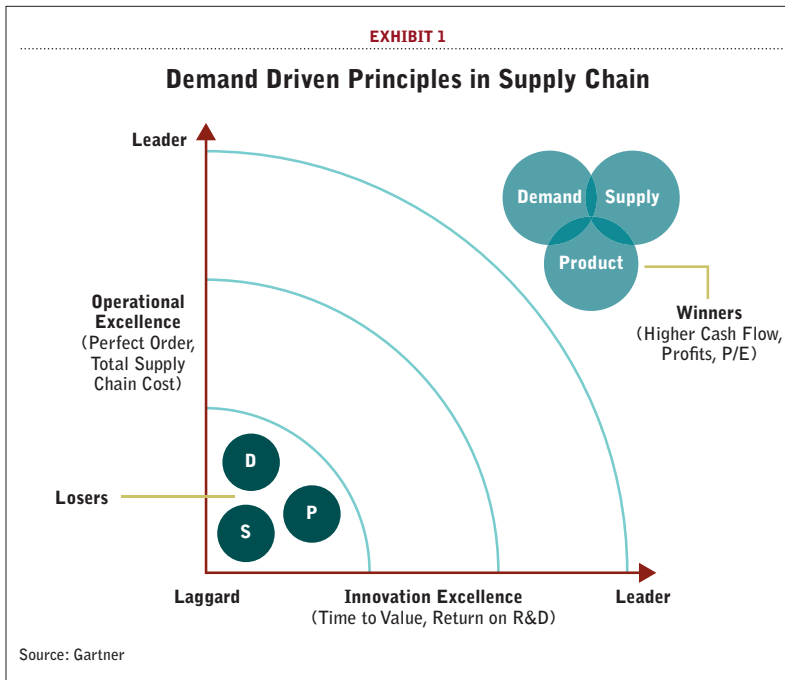
Supply Chain Top 25 for 2011

1. Apple
2. Dell
3. P&G
4. Research in Motion (RIM)
5. Amazon
6. Cisco Systems
7. Wal-Mart Stores
8. McDonald's
9. PepsiCo
10. Samsung
11. The Coca Cola Company
12. Microsoft
13. Colgate-Palmolive
14. IBM
15. Unilever
16. Intel
17. HP
18. Nestle
19. Inditex
20. Nike
21. Johnson & Johnson
22. Starbucks
23. Tesco
24. 3M
25. Kraft Foods

development.

Excellence is a matter of visibility, communication, and reliable processes that link all three of these functional areas together. When these processes work together, the business can respond quickly and efficiently to opportunities arising from market or customer demand. Defining characteristics of supply chains built to this design include the ability to manage demand rather than just respond to it, a networked rather than linear

approach to global supply, and the ability to embed innovation in operations rather than keep it isolated in the laboratory. The demand-driven model is inherently circular and self-renewing, unlike the



chain: operational excellence and innovation excellence. Operations, including delivering as promised to customers and keeping costs under control, are relatively easy to measure and unambiguous as business value metrics. We recommend a hierarchy of metrics, at the top of which are perfect order rate and total supply chain costs, to monitor this dimension. (See Exhibit 2.)

Of course, operational excellence has value only if customers want what is being made and shipped. To address this dimension, we look at innovation excellence. Although far harder to measure reliably, this dimension also can be managed with a hierarchy of metrics, in this case topped by time to value and return on new product development and launch (NPDL). (See Exhibit 3.) Companies that manage to balance leadership on both these dimensions

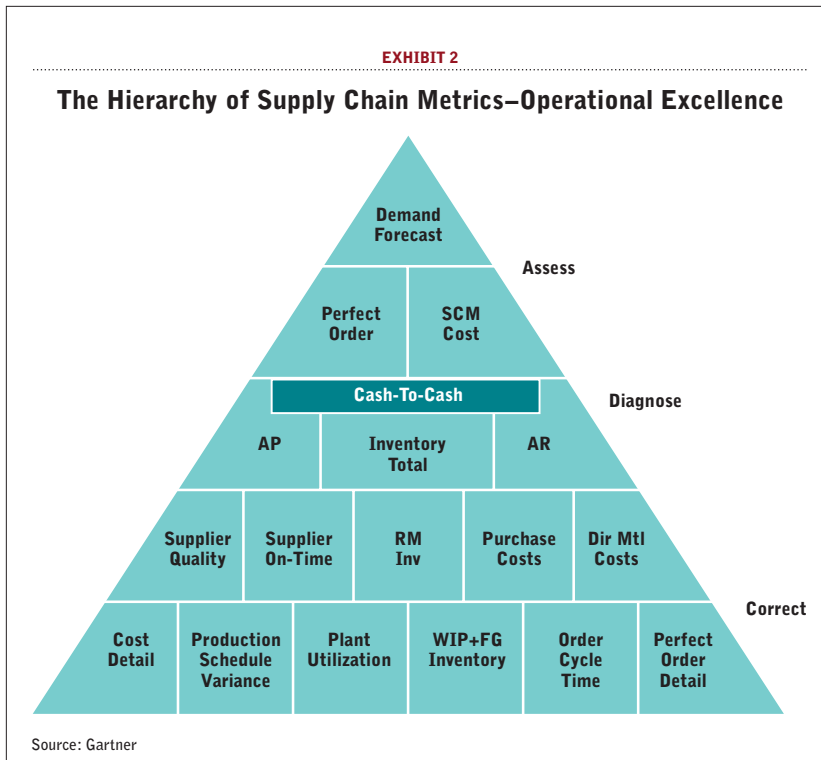
push supply chains of our factory-centric industrial past.

Operational Excellence and Innovation Excellence

Two basic dimensions of measurement capture the totality of the best-in-class demand-driven global supply

over time not only satisfy their customers but also earn better returns on capital invested, whether in assets or research and development.

Peer voters and our own analysts are instructed to use this definition of excellence when completing their ballots. The typical reference points used then are demonstrated operational and/or innovation excellence as experienced by the voter as a customer, supplier, competitor or professional peer of the companies under consideration.

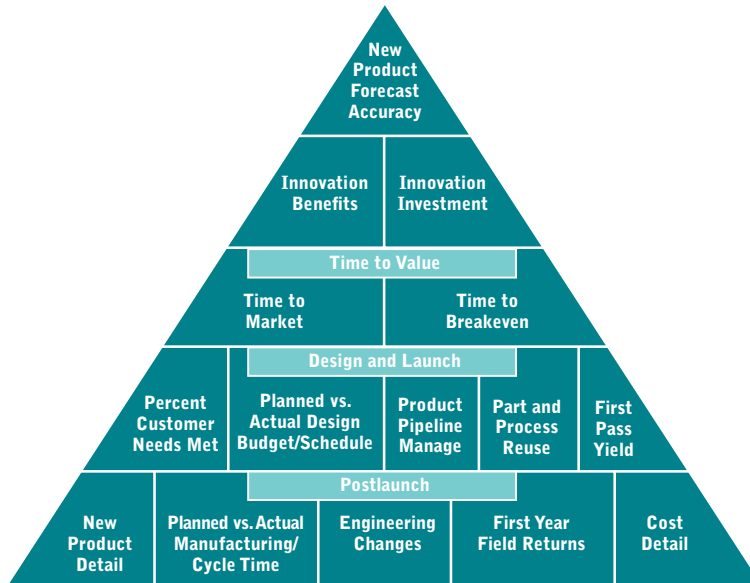


What Differentiates the Leaders?

Each year, our supply chain analysts research the supply chains of hundreds of companies. Two of the themes we are seeing across this research should be noted here. First is an increasing emphasis on the notion of resilience: the ability to deliver predictable results, despite the volatility that many have pointed out is now here to stay. Speed, agility, efficiency, responsiveness and innovation—all remain critical, but equally important is a resilient supply chain. Companies like Cisco, Dow

EXHIBIT 3

The Hierarchy of Product Metrics - Innovation Excellence



Source: Gartner

chain landscape. Yet few companies do them well, and even fewer have developed mature strategies to string them together. We'll discuss each of these tactics below.

- Organization as Value Chain
- Extended Supply Chains as

Networks

- Segmentation of Supply Chains
- Sales & Operations Planning for

Balance

- Embedded Innovation in Supply Chain

- Hierarchies of Supply Chain

Metrics

Organization as Value Chain

One of the trends we've seen over the last several years is a move from the notion of "supply chain" to "value chain" and a concomitant increase in the span of responsibility of the sup-

ply chain organization. The old image of a supply chain organization limited to either inbound materials management or logistics is fading. What's replacing it among the leaders is a supply chain organization, often reporting at the board level, whose responsibilities go beyond the functions of plan, source, make, and deliver to include functions such as customer management, new product launch, post sales support, and change management. Moreover, the leaders link these key functions through

Chemical, RIM, Unilever and others are actively designing in structures, processes and methodologies to create and expand this resiliency not only in their own supply chains, but in those of their trading partners as well.

The second is the notion of what we call "orchestration." Companies have been moving steadily up the demand-driven maturity curve over the last several years. What differentiates the leaders is that they go beyond simply borrowing and adapting others' best practices. They create new ones altogether, often defying conventional wisdom to rewrite the rules and increase the gap between themselves and others.

The question is, how do they get there? With seven years of



Leaders take the notion of the organization as value chain one step further; they design and manage their supply chains as the extended networks of trading partners.

data and discussion behind it, the Supply Chain Top 25 has offered some important lessons about leadership and excellence. Chief among these is that while best practices are critical, functional competence is not enough to define a leader. Demand-driven leaders go beyond to build a foundation for growth and continual learning that constitutes an engine for superior competition.

There are six tactics that we've seen leaders use. Some of these are, in fact, widely used across the supply

the cross-functional processes and roles that are so critical to being demand-driven.

We've talked about Cisco Systems in the past, where the supply chain organization has been renamed to "Customer Value Chain Management" and is organized to mirror, rather than serve, the business. In terms of organization, the transformation has included establishment of supply chain functions for new product development that work closely with Cisco's engineering

organization to coordinate fast and successful launches, customer service that not only fixes problems in the field but tracks end-to-end resolution, and quality control.

But it's not just about reporting structure. Whether they formally change organizational reporting lines or not, leading companies are redefining the responsibilities of their supply chains to move away from functional silos toward an end-to-end value chain focus—starting with the end consumer of the product and moving back



By identifying the leaders, we hope to consistently highlight the best practices from which others can learn, thereby raising the bar for the supply chain profession as a whole.

through the supplier base and new product launch—that manages the physical and information flow through the network.

Consumer products and high tech companies have led the way in this, but there is plenty of movement in other industries as well. In healthcare/life sciences, the customer has historically been the next paying trading partner—for example, manufacturers have traditionally viewed distributors as their customers. Companies like J&J and Novartis are changing that view, looking out to the multitude of customers in their value chain, going from “the patient back to the pallet.” Healthcare systems like Sisters of Mercy have expanded the span of responsibility for their supply chain organization to include the patient bedside all the way back to the supplier base. Aerospace & Defense manufacturers have traditionally been program-driven, supply-centric organizations. But companies like Raytheon are breaking out of this paradigm, going beyond the traditional functions of procurement, logistics, material management, and subcontract management to include the customer bidding process and forecasting. Raytheon also has a strong governance process to help ensure cross-functional alignment where needed, for example between engineering and supplier management, in which supply chain influences designs that shape demand and mitigate risk.

Extended Supply Chains as Networks

Leaders take the notion of the organization as value chain one step further; they design and manage their supply chains as the extended networks of trading partners (cus-

tomers' customers, suppliers' suppliers, logistics providers, contract manufacturers, third-party warehouses, and so forth) that they really are. What they're doing is orchestrating a set of activities across the network, aligning goals based on each player's value proposition that will result in the desired outcome from that network—the profitable delivery of final product to a customer.

RIM's Partner Collaboration Express initiative is aimed at establishing process and technology connections with its strategic trading partners to create more seamless collaboration, supported by its Operations Control Center to create an interconnected network with global visibility to demand patterns, supply networks, and product requirements.

The combination of collaboration and end-to-end visibility enables RIM to balance efficiency and agility while executing its supply chain anywhere in the world. Microsoft has co-designed its end-to-end value chain collectively with its trading partners. With a heavy reliance on third party manufacturing resources, Microsoft locates its staff on site with suppliers, not only to ensure the quality of the output but also to provide its own supply chain expertise to suppliers whose margins are often very thin.

Segmentation of Supply Chains

Another trend we've seen over the last few years is the move toward defining segmented supply chains. In many organizations, supply chains historically “grew up” organically, rather than being proactively and strategically designed. Leaders have realized that, in fact, one size does not fit all, and that the days of having one supply chain approach through which they force fit all their products are over. Instead, these companies are defining how many supply chains they need to operate, and designing an architected set of supply chain strategies that will allow them to profitably deliver supply through each.

Many companies segment their customers, or their suppliers, or their products. The leaders have figured out the key to end-to-end segmentation, which requires the combination of all of these. Gartner sees supply chain segmentation as the dynamic alignment of customer channel demands and supply response capabilities, with each segment optimized for net profitability. This requires a complex set of capabilities to optimize each decision point in each segment, including where

and how to source, how to price, what service levels to promise, which orders to take, and which channels to deliver through.

We have defined seven steps companies follow to segment and define their supply chain types, including:

1. Conduct customer and market analysis.
2. Assess current capability.
3. Cluster value chain requirements for the supply response.
4. Design portfolio of supply chain types.
5. Align and enable dynamic cost model.
6. Align cross-functional metrics and incentives.
7. Govern and refine.

One classic example of this is Dell, second in our Supply Chain Top 25 this year and in the Top Five since the beginning. The company revolutionized supply chain management early on with its direct, configure-to-order, just-in-time-inventory model. But this one-size-fits-all supply chain hit up against a set of challenges as the basic product became increasingly commoditized, customer preferences changed, and emerging markets blossomed in importance. Business customers required different service levels, purchase options, pricing variations and delivery speeds than consumers. In response, Dell embarked on a transformational journey to segment its supply chains and design the most profitable response for each, aligning all internal functions to execute against the new vision.

The new portfolio allows Dell to vary the cost, speed, and service level of their response to best meet the value needs of the customer group. The results have been impressive: reduced complexity, stronger connection to customers, improved internal collaboration, improved forecast accuracy, and \$1.5 billion in cost reductions between 2008 and 2010.

Sales & Operations Planning for Balance

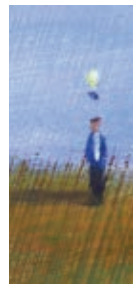
Sales & Operations Planning is perhaps the most widely known and used tactic, but it is also something that most companies struggle to do well. Research on S&OP shows enormous variation in the composition of S&OP teams, the goals of S&OP meetings or processes, and the degree of maturity in technology support for this critical tactic.

Through our research in this area, we've found that

the majority of companies are stuck in "Stage 2" of our S&OP maturity model, falling prey to what we've called the "seven deadly challenges of S&OP"—clarity of goals, alignment to strategy, reward systems, definition of a "good" decision, governance, the role of the forecast, and connection of planning to execution. A Stage 2 level S&OP process focuses on the critical activity of supply/demand balancing, matching demand that incorporates customer and market intelligence to the organization's asset, resource and material constraints to arrive at a feasible production plan. At the same time however, in this stage ownership remains with the supply chain organization, focus is on the short-term planning horizon, and many companies find that decisions often don't translate into execution at lower level processes.

Companies in the Top 25, however, often excel at S&OP. These organizations focus their S&OP process on the strategic and tactical tradeoff decisions they need to make to ensure optimum profitability across the end-to-end value chain. Inventory is seen as a strategic lever

What differentiates the leaders is that they go beyond simply borrowing and adapting others' best practices. They create new ones altogether.



to buffer demand volatility or supply risk rather than as a cost-slashing target, as the operating plans become tightly integrated with financial plans. Jointly owned across business leaders, the S&OP process is where go-to-market opportunities are translated into profitable responses from the total supply network, with a focus on revenue, profit, and service rather than on volume and units. All of this, of course, requires more robust data, a clear governance process, the right metrics, and a culture that rewards transparency and prevention rather than fire-fighting.

Samsung Electronics, a regular in our Top 25, has often been cited as one of the best practitioners of this tactic, and with good reason. S&OP at Samsung is a fundamental component of the operation with a highly structured process that has visibility at the highest levels of senior management. Moreover, the process is supported with extensive data that allows them to make complex tradeoffs decisions quickly and efficiently. Unilever, No.15 this year in the Top 25, has implement-

ed a global process designed to take advantage of natural trade-off points in the organization, and has an advanced governance capability to assess process compliance. Procter & Gamble's S&OP process is governed by the general manager with components owned by the different businesses, and is tightly integrated with the financial profit forecast. At Kimberly-Clark, the S&OP process includes an explicit focus on risk analysis on both the demand and supply sides, with a clear link to finance that allows value-based decisions. And at Nike, where S&OP serves as a cross-geographical collaboration platform and a link to financial forecast accuracy, the process extends beyond traditional supply chain boundaries to incorporate product and portfolio management, contract manufacturing, and retail performance.

Embedded Innovation in Supply Chain

We first published our three-circle demand-driven model in 2004 in a report called "21st Century Supply on Demand." The inclusion of a "product" circle to accompany supply and demand carried an explicit message about the importance of connecting traditional notions of supply chain with the new product development and launch process to ensure that new products are brought

fast changeovers to enable a very different strategy of enticing a younger market with over 500,000 custom vehicle configurations. Caterpillar, which sells highly configured heavy equipment with complex variations that extend lead times, connects its design to a supply chain segmentation strategy to reduce demand uncertainty, offering standard products with shorter lead times in one segment, while in other segments offering more variation but longer waiting periods. Embedded innovation is a tactic that the best supply chain organizations use to more quickly and reliably convert better products into higher profits for the business.

Hierarchies of Supply Chain Metrics

All companies measure. In fact, most companies (and in particular, most supply chain organizations) measure a lot. What most still struggle with is how to focus on the metrics that matter—and even more importantly, how to interpret and then act on those metrics to achieve a desired outcome, namely to improve operational results. From our years of research in this area, we find that most organizations are, in fact, awash in supply chain metrics, and find themselves so caught up in the tactical aspects of measuring—defining, collecting, sorting, translating, rational-

izing differences—that it becomes an end in itself. And suddenly they realize they've lost sight of the bigger picture.

While there are many reasons for this, underlying much of the difficulty is a cultural issue.

In most organizations, numbers are seen as something that you "game"—that is, how can we make sure our department comes out looking good and the blame gets shifted somewhere else. This is exacerbated by the fact that in most companies, targets are set for each of the functions (procurement, manufacturing, order management, transportation, warehousing and so on) so each is programmed by the numbers to focus on its own goals.

The best companies—the ones we call "excellence addicts"—have a very different approach to metrics. People in these organizations understand that the whole is greater than the sum of the parts, that it is, in fact, a system, and that the purpose of the metrics is to make the entire system work better. When individuals in these companies get together to discuss and interpret a set of numbers, the conversation isn't about whose fault some-

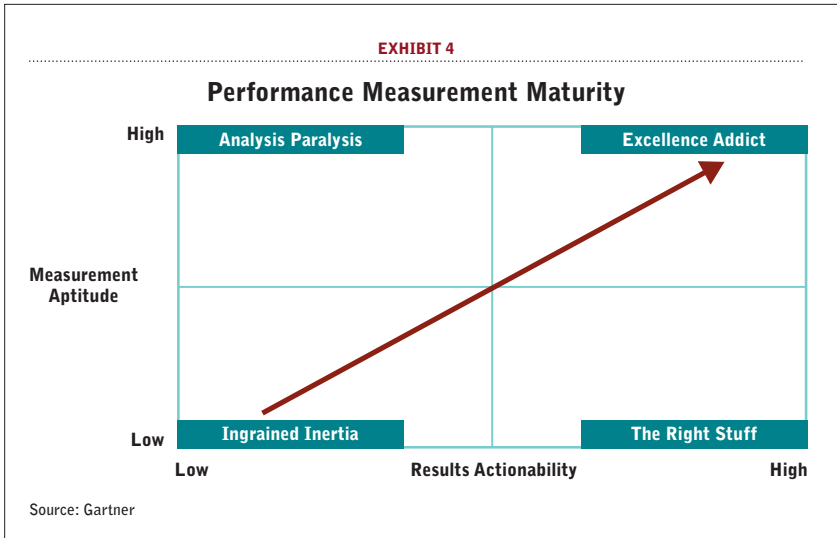


Two basic dimensions of measurement capture the totality of the best-in-class demand-driven global supply chain: operational excellence and innovation excellence.

to market that satisfy the total customer experience profitably and effectively. Without this connection—when new products are launched without having taken into account supply chain considerations early on, and when supply chains are designed without taking into account that new products require different supply chain strategies than existing products—we get new products that are unprofitable to deliver, or high margin products that lack differentiation or strategic market impact, or a failed launch altogether.

There are many examples of embedded innovation. Ford shares vehicle platforms across brands to improve factory utilization and reduce supply chain variability, allowing it to profitably respond to variable demand across its global brands. Fiat uses late stage postponement and a manufacturing process designed to allow

EXHIBIT 4



which is faster, cheaper, environmentally more sound, and more sanitary to boot.

There are other examples, including Intel, Procter & Gamble, and Cisco. All have realized that using metrics with an attitude of curiosity rather than fear results in better outcomes. They also realized the importance of something we call “balanced excellence.” Rather than mindlessly aiming to be best in class on every subcomponent of every metric, they understand that they need to set the right targets focused on end-to-end supply chain performance, and then consciously

design and manage the tradeoffs they will need to make to achieve those goals.

thing is; instead, it’s about where things broke down in the system, how to fix them, and then how to take it to the next level. They are ruthless in constantly examining their own processes to push the envelope of performance. (Exhibit 4 shows the Performance Measurement Maturity Matrix.)

PepsiCo is a great example of this. Embedded in the organization’s DNA is a culture of challenging and questioning the status quo: constantly improve, and then improve some more. When you’ve reduced time and cost and increased service as much as you can, when you’ve improved down to the “theoretical absolute” and you’ve hit the physical limitations of the existing process, you don’t stop. You keep asking: How else can we do it? For example, in the beverage business, sanitation of the bottle is hugely important and represents a big chunk of the cost both in dollars and in the environmental impact on water. After endless cycles of improvement, PepsiCo asked themselves, why use water at all? The result: they switched to ionized air to sanitize the bottles,

design and manage the tradeoffs they will need to make to achieve those goals.

Raising the Bar for All

At its highest level, the goal of the Supply Chain Top 25 research has always been to raise awareness of the supply chain discipline and how it impacts business. By identifying the leaders—that is, companies that are

Embedded innovation is a tactic that the best supply chain organizations use to more quickly and reliably convert better products into higher profits for the business.



pushing the envelope of supply chain innovation—we hope to consistently highlight the best practices from which others can learn, thereby raising the bar for the supply chain profession as a whole. The ongoing discussion and debate about what excellence really means and how we as a supply chain community should measure and recognize it helps to clarify and illuminate what it takes to get to the next level. ∞

THE GREENING *of* WALMART'S SUPPLY CHAIN...

By Erica Plambeck and Lyn Denend

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In 2007, SCMR featured an article on Walmart's burgeoning sustainability program, focusing on eight specific initiatives being undertaken at the company. Four years later, the author of that article, Erica Plambeck of Stanford, and colleague Lyn Denend revisit those initiatives to assess what Walmart has accomplished to date—and what still needs to be done.

Walmart made headlines in 2005 when its CEO, Lee Scott, announced that the company was launching a new business sustainability strategy designed to meet three sweeping environmental goals: to be supplied 100 percent by renewable energy; to create zero waste; and to sell products that sustain people and the environment.¹ Achievement of these goals would require fundamental change in how Walmart managed its supply chain

To guide that change, Walmart convened “Sustainable Value Networks” of stakeholders, including non-governmental organizations (NGOs), policy makers, eco-friendly competitors, academics, and suppliers. These SVNs, which are organized to align with the company’s overarching sustainability goals, have evolved over time (see Exhibit 1). Their goal was to scrutinize the environmental performance of the company’s extended supply chain, suggest improvements, and help implement new ways of working.

In an article for *Supply Chain Management Review* (see “The Greening of Walmart’s Supply Chain,” July/August 2007), we outlined these eight key practices that Walmart adopted to “green” its supply chain:²

1. Identifying goals, metrics, and new technologies.
2. Certifying environmentally sustainable products.
3. Providing network partner assistance to suppliers.
4. Committing to larger volumes of environmentally sustainable products.
5. Cutting out the middleman.
6. Restructuring the buyer role
7. Consolidating direct suppliers.
8. Licensing environmental innovations.

In combination, these practices have created substantial business value for the company. First, they have led to cost



Daniel Guidera

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reductions, notably through improved energy efficiency. Second, they have introduced new sources of revenue. For example, while the company used to spend \$16 million a year to haul plastic waste from its stores to landfills, it now pelletizes and sells the plastic to its packaging suppliers, which adds \$28 million a year to its bottom line. Third, they provide assurance of supply. When the Chinese government threatened to shut down a number of textile dye houses to reduce pollution before the 2008 Beijing Olympics, Walmart enlisted one of its new NGO partners to help a supplier imme-

diately formulate a more environmentally-friendly process. Fourth, the company has gained greater voice with policy makers, providing input on legislation such as the Supply Star Act of 2010.³

Perhaps the greatest benefit to Walmart's going green has been a boost in public relations, which helps the company secure permission to open new stores and increases sales in its existing locations. According to Covalence, an organization that measures the ethical reputation of companies by cumulating their positive and negative news coverage, Walmart's reputation

EXHIBIT 1

Walmart's Sustainable Value Networks

	2007	2010
Renewable Energy	<ul style="list-style-type: none"> • Global Greenhouse Gas Strategy • Alternative Fuels • Energy, Design Construction and Maintenance • Global Logistics 	<ul style="list-style-type: none"> • Global Greenhouse • Alternative Fuels • Sustainable Buildings • Logistics
Zero Waste	<ul style="list-style-type: none"> • Operations and Internal Procurement • Packaging 	<ul style="list-style-type: none"> • Waste • Packaging
Sustainable Products	<ul style="list-style-type: none"> • Textiles • Electronics • Food and Agriculture • Forest and Paper • Chemical Intensive Products • Jewelry • Seafood • China 	<ul style="list-style-type: none"> • Textiles • Electronics • Food, Agriculture and Seafood • Wood and Paper • Chemicals • Jewelry

Source: Walmart

was negative and steadily declining prior to the launch of the sustainability strategy.⁴ In 2009, just four years later, Walmart's reputation was ranked third among 35 multinational retailers (up from last place in 2007).⁵ The company is now the subject of more positive than negative coverage, led in large part by affirmative press on its sustainability-related activities.

However, Walmart's reputational gains are at risk. The company is under increasing pressure from its environmental NGO partners to address the fact that its carbon footprint is still expanding (due to new store openings and other growth-related factors). Perhaps recognizing the importance of managing the public's perception of its sustainability effort, Walmart formally moved the program under its corporate affairs and government relations function.

When Lee Scott retired and many of the other sustainability leaders moved on to different roles, some wondered if this would negatively affect the company's commitment to greening its supply chain. Yet, sustainability appears to be alive and well at Walmart. Most notably, in February 2010, Scott's successor, Mike Duke, committed to eliminate 20 million metric tons of greenhouse gas (GHG) emissions (the amount of Walmart's direct emissions in 2010) from the company's global supply chain by the end of 2015.

Walmart also has taken steps to globalize its efforts.

Back in 2007, a network team at the company's headquarters in Bentonville, Arkansas was charged with coordinating an approach to address the sustainability of Walmart's 20,000 Chinese suppliers and vast numbers of related stakeholders amid China's complex political environment. When this didn't work, the company transferred all China-related sustainability activities to that country and empowered its local business leaders to take ownership for making their stores and suppliers more sustainable. At the kickoff, known as the Beijing Sustainability Summit, Walmart challenged its top 200 suppliers to improve the energy efficiency of their factories by 20 percent per unit of production by 2012. (Exhibit 2 shows the other goals introduced at the summit). Similar activities in other countries resulted in the spread of the sustainability strategy to Walmart's major locations around the world.

In 2010, in addition to catching up on Walmart's most recent activities, we had the opportunity to re-evaluate the eight practices listed above that Walmart originally adopted to green its supply chain. Most, though not all, are still being used. Some required adjustments. Others have been strengthened and expanded throughout the organization.

1. Identifying Goals, Metrics, and New Technologies

NGO partners like the Environmental Defense Fund (EDF) continue to provide valuable assistance to Walmart in managing its supply chain—for free. EDF is willing to invest substantial resources in helping Walmart in exchange for the opportunity to influence the company to adopt aggressive goals, such as its target to eliminate 20 million metric tons of GHG emissions from its global supply chain. EDF played a central role in shaping this goal and convincing Walmart that it would be feasible. Additionally, it is helping the company achieve the target by working collaboratively with Walmart's top 200 suppliers in China to improve the energy efficiency of their factories as outlined at the Beijing Summit.

Walmart continues to invest significant time, money, and effort into figuring out how to measure sustainability and track progress toward its goals. At the most basic level, the company has gotten all of its direct suppliers in the U.S. across all of the SVNs to complete a supplier sustainability assessment known as the "15 questions." These questions cover supplier performance on metrics related to energy and climate, material efficiency, natural resources, and ethical production, as shown in Exhibit 3. According to Rand Waddoups, senior director of the sustainability core team in 2010, "They're very valuable.

EXHIBIT 2

Beijing Sustainability Summit Goals

Social and Environmental Compliance

All direct import, nonbranded and private label suppliers must declare that their factories are compliant with local social and environmental regulations by the end of 2011. By 2012, all direct import suppliers must source 95 percent of their production from factories that receive one of Walmart's two highest ratings in audits for environmental and social practices.

Transparency

By the end of 2009, all direct import suppliers, as well as private label, and nonbranded product suppliers must disclose to Walmart U.S. the name and location of every factory they use to make the products Walmart sells.

Safety and Quality

Walmart will work with suppliers to drive customer returns on defective merchandise to less than 1 percent by 2012.

Energy Efficiency

Walmart will partner with suppliers to improve energy efficiency by 20 percent per unit of production by 2012 in the top 200 factories in China from which the company sources directly (against a 2007 baseline).

Source: Drawn from "Walmart Global Sustainability Report: 2010 Progress Update," <http://cdn.walmartstores.com/sites/sustainabilityreport/2010/WMT2010GlobalSustainabilityReport.pdf> (October 12, 2010).

In one sense, they help direct the suppliers so that they know what's important to get started on. They also give us a really good ability to understand who's learning how to be transparent. And, finally, they help us recognize who's leading and who's lagging."

Transparency is essential for Walmart to identify and address environmental impacts. With better information, the company can also rationalize its supply chain and reduce costs. For example, Walmart has gathered data on the ingredients, country of origin, and supplier's suppliers for all 6,000 of its private brand products. In its private brands operations, the scorecard for suppliers gives points for transparency and other sustainability-related activities, such as carbon and waste management, in addition to traditional considerations like financial performance, quality, and on-time delivery. The scorecard is used to allocate business as well as to determine which suppliers the team should engage with at a strategic level, which could benefit from coaching, and which require more serious development.

Within and outside of private brand operations, Walmart has conducted lifecycle analyses (LCA) of the environmental impacts of some of its products. Yet it has found this process to be time consuming, expensive, and fraught with complexities. Convinced that the industry as a whole could benefit from having common LCA data and standards for communicating impacts to consumers,

the company initiated the creation of the Sustainability Consortium—a collective of manufacturers, retailers, NGOs, and universities working together to develop the science behind a system for measuring the environmental and social impacts of consumer products throughout their lifecycle. The consortium, which is led by experts from the University of Arkansas and Arizona State University, was started with \$2 million in seed funding from Walmart. Over time, providing such information

EXHIBIT 3

Walmart's 15 Questions

Energy and Climate: Reducing Energy Costs and Greenhouse Gas Emissions

1. Have you measured your corporate greenhouse gas emissions?
2. Have you opted to report your greenhouse gas emissions to the Carbon Disclosure Project (CDP)?
3. What is your total annual greenhouse gas emissions reported in the most recent year measured?
4. Have you set publicly available greenhouse gas reduction targets? If yes, what are those targets?

Material Efficiency: Reducing Waste and Enhancing Quality

5. If measured, please report the total amount of solid waste generated from the facilities that produce your product(s) for Walmart for the most recent year measured.
6. Have you set publicly available solid waste reduction targets? If yes, what are those targets?
7. If measured, please report total water use from facilities that produce your product(s) for Walmart for the most recent year measured.
8. Have you set publicly available water use reduction targets? If yes, what are those targets?

Natural Resources: Producing High Quality, Responsibly Sourced Raw Materials

9. Have you established publicly available sustainability purchasing guidelines for your direct suppliers that address issues such as environmental compliance, employment practices and product/ingredient safety?
10. Have you obtained third-party certifications for any of the products that you sell to Walmart?

People and Community: Ensuring Responsible and Ethical Production

11. Do you know the location of 100 percent of the facilities that produce your product(s)?
12. Before beginning a business relationship with a manufacturing facility, do you evaluate the quality of, and capacity for, production?
13. Do you have a process for managing social compliance at the manufacturing level?
14. Do you work with your supply base to resolve issues found during social compliance evaluations and also document specific corrections and improvements?
15. Do you invest in community development activities in the markets you source from and/or operate within?

Source: "15 Questions for Suppliers," Walmart, walmartstores.com/download/3863.pdf (October 11, 2010).

to consumers could create an advantage for private-label brands within a product category by allowing consumers to see similarities, or perhaps even superior environmental performance, for the private-label products relative to higher-priced national brands.

In the chemicals SVN, Walmart is leading the development of a database for capturing and analyzing the ingredients of every chemical-based product on the company's shelves. The tool—called GreenWERCS—screens product ingredients against a list of 3,800 chemicals that are known mutagens, carcinogens, or persistent biological toxins. If any red flags come up,

Walmart continues to invest significant time, money, and effort into figuring out how to measure sustainability and track progress toward its goals.

the supplier can find out exactly what chemical(s) caused the problem and use the tool to explore reformulations to eliminate it. Walmart's buyers can also see which products contain chemicals of concern and can use that information when making buying decisions. According to Elizabeth Sturcken of EDF, whose organization is working with Walmart on the initiative, the data available from GreenWERCS is causing suppliers to become more innovative and motivated to make their products safer. "They're seeing a business opportunity to sell more to Walmart if they can show that their products don't contain some of these chemicals of concern," Sturcken said.

An ongoing challenge is to verify the validity of the new information gathered through these measurement tools. For instance, with GreenWERCS, all information is self-reported by suppliers and, in 2010, Walmart did not have a robust mechanism in place to audit its accuracy. "We need a validation process... with a sufficiently onerous penalty that there's no benefit to lying about your product," noted Michelle Mauthe Harvey of EDF. Such a system would not be difficult to put into place, but it could get expensive. The question is whether Walmart would be better off investing in auditing systems vs. directing resources toward helping suppliers improve their product design and production processes.

2. Certifying Environmentally Sustainable Products

By participating in certification programs for the sustain-

able management of natural resources, such as fish or timber, Walmart gains third-party verification of environmental performance while sustaining the resource and improving the company's assurance of future supply. Certification also increases transparency. For example, Walmart achieves visibility of the entire chain of custody—from boat to plate—with the certification of its wild-caught seafood by the Marine Stewardship Council (MSC).

While the value of certification continues to outweigh its costs to Walmart, these programs are not without their challenges. As other major food retailers followed Walmart's lead in sourcing MSC certified fish, demand has significantly outstripped supply. As a result, MSC certified fish now costs up to 20 percent more than non-certified fish of the same type.⁶ However, Walmart cannot charge a premium for MSC certified fish because its customers generally do not recognize value in the MSC ecolabel.

Factors such as these have caused Walmart to shift its mix of seafood from nearly 70 percent wild-caught fish five years ago to roughly 60 percent farm-raised fish in 2011.⁷ Concurrently, the company has pursued certification for farm-raised fish using standards developed by the Global Aquaculture Alliance (GAA). Importantly, certification for farm-raised fish is faster and less expensive, which means there is little or no price premium associated with the product once it is certified. Moreover, certification requirements extend all the way back to the hatchery and include standards around the use of antibiotics and other issues related to food safety. So, in contrast to MSC certification of wild-caught fish, certification of farm-raised fish offers clear private benefits for consumers as they seek to make healthier eating choices.

3. Providing Network Partner Assistance to Suppliers

Walmart is still facilitating partnerships to help its suppliers realize desired results that, in turn, help the company achieve its goals. For instance, in China, the company is actively providing support to its top 200 factories as they strive to meet the energy efficiency goal set forth at the Beijing Sustainability Summit. As noted, Walmart has enlisted NGOs such as EDF and Business for Social Responsibility (BSR) to provide training and specialized expertise that is in short supply in China. According to Laura Ediger of BSR, these experts give the factories

“independent, credible advice to help them get started,” such as tips for making their boilers, air compressors, or lighting more energy efficient.

Since the goal was announced in 2008, more than 300 factory visits had been completed by teams of Walmart and NGO representatives. The good news, wrote Andrew Huston in a blog post on the subject, is that “The opportunities for improvement are even larger than we envisioned—it’s not unusual for us to find savings of up to 60 percent in many factories—and the payback periods for upgrades are absurdly short. We never recommend a project with a payback period longer than two years, and many of the recommendations we make have simple returns on investment of less than six months.”⁸

On the downside, continued Huston, Walmart is “famously frugal” in its quest for low prices and resources are always tight. As a result, the company has shown a tendency to pull people off of the project, leaving its NGO partners to fend for themselves, when issues more central to its own business arise. “In our estimation,” he concluded, “it would require only minimal additional human resources and a few key structural changes to knock this program out of the park and truly transform the way energy is managed in Chinese factories.”⁹

4. Committing to Larger Volumes of Environmentally Sustainable Products

Before launching its sustainability strategy, Walmart rarely made long-term quantity commitments; it began doing so to drive suppliers toward more sustainable practices. For instance, in 2006, it made a five-year verbal commitment to a group of farmers to buy their organic cotton. This long-term, high-volume commitment was meant to assure the company’s supply of organic cotton and eliminate the risk of these farmers reverting to faster, easier, and less expensive non-organic practices.

Similar commitments were used to encourage suppliers to invest in green innovations. As Andrew Ruben, executive vice president of private brand operations, explained: “It could be moving to a different packaging that, at scale, will have a lower cost. But to get from here to scale might require an investment that takes two and a half or three years to pay off. Offering a two-year commitment gives a supplier enough incentive to make the investment.” Consistent with its focus on low prices, Walmart generally prefers using quantity commitments to paying premiums as a way to motivate suppliers.

5. Cutting Out the Middleman

When Walmart made the decision to buy organic cotton directly from farmers, there was a big push within the company to eliminate intermediaries in the supply chain. However, by 2011, the company did not intend to renew its cotton commitment as it had decided to once again delegate the procurement of cotton as a raw material to its tier-one textiles suppliers. Matt Kistler of Walmart, who replaced Ruben as leader of the sustainability strategy, explained how the company was now taking a slightly more selective approach. “Unlike coffee

Walmart’s business value from going green includes supply chain cost reduction, new sources of revenue, assurance of supply, voice with policy makers, and greatly improved public relations.

or apples, we don’t sell cotton as a product,” Kistler said. “We sell coffee. We sell apples. But we don’t sell cotton. So buying a commodity that Walmart does not sell directly to its end consumer may not yet be something that Walmart is best suited to work in first. But I will say that the learning experience we got out of cotton has now propelled us a lot farther and faster in other areas where we’re actively buying directly.”

In China, for example, Walmart has initiated a direct farm program, which seeks to directly engage one million farmers. Through this effort, the company hopes to improve food freshness and reduce costs by eliminating intermediaries and inefficiencies in the supply chain. According to Beth Keck, senior director of sustainability: “The farmer is getting a better price and better income. The customers are getting their fresh produce at a better price. We’re making more money on it. And, most important, when it comes into the distribution center, we’re able to add another layer of food safety testing onto the fresh produce because that’s been a big concern in China; and then work with the farmers to help bring them under the government standards and labeling system, which gives our customers more confidence as well.”

6. Restructuring the Buyer Role

In 2007, the textiles SVN experimented with redesigning its buying roles to facilitate more effective supplier relationship management. Rather than continuing to have buyers work as generalists across the product category,

the network leaders created a team-based approach that allowed individuals to specialize in one of four key areas: merchandising (buying), product development, sourcing, or planning/execution.

Walmart indicated that it was rolling out similar changes across the organization in 2010. However, while one of the explicit objectives in the textiles network was to allow some members of a buying team to stay in their roles longer, this did not appear to be the

Walmart is under increasing pressure from environmental NGO partners to address its expanding carbon footprint.

case with the larger company-wide restructuring. Many of Walmart's buyers still rotated into new product areas every 12 to 18 months.

"Normally this would frighten the supplier base," noted Manish Kumar, CEO of The Fishin' Company, one of Walmart's primary tier-one seafood suppliers, "especially the folks who are selling the most because we've got the most to lose.... The new people come in with different personalities and different backgrounds and you've got to convince them all over again." However, as suppliers help bring the new buyers up to speed in a competitive business environment, Kumar explained that the turnover can actually work in their favor. New buyers increasingly look to their suppliers for the specialized expertise needed to ensure that a product continues to be procured in the most efficient, cost effective manner. "We're not really selling them anymore," he said. "We're co-managing the business."

7. Consolidating Direct Suppliers

By consolidating its direct suppliers, Walmart initially planned to make stronger incentives available to a relatively smaller number of companies to drive improvements in their environmental performance. Today, the opportunity to earn more of Walmart's business remains a compelling motivator. In addition to the obvious benefits, suppliers achieve reputational advantages that help them expand their business with other buyers.

According to Kumar, other retailers begin to "take note." He explained: "They say, 'This is a company that continues to get products on Walmart's end caps. There must be something about them; let's check them out.' And when I approach them, I've found it easier to engage in a conversation because they've seen our name out there. I won't lie—it's great to have your name on a

Walmart shelf. It gives you such great visibility in the marketplace."

Yet consolidation may shift power within the relationship from Walmart to the supplier. At the same time The Fishin' Company has become a bigger supplier to Walmart, Walmart has become a smaller percentage of The Fishin' Company's business. In parallel, as Walmart has entrusted Kumar and his team to help co-manage its seafood business and train its buyers as they rotate through the product category, his organization has secured an increasingly influential position in Walmart's supply chain. Fortunately for the environment, a more influential supplier may have a greater incentive to make investments that promote sustainability and long-run profitability for the supply chain as a whole.

8. Licensing Environmental Innovations

Walmart still encourages suppliers working on new environmental or supply chain innovations as part of the sustainability effort to consider licensing those new technologies. Through licensing, suppliers can generate additional revenue streams and realize a quicker payback on their investments (which helps keep costs down for Walmart). For instance, The WERCS will ultimately make its GreenWERCS tool available to other retailers with the company's blessing.

Walmart has also begun playing a more proactive role in promoting the spread of good ideas. In private brand operations, where the company has the most direct control over product design, the team is actively seeking to stimulate supplier innovation. According to Ruben, they target the top 15 to 20 percent of their suppliers and bring them together in non-competitive working groups. "So it could be a poultry supplier... a dish soap manufacturer... [and] a vitamin supplier. People who have similar challenges in the industrial model, but they have non-directly competing commercial interests," Ruben said. "We're getting people to work together in non-competitive groups to invent."

The first step in the process is achieving visibility of important problems and where improvements can be made through lifecycle analysis and the identification of sustainability "hot spots." The second step is getting experts to come in and help the suppliers solve these problems. "For example, we might have Environmental Defense Fund come help a dog food manufacturer related to a certain ingredient or to a plastic or a type of resin," he explained. The third step is to monitor the

changes and establish feedback mechanisms to make sure they have the intended effect.

What Else is New?

In addition to these eight supply chain practices Walmart has begun to branch out in other directions. Notably, it has started partnering more extensively with other buyers as it has recognized that many environmental impacts are deep in the supply chain, below tier one. In these areas, Walmart accounts for only a small fraction of a supplier's business and a coalition is necessary to effect meaningful change.

For example, through lifecycle analysis, Walmart discovered that soap was responsible for an alarming level of GHG emissions, primarily due to the palm oil it contains, which is linked to large-scale tropical deforestation in countries such as Indonesia. Walmart made a public commitment in October 2010 to use only 100 percent certified sustainable palm oil in its private label products in the U.S. and the U.K. by 2015. In doing so, the company expected to reduce greenhouse gas emissions in its supply chain by 5 million metric tons in the same timeframe. To make this happen, the company is working with suppliers such as Cargill, the primary source of palm oil in the products it purchases. However, the palm oil-based products sold by Walmart represent only a fraction of Cargill's total business so the strength of Walmart's bargaining power remains to be seen. Moreover, Cargill accounts for an even smaller percentage of global palm oil demand.

In terms of catalyzing widespread change, Walmart's leadership position in this arena could simply result in a reshuffling of suppliers (with environmentally responsible sources supplying Walmart and less responsible sources supplying companies that care less about deforestation) unless other retailers also demand sustainable palm oil. To begin addressing such risks, the company's ASDA division in the U.K. is a member of the Unilever-Greenpeace Sustainable Palm Oil Coalition, which helps buyers move toward sustainable sources for palm oil. Beyond this, the company appears to be in the process of defining a cohesive strategy.

Much Work Ahead

Through the supply chain practices discussed in this article, Walmart continues to make real progress on its sustainability strategy. Moreover, the company is extracting considerable value from its new ways of working that can be replicated by other retailers and suppliers to achieve similar benefits.

However, the unfortunate fact remains that change of an entirely different magnitude is necessary for envi-

ronmental sustainability. To make an 80 percent reduction in anthropogenic GHG emissions before 2050, as advocated by a majority of climate scientists and delegates to the 2009 Convention of the United Nations Framework Convention on Climate Change, new policies are needed in the U.S. and abroad to give Walmart and others financial incentives for driving more dramatic change. The human health and environmental impacts of chemicals are less well understood but likely of importance commensurate to climate change. New chemicals policies, such as REACH in the EU, will also spur dramatic changes in supply chain management. ☞☞

Endnotes

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Achieving Flexibility in a VOLATILE WORLD

By Reinhard Geissbauer and Brad Householder

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New global survey from PRTM confirms the importance of operational flexibility in supply chain success and identifies five key levers that leaders employ to make it happen. The financial and performance benefits of improved flexibility can be profound. And companies can start realizing those benefits, by taking the basic steps outlined here.

For many years, conventional wisdom defined supply chain management as a quest for the lowest possible price, the leanest processes with the shortest throughput time, and the lowest level of risk. But, over the last three years, global supply chain managers have experienced a paradigm shift: Economic, business, political, and even geological factors have led to unprecedented volatility and uncertainty. In this new business world, supply chain flexibility is not just a source of competitive advantage—it is fundamental to staying in business. Today, the supply chain manager's mission is to meet customer needs, despite unpredictable swings in customer demand and the availability of resources.

Between 2008 and 2011, the community of global supply chain managers has seen dramatic shifts in focus from a strong push for growth (2008) to managing the implications of the economic crisis (2009), which required full focus on cash control and survival. Then, in 2010, optimism returned and companies put growth back on the agenda. We expect that 2011/2012 will find many executives wondering why revenue growth cannot be faster—and how natural disasters like 2011's devastating Pacific Rim earthquakes will affect both operations and sales.

As a result, volatility has become the “new normal” for global supply chains. Cost control and efficiency will always be important, but, from now on, companies won't be able to reap the rewards of efforts on those fronts unless they can build real flexibility into their processes.

In preparing PRTM's 2010–2012 *Global Supply Chain Trends* report last year, we noticed that attention to flexibility



has, in fact, become a constant. Hence, in the spring of 2011 we conducted a follow-on study dedicated to explaining which levers can increase supply chain flexibility, as well as what leading companies are doing differently from their industry peers. Drawing from interviews conducted with 150 global executives across a broad range of industries, we have identified five key levers, which are discussed in detail below.

Operational Flexibility Defined

Before examining those levers, it's important to explain what we mean by operational flexibility. Supply chain practitioners across industries understand the need for flexibility. However, when we talk about "flexibility"

here, we do not mean recovery after a one-time crisis (like the Japanese earthquake of 2011), or a heroic effort from especially hard-working and talented employees. Flexibility is not about good "firefighting," nor does it involve doing everything faster than last year. It is a different way of doing business: When a company is able to keep customer lead times stable despite demand spikes and supply disruptions, that company is flexible.

Our definition of flexibility as it relates to supply chain management is called *operational flexibility*: The ability to rapidly adapt to changes in customer demand or internal/external supply by ramping up or down internal and partner operations. Operational flexibility involves the entire supply and demand chain—from product launch to end-of-life management, with interaction points at every stage of the product life cycle. We see true operational flexibility as a strategic objective, built into processes and planning, and supported by experienced professionals and sound investments.

The Five Key Levers

Operational flexibility is easier to discuss than it is to implement. What separates the companies that lead the way from those that simply use the buzzword and hope for the best? Our 2011 survey identified five key levers that leading companies are already implementing.

1. Focus on supply assurance and proactive capacity management for critical resources

The large majority of survey respondents—more than 70 percent—regard supply assurance management as the most important lever for boosting operational flexibility (Exhibit 1). Supply assurance entails establishing partnerships with key suppliers based on long-term commit-

During the last three years, many companies were overwhelmed by the magnitude of demand and supply volatility. Consequently, they tended to focus on short-term priorities, applying approaches that worked in the past.

ments. Our study found that flexibility leaders work with key suppliers to develop a preferential delivery schedule in case of capacity restraints, as well as processes that have maximum upward and downward volume flexibility. These leading companies also communicate real-time demand and guarantee orders in a pre-defined volume band to their supply base. Moreover, they secure supply for critical material groups in multiple geographic regions to ensure reliability.

For flexibility leaders, supply assurance goes well beyond the four walls of the enterprise. It includes the entire partner network—providers of material, labor, and equipment—to ensure a stable supply response to changes in customer demand. Leading companies are prepared to go into crisis mode at a moment’s notice, and many have standing “war rooms” to cope with major disruptions. With working capital limits, both in-house and at suppliers, this is a complex task—but essential for staying ahead of the competition.

Despite the criticality of supply assurance and proactive capacity strategies for flexibility, nearly half of respondents have not yet fully implemented these levers. A third of the companies report that they have not focused at all on this lever.

2. Relentlessly engage in collaborative end-to-end demand and supply planning

The crisis of 2009, the upturn of 2010, and the challenges of 2011 have underscored the vital importance of effective demand and supply planning. Our research shows that this capability separates industry laggards from leaders. Leaders have already improved their planning capabilities. These companies do real-time planning and execution tightly focused on critical resources, and effective modeling of scenarios for rapid response to high demand volatility and major supply disruptions.

To battle volatility, companies have applied a variety of planning practices. Until recently, planning approaches focused predominantly on understanding market and demand signals to determine what level of supply was appropriate. During the past few years of crisis and

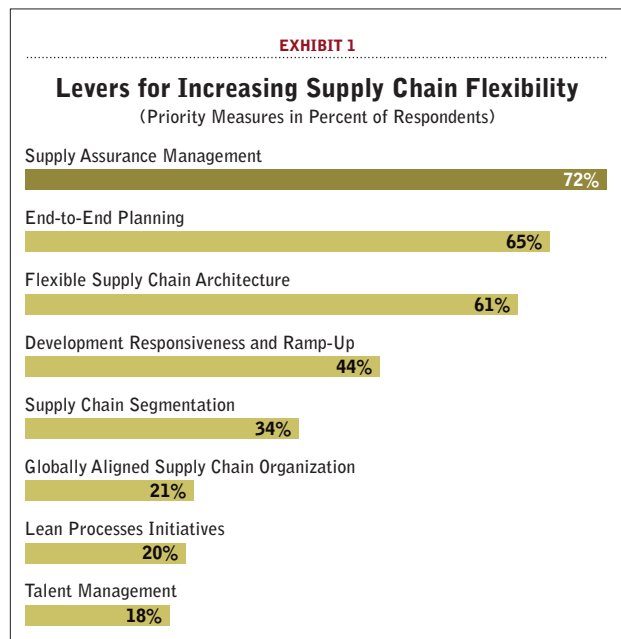
recovery, companies devoted even more effort to “getting closer to their customers.” Supply chain leaders established end-to-end, real-time demand and supply planning with both key customers and suppliers.

Collaborative forecasting or joint planning of key supply chain parameters allows for faster and more informed decision making. As a result, companies can anticipate

ups and downs in demand and adjust product or supply availability accordingly across all supply chain partners. Collaborative forecasting, executive sales and operations planning, or real-time demand planning are being implemented on average by more than 50 percent of the companies surveyed (Exhibit 2). However, more than 20 percent of respondents said their companies have not even started to execute key end-to-end supply chain initiatives.

A truly connected and timely flow of planning information within and between customers, suppliers, and the company itself is no longer a “nice to have” capability—it is clearly a key ingredient for flexibility and, therefore, for long-term survival. For example, leading companies now select key materials or products at Tier 1 and Tier 2 suppliers, and target them for specific forecasting and planning.

On the demand side, leading companies focus their planning efforts on products in different customer segments that require guaranteed lead times and are indicators for changing demand patterns.



3. *Tightly integrate and coordinate their own and their partners' supply chain architectures*

Another key lever for operational flexibility is the proactive management of a company's supply chain architecture, including the architecture of customers, key suppliers, and other supply chain partners. Optimized supply chain architectures define how the various supply chains in the extended enterprise play together as an integrated whole. True supply chain flexibility occurs only when organizations can make the necessary alignments and partnerships work across the extended supply chain.

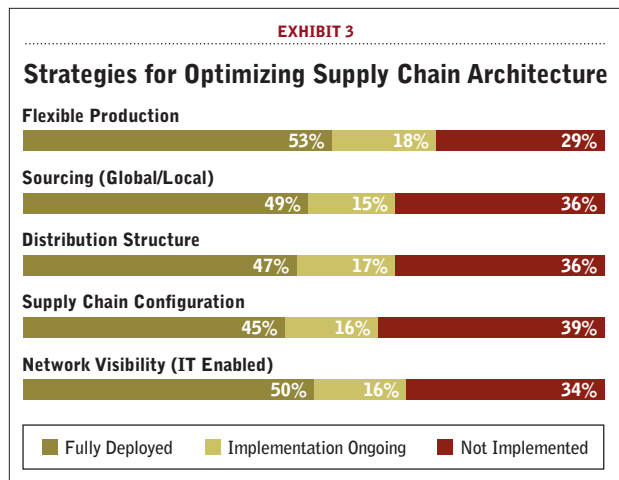
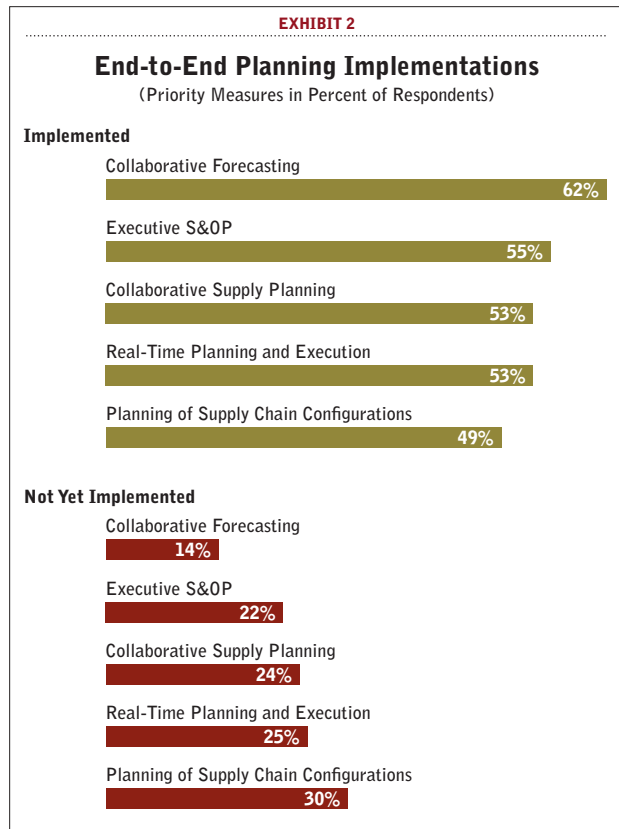
Most companies clearly see what needs to be done, and have moved in the right direction internally (Exhibit 3). Approximately 71 percent of survey respondents are working on setting up flexible production and assembly facilities; many companies are developing flexible shift models to quickly ramp-up or ramp-down their supply chain capacities. And 61 percent of respondents have implemented measures, either fully or partially, to increase flexibility of their overall supply chain configuration.

However, integration with key suppliers, partners, and customers is generally less advanced. More than a third of respondents reported issues with their key suppliers' architecture, and a nearly equal proportion found major gaps in their customers' architecture as evidenced by the customers' ability to jointly react to changes in demand.

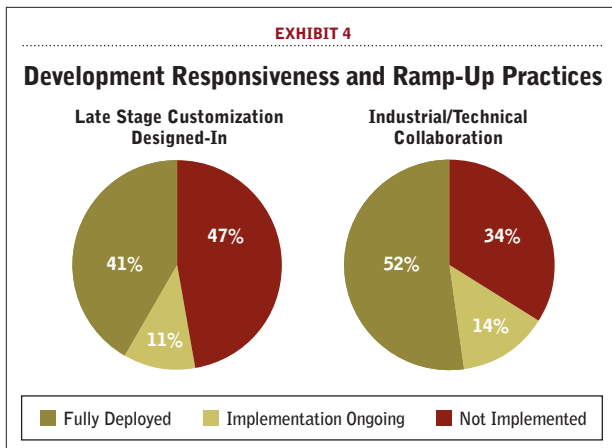
While many organizations use the Supply-Chain Operations Reference-model (SCOR) to describe their supply chain architecture today, few integrate customers and suppliers into the overall supply chain architecture of the extended enterprise. But flexibility leaders are working to expand their supply chain architecture to include design and engineering setup, manufacturing facilities in various regions, and logistics and service structure. Leaders also ensure that all players in the global extended enterprise network measure themselves according to jointly agreed upon performance standards—key to achieving maximum flexibility while mitigating performance and cost risks.

4. *Tear down the wall between supply chain and product development*

The survey found that companies on the whole have gained flexibility by reaching across walls to collaborate with customers and suppliers. In today's environment, however, this is clearly not enough. The key differentiating lever in a faster time-to-market environment is the ability to master new product introduction and product retirement across very diverse customer markets. Half of our survey respondents understood this need and invested



in higher development responsiveness (Exhibit 4). Supply chain flexibility leaders in particular realize that accelerating ramp-up and ramp-down of products requires integrating product development and supply chain activities from the onset. They take pains to establish cross-functional teams that are engaged with the product “from cradle to grave”—defining product requirements across the entire life cycle and planning for significant shifts in demand

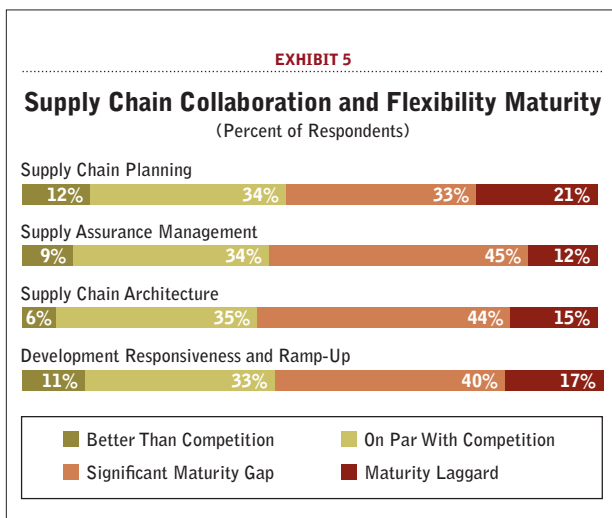


and supply availability.

Basic practices such as tighter management of engineering change orders and a focus on component reuse are critical as well. This joint approach marks a significant departure from the more common functional separation between product development, quality, procurement, supply chain, manufacturing, and service operations. A “win-win” collaborative setup includes joint consideration of product development, sales, and supply chain requirements.

5. Relentlessly drive superior collaboration and flexibility

While these four operational practices promote flexibility, they alone are not enough. True operational flexibility also requires the right mindset and a commitment from top management. Nearly all companies surveyed acknowledge the need to significantly improve operational flexibility. However, many supply chain managers complained



Study Methodology

One hundred and fifty senior executives participated in the 2011 Global Supply Chain Trends survey, which was conducted to gain insight into the ways in which leading companies have applied supply chain levers to become more flexible. Respondents represent a broad range of company size (24 percent having between \$1 and \$5 billion in annual revenues and 32 percent with revenues about \$5 billion annually). The survey population included organizations from diverse industries, with strong representation from automotive and industrial companies, consumer retailers, health care and pharmaceuticals, and the aerospace sector.

Supply chain leaders are defined as the top 20 percent of supply chain performers, while laggards are the bottom 20 percent. Companies were evaluated according to various quantitative criteria, including on time in full (OTIF) performance, supply chain cost, and supply chain flexibility. They were also assessed according to PRTM’s Supply Chain Maturity Matrix, which is based on SCOR. Leading companies are at maturity stage 3 or 4, with very mature processes and external supply chain partnerships.

that required investments—for example, for training employees in new processes—were often not approved.

Only 10 percent of the surveyed companies, on average, said their collaboration and flexibility practices were at a level of maturity that allows them to adapt their business models faster than the competition. Asked to rate their companies’ skills at supply continuity assurance management, for example, only 9 percent of respondents said they were better than their competitors.

According to our analysis, more than half of survey participants are at a level of collaboration and flexibility maturity that significantly lags behind the competition (Exhibit 5). During the last three years, many companies were overwhelmed by the magnitude of demand and supply volatility. Consequently, they tended to focus on short-term priorities, applying approaches that worked in the past.

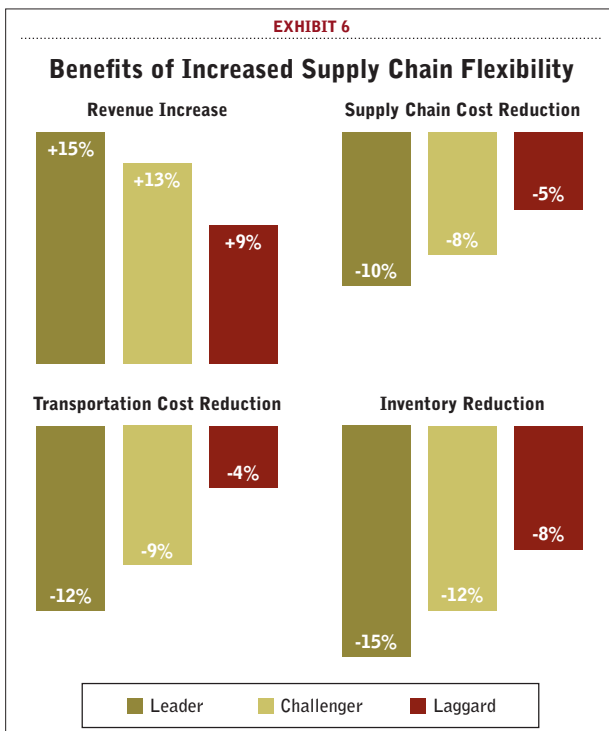
Leading companies, by contrast, met the challenges of volatility with a mid- or long-term perspective and investments that were warranted. They made operational flexibility a top management priority and secured support from managers across sales, engineering, and key supply chain functions. These companies have achieved effective supply chain planning and forward-looking supply assurance, setting up truly responsive supply chain architectures and improving development responsiveness and ramp-up. Not surprisingly, they have outpaced their competitors.

The Benefits of Improved Operational Flexibility

Significant investment is critical for achieving operational flexibility. Many supply chain executives report that their companies' need to invest in flexibility is at odds with their continued focus on reducing total supply chain costs. However, survey respondents indicate that focused investment in operational flexibility pays off, both in revenue realization and in cost savings (Exhibit 6).

Supply chain flexibility drives revenue and achievable sales margins. Based on the response of the survey participants, we conclude that operational flexibility helps improve revenue realization by up to 15 percent and cost savings by as much as 10 percent annually. Higher revenues originate from a company's ability to respond to significant demand upswings. In a volatile world, large orders do not depend solely on customer loyalty; a company's ability to deliver the required quantity to any global customer location on time is also critical.

Lower overall supply chain cost is driven by fewer supply risks, reduced working capital, better planning of inventories and logistics, and less time spent on expediting and crisis management. For example, supply chain leaders are securing the supply of critical raw materials or products in long-term commitments to ensure best prices and on-time delivery. They also do end-to-end supply chain planning to reduce inventories and free up working capital.



Designing a Multifaceted Supply Chain

A global leader in consumer health products was facing mounting challenges across numerous fronts. Its supply chain had to consistently deliver high volumes to big-box retailers, whether they operated in China, Europe, or the U.S. But it also had to respond rapidly and reliably to huge promotions that emptied shelves at the mega-stores. The same company competed in emerging markets, as well, where it served thousands of small mom-and-pop stores that required high turnover, small packaging, and constantly changing product variety. Adding to the pressure: Fierce competition from lower-cost private-label goods.

When the multinational company assessed its physical supply chain structure and its internal capabilities, it realized that both were based on an outmoded one-size-fits-all supply chain model. To win in the marketplace of the future, the company broke its network into four separate supply chains based on the differing characteristics of demand.

One could excel at meeting high-volume, stable demand in the U.S. and Europe with extreme levels of reliability. A second could respond to high-volume promotional surge demand. A third could adapt to low-volume, high-variety, high-volatility demand in emerging markets, where new flavors and packaging constantly changed. Finally, a fourth could roll out new products around the world rapidly enough to beat the inevitable private-label knockoffs that had been beating them to market in the past.

This multifaceted strategy led to completely different flexibility requirements for the four categories of demand. From that starting point, the company developed four distinct supply chain operating models, then defined the critical capabilities and the physical network required for each. The next challenge was to implement its roadmap, restructuring the network and improving the processes required to meet customer delivery expectations cost effectively, regardless of whether they came from a large Wal-Mart promotion or a new product launch in Asia.

Taking the Next Steps Toward Operational Flexibility

Many companies rush like firefighters to respond to volatility in supply and demand. The flexibility leaders, on the other hand, take a more balanced and strategic

Collaborating Farther Upstream in the Supply Chain

Now that demand was growing once again after the downturn, a dominant electronics equipment company faced a new problem—shortages of critical components were starving the supply chain and lowering revenues. Suppliers had either scaled back capacity or closed altogether during the global financial crisis. To complicate the situation, lack of visibility into the company's extended supply chain was making it difficult to find an easy solution. Critical component shortages continued.

The company adopted a two-phased approach to turn things around. As a stopgap measure to minimize the short-term impact, the company identified and prioritized the most critical bottleneck components and pulled out all the stops to shore up supply. But the company also realized it needed to make more fundamental changes over the long term to develop a supply chain that was flexible and responsive to uncertainties in demand.

It began with an end-to-end assessment of its extended supply chain and a benchmarking study to look at the flexibility practices of competitors. Both efforts highlighted gaps in how the company collaborated two to three tiers back in its supply chain. More flexible competitors had better visibility, tighter monitoring, and closer collaboration and control of their extended supply chains.

In response, the company put in place improved systems to enhance its visibility all along the supply chain; collaboration processes to enable joint decision-making with partners to better align supply and demand; and segmented supply chains tailored to the needs of different groups of products and customers.

The result: An improved ability to sense and respond to market needs in good times and bad.

approach. We believe that companies seeking to improve their operational flexibility can learn from these leaders. In particular, interviews with the leaders highlighted five principles they follow to achieve high flexibility. These principles serve as a valuable guide for taking the next steps toward greater operational flexibility:

1. Let your business strategy define your flexibility requirements. Leaders have a clear understanding of their basis of competition. They have an answer to the question, Will we be the leader on price, product performance, service, or flexibility? They define where,

when, and how much flexibility they require to meet the demands of critical customers and markets. For example, a leading consumer goods company evaluated its global strategies and determined it needed multiple supply chain types. See the accompanying sidebar “Designing a Multifaceted Supply Chain.”

To put this principle into practice, craft a statement about how you expect to win in your key segments and markets, and how flexibility will improve performance. Then translate that statement into the highest priority flexibility requirements to meet the demand characteristics of the markets and customers you serve. As you do, answer these questions: How much flexibility is required in the supply chain? How fast do we need to respond?

2. Design your supply chain architecture to meet your flexibility requirements. Many companies try to force flexibility into a physical supply chain structure that is incapable of delivering on that promise. Once leaders define the importance of flexibility to their business strategy, they next find out if their supply chain is physically up to the challenge. They use analytical models to test “what if” scenarios and optimize their processes.

To design flexibility into your supply chain, perform enough analysis to answer such questions as: Do we have distribution centers in the right places? Do we have the right supplier and manufacturing network? Do we understand the capacity bottlenecks and responsiveness levels of supplier and manufacturing networks several tiers back in the supply chain? Then build business cases based on the real value of flexibility in dynamic scenarios, not just a static base case.

3. Remove internal bottlenecks. Companies often race to collaborate with customers and suppliers, only to stumble when they find that the bottleneck lies inside their company. They lack the right planning skills, effective IT systems to share accurate forecast data with suppliers, or the ability to accurately translate customer forecasts into product requirements. A leading electronics equipment company, for instance, added tighter monitoring, control, and visibility across its extended supply chain to increase flexibility. (See the accompanying sidebar “Collaborating Farther Upstream in the Supply Chain.”)

Before you collaborate more intimately with partners, make sure your own house is in order. First, perform an assessment of your current operational capabilities. Then you can develop an improvement roadmap to fix the gaps where your internal capabilities limit external collaboration. We have found four stages of operational maturity that define companies

traveling the road to supply chain flexibility: administrator, challenger, leader, and champion. At the highest level, flexibility champions integrate strategies, targets, and performance metrics with important business partners and they involve suppliers, customers, engineering, and manufacturing in processes throughout the product life cycle.

4. Define your end-to-end collaboration relationship. Flexibility leaders establish the right collaboration level with their partners. They ask: Is our collaboration strategic, operational, or transactional? Once that collaboration level is defined, companies put in place a joint service agreement that documents how partners will interact, and the systems, processes, and metrics that will define success.

To do that, make sure to strengthen relationships at the right organizational level to match the type of collaboration you need. For example, with a strategic relationship, you typically review elements like product roadmaps, markets, and customer segments one to five years or more in advance, collaborating at a general manager to general manager level.

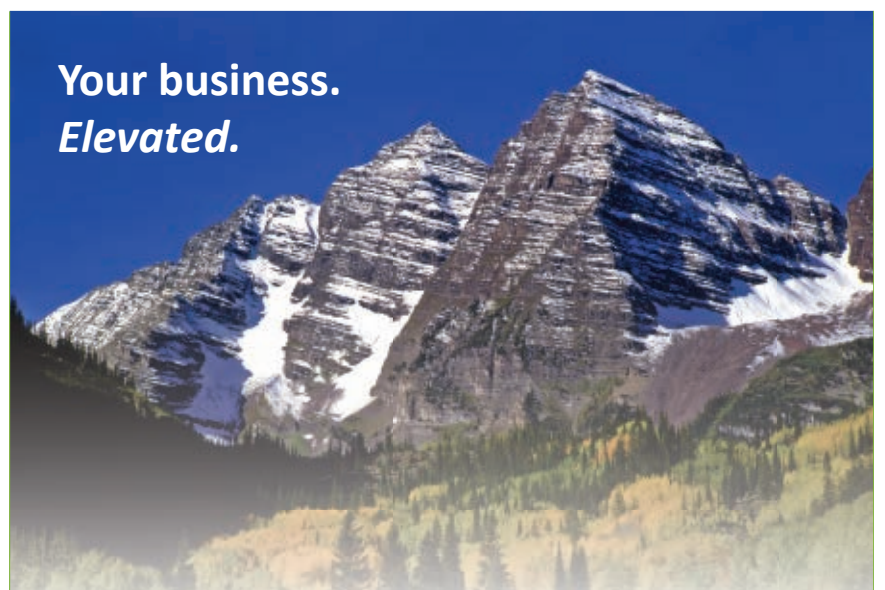
5. Continuously manage flexibility as a core element of your operational capabilities. Many companies make their supply chains more flexible only in response to a major disruption in supply or demand. But to prosper in today's volatile world, flexibility leaders engage in an ongoing process of assessment and improvement. They constantly evaluate the impact of their strategy and business environment on the supply chain, and they continuously upgrade their capabilities and increase their flexibility.

As a final step, review a documented flexibility roadmap quarterly or semiannually as part of your sales and operations planning process, and embed steps 1-4 in your periodic strategic planning process.

These best-practice actions define the difference between the leaders and the laggards in operational flexibility. For the leaders, flexibility becomes an integral part of the way they do business, and generates sig-

nificantly better top- and bottom-line performance. ∞

Authors' note: Also contributing to this report were Joseph Roussel, Jim Takach and Michael D'Heur, all with PRTM.






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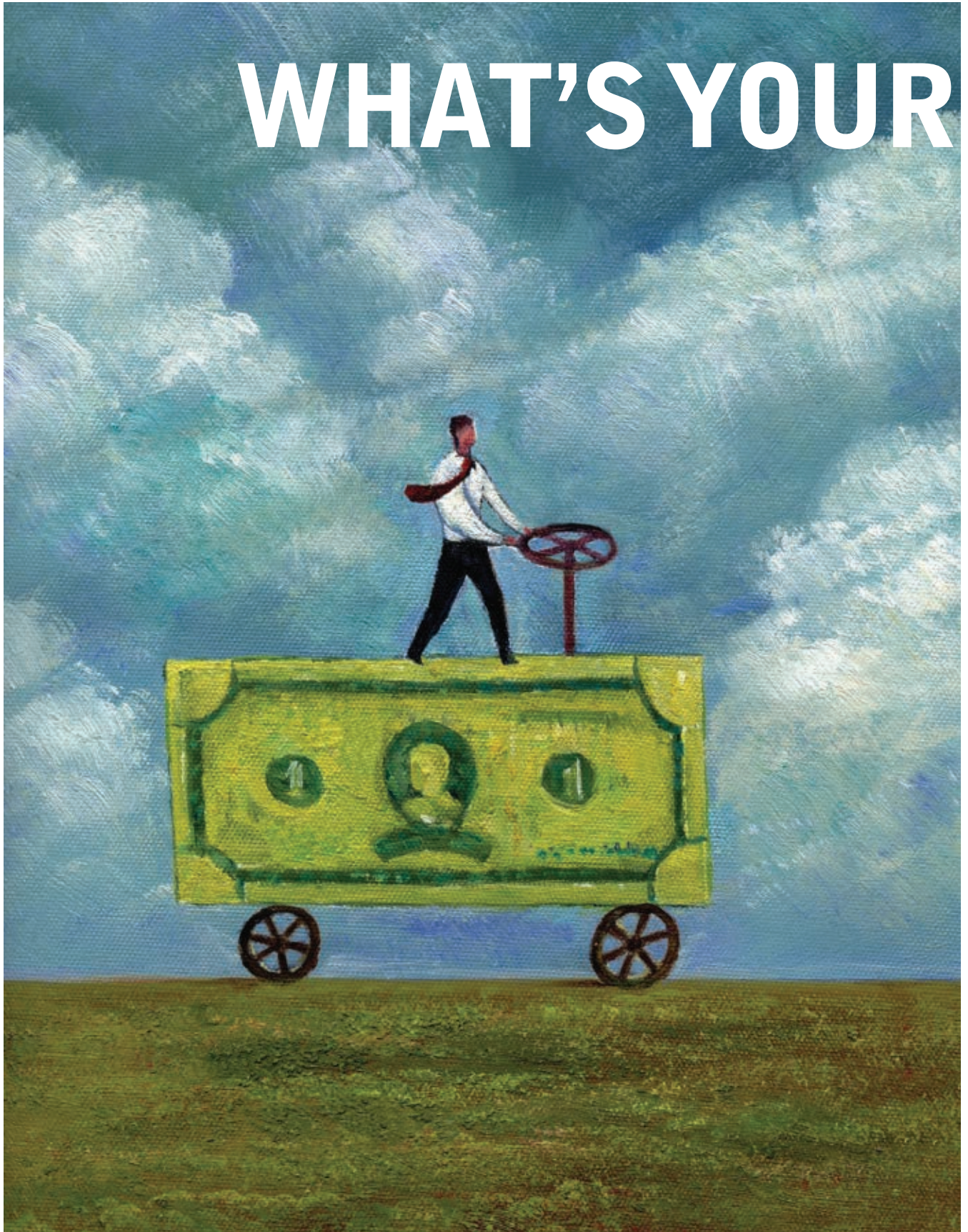
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WHAT'S YOUR



MOBILITY INDEX?

Mobile devices seem to be ubiquitous these days. So it's not surprising to hear all the talk about mobility in the supply chain. But what's the real potential of mobility in the key supply chain processes. And what's the best way to identify and tap that potential? Carefully determining your "Mobility Index" will go a long way toward answering these questions.

By Sumantra Sengupta

Sumantra Sengupta is a Managing Director with EVM Partners, a business advisory and strategic systems integration firm focused on the manufacturing and retail sectors. He can be reached at sumantra@evmpartners.com.

Recently, I was sitting in the audience listening to the CEO of a leading business intelligence platform provider deliver the keynote speech at his company's annual user conference. CEOs typically use the user conference as a vehicle for announcing a major launch—and this time was no different. This particular launch involved the deployment of reports and order management capabilities on the iPad. It all looked really cool and there was the obligatory audience applause.

Yet as I read the material provided, it became less and less clear how the deployment would drive business value in the core or extended supply chain for users. Was the benefit derived from receiving the information on a device that you could carry at all times? Or was the value in being able to understand the information as you made another mad dash to the next customer? Maybe it was the ability to change your business processes in the supply chain to enable better execution? Or was this just an IT-driven exercise that would involve millions of dollars spent in delivering

static old information on the go?

Despite my lack of clarity over the promised benefits, the CEO was certainly on to something. A recent study by ARC Advisory Group of supply chain executives showed that 69 percent were using smart phones as mobile technologies in their daily operations. Twenty-two percent said they were using their phones to scan bar codes and another 22 percent said they were using the devices to take pictures of receipts at the dock.

In fact, mobile devices, smart phones, iPads, "iEverythings" seem to have taken over our worlds. In the supply chain context, some of the promised benefits of mobility focus on potential reductions in freight and labor costs, better decision making via enhanced information sharing, and improved customer and consumer service levels thanks to the real-time responsiveness delivered via mobile capabilities. Mobility essentially enables the supply chain person to do his or her job anywhere or anytime.

Yet we believe that not all companies will benefit from mobility in the same way. In this article, we offer an approach for determining the impact that mobility (or "M")

will have on an organization. This approach is based on an analysis of business type and on the relative importance of mobility to the value chain “mega” processes—i.e., Plan, Buy, Make, Move, and Sell/Serve, which we derive from the Supply Chain Council’s SCOR (Supply Chain Operations Reference) model. Readers can use the resulting framework to gauge their Mobility Index, which can be used to determine how beneficial mobility can be for their supply chain.

Four Steps to the M Calculation

We suggest the following four steps to help you derive the M index calculation that is relevant for your business:

1. Identify your business segment according to its main operating principles: Make to Stock; Build to Order; Assemble to Order; Grow to Market.
 2. Determine the relative importance of the supply chain mega processes—Plan, Buy, Make, Move, Sell/Serve—to your business.
 3. Gauge the relative importance of mobility for each of these processes.
 4. Derive the “M” (mobility) index for your business segment by analyzing the results of steps 2 and 3.
- We discuss each step in detail below.

Step 1: Identify Your Business Segment

While thinking through the applicability of M to your business, you first need to examine the fundamentals of the business strategy that characterize your business/industry. Most manufacturing industries and businesses can be segmented into one (or in some cases a hybrid) of the following four segments:

- Make to Stock (MTS)—typically associated with consumer products, electronics, chemicals, health care (pharmaceuticals), automotive.
- Build to Order (BTO)—industries include construction, heavy manufacturing, aerospace and defense.
- Assemble to Order (ATO)—associated with high technology (hardware) and semi-conductor.
- Grow to Market (G2M)—agriculture is the main industry here.

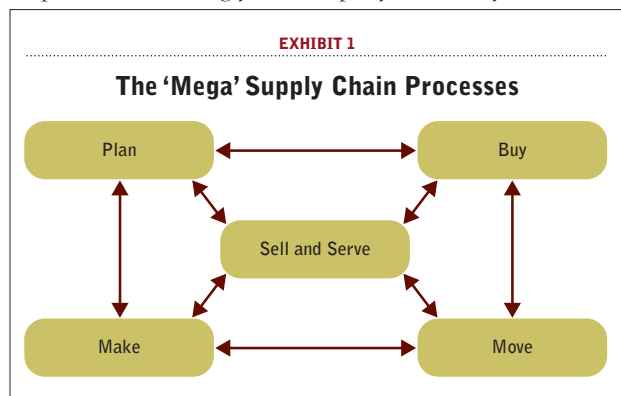
Every manufacturing-oriented business tends to fall into one of the above classifications in terms of getting product to market. In some cases, individual business units within an organization may fall into different segments. The degree of responsiveness required in the extended supply chain tends to vary by business segment. For instance, the faster the time-to-market and less stock buffer, the higher is the degree of responsiveness that can be absorbed/utilized in the business.

Also, we find that the main business processes are fairly homogeneous across all segments—that is, Plan, Make, Move, etc., all tend to accomplish the same end objective. The main difference is the relative importance of each process, which is driven by the business model of the particular segment.

Steps 2: Determine Relative Importance of Mega Processes to Your Segment

Step 3: Determine Relative Importance of Mobility for Each Process

We discuss Steps 2 and 3 together because of the close linkage of the mega processes and the importance of each process to each business segment. To guide our discussion, we use the supply chain process framework shown in Exhibit 1. Identifying the relative importance of each process to your business segment and the relative importance of M to each process are the essential steps in determining your company’s Mobility Index.



Plan: The planning function can be categorized into constructs around demand, supply, manufacturing, and distribution. This categorization of sub-processes requiring planning holds true regardless of the industry type, though the complexity will vary depending upon the business segment (MTS, BTO, and so on). We have found that in all of the segments there is an inherent process latency that is built into planning (one exception being real-time order promising). In many cases this latency varies between weekly and monthly (such as in the case of most MTS, ATO, and BTO environments). In some instances daily planning is necessary. However, the decisions made for that timeframe tend to be focused more on the rapid follow-through and execution of decisions made prior to the daily decision-making. Hence, the process latency should be used as a major indicator of the benefits that can be derived from utilizing and accessing data via mobile means.

In most cases of planning, we believe that mobility usage would focus largely on accessing data across platforms and locations as opposed to using the data to drive further responsiveness in the value chain. The exception to this rule would be in the order promising constructs in which the utilization of mobility (in terms of data accessibility and portability) would make the supply chain more agile while potentially lessening the latency in the value chain for that date-promising process. However, we should also note that data accessibility and portability will always come at an additional cost for IT infrastructure. Accordingly, the added cost should always be traded off against the purported benefit (more on that in a later section).

Buy: This function in every supply chain deals with the sub-processes involved in procuring the goods and services required for a company to perform its core business. For the purpose of this article, we can partition the function into its major processes of strategic sourcing, P2P (procure to pay) transactional support, and monitoring for compliance.

Strategic sourcing is the Buy sub-process in which a company balances its spend management for key products and services so as to continually improve baseline price and performance. This is often done via vendor rationalization or a material source shifts—i.e., moving closer to the source of material especially if it is a byproduct of another. As with the planning function, we posit that utilization of the M index would center on the accessibility of data across platforms and locations as opposed to using the data to drive any further responsiveness. You can always find exceptions to the rule, of course. One that comes readily to mind is using strategic sourcing as well as other parts of the supply chain mega processes in times of disasters and supply chain disruptions. (The recent events in Japan are testimony to that.)

Many corporations around the globe have optimized the sub-process of P2P transaction processing. Payment processing, for example, tends to be largely a non-strategic back office function in most companies. For this activity, using aspects of M would likely add unnecessary costs to a function that is already burdened with costs and tightly controlled.

Make: For many years now, academics and practitioners have been seeking to optimize the make (manufacturing) mega process. It is quite amusing to note that research on the job shop model with its billion variations still keeps academics up at night. I often wonder why

the work on operational optimization continues to be U.S.-centric, given that most manufacturing has migrated to the Asia/Pacific region. For the purposes of understanding the M index, we focus on the following Make sub-processes: shift scheduling; labor scheduling and management; traceability; and shop floor control.

Shift scheduling continues to be crucial for the stabilization of supply chain triggers and utilizing real-time data accessibility to manage around downtimes and

We believe that not all companies will benefit from mobility in the same way.

unforeseen outages. Mobility in this sub-process will add to the continuous improvement processes that tend to be in place in large corporations.

Labor scheduling and management within the operations center or plant is a large cost driver with enormous impact on COGS. Utilizing M constructs around data analytics to solve labor balancing problems in real time has the potential to add economic value in operations. Additionally, many plant operations have attached warehouses in which the same labor balancing construct can be applied (oftentimes that part of the cost tends to be classified under the distribution cost).

Product /Lot traceability has gained more prominence in recent years because of the myriad recalls that have occurred in the manufacturing and agricultural sectors. Traceability that is often mandated by Federal agencies has added cost to the affected companies while driving the use of remote sensing and monitoring technology that needs multiple sites for data collection and submission. In the agricultural industry, it is commonplace to find machines being used that are enabled with mobile printing and tracking technology for tagging and labeling produce as it is harvested from the farms. This data can then be remotely sent for analysis and logging to track field packaging at the lot levels; it also can be used to perform quality assurance and productivity analysis. This capability can further support the reverse logistics processes that may be required in given industries.

Shop floor control is one sub-process that has to operate in real time or near real time. This area has been managed quite well in automated facilities that utilize PLCs and end-of-line monitoring, optimization, or simulation capabilities. There are benefits to be gained by collecting and analyzing that data in real time. Yet the cost of deploying that across the portable platform in a ubiquitous manner far outweighs the potential benefits.

Move: The process of transporting and storing the physical goods to either the end consumer or to an intermediary channel partner has become more critical as fuel prices rise, carrier capacity tightens, and imports of manufactured products increase. For our discussion purposes, the major sub-processes of this Move function that are relevant to the M index include goods routing, labor management, dock and yard management, and inventory visibility.

The sub-process of *goods routing* covers the movement within an organization's network (including within a warehouse) as well as routing to a channel partner. The real-time capabilities of mobile processes and technology could be very beneficial for routing, tracking and placements as well as for load balancing inbound and outbound hauls. These capabilities are often overlooked by manufacturing/assembly companies but are well rec-

By understanding the importance of the supply chain mega processes to your business segment and the relationship of mobility to each process, you can begin to calculate your M index.

ognized by services providers such as 3PLs.

Labor Management is a large cost driver in Move, just as it is in Make. And as in Make, mobile capabilities and analytics could be employed to further drive productivity. (Note that our analysis assumes non-union environments since unionized environments in many cases may have agreements in place that would impede the use of some of the process analytics).

Dock and Yard Management sub-processes tend to be very labor intensive and static even in today's agile supply chains. We have found that companies tend to treat these activities as necessary evils that have to be managed to get goods flowing. However, inefficiencies in dock and yard management can often be causes for customer service problems because of longer- than-necessary dwell times or even missing assets (yes, even something as big as a trailer can sometimes go missing for a few hours or even days in crowded locations). The ability to provide traffic flow based on dock schedules and yard placements can be a supply chain throughput advantage.

Inventory visibility and associated timeliness within the network is largely based on the company's supply chain operating model, lifespan of its products, and cost of the inventory. We find that real-time tracking and tracing is not a necessity in all business environments.

A general rule of thumb is that the higher the value of inventory/the shorter the product lifespan, the greater the potential of mobility in improving inventory visibility. Note that there are some industries in which government mandates for product visibility dictate the business process and information needed to support the mandate.

Sell/Serve: For our discussion, the sub-processes under Sell/Serve include order transaction management; tracking, and service visibility and associated analytics.

Order transaction management can be viewed as the ability to take orders anywhere, anytime and be able to submit them for processing in the same fashion. This capability can be used quite effectively, especially in businesses that can use remote order processing to influence sales. The capability also is useful in establishing promised deliver dates or presenting customers with options (intelligent shopping) while they are browsing in their location of choice. While mobile will never supplant the traditional order receipt processes, it can effectively add a layer of customer intimacy and intelligence to a

largely back-office function.

Tracking is probably the most easily understood sub-process post order entry. We are all familiar with the process of tracking a FedEx or UPS package. Automotive manufacturers, particularly in the luxury brand segment, also have developed this capability on static devices (mainly PCs), but could hugely move the needle on customer intimacy if they could accomplish the same with M. While some may debate the direct benefit of the portable process overall, most do recognize the huge value of mobility in enabling customer intimacy. This is especially important for the luxury brands that cater to a segment of buyers that have become more tech savvy and are quite demanding in the face of competing alternatives.

The *service visibility and analytics* sub-process is an essential part of channel partner and consumer intimacy programs that alert us to potential problems before we get the dreaded customer calls. And when a problem does arise, M enables a more rapid response. This is particularly important in the B2B arena since customers tend to be large and their concern with and visibility into issues more intense. Given the non-centralized nature of the human resources and processes that typically govern our supply chains, it is important to be able to view, analyze and act on service resolution issues based on approval levels from

disparate locations and by utilizing smart device capabilities (similar to issue escalation processes within IT). The processes surrounding the appropriate resolution mechanisms must be carefully designed. In any case, the ability to mobilize this sub-process can be a competitive advantage in many industry segments.

Step 4: Calculate the M index for the Industry Type

With an understanding of the importance of the supply chain mega processes to your business segment and the relationship of mobility to each process, you can begin to calculate the M index for your company. We recommend a three-stage process.

First, assign a degree of mobility reliance to each of the supply chain mega process based on the industry's segment. For example, the commodity nature of in the Grow to Market (G2M) environment (agriculture and produce), gives the planning function a relatively low level of importance. So the Plan component would be assigned a rating of low/medium (L/M), which translates to a score of 2 as shown below. Similarly, Buy would receive a low/medium score as the input materials tend to be relatively static and well managed, and the associated supply base mostly local. The Make—or in this case, really the Grow—component is highly relevant for this industry segment. Therefore, Make is given a high (H) rating as is Sell/Service because of the daily customer-intensive nature of this segment. Move gets an in-between rating of medium/high (M/H), given the perishable nature and short shelf life of many of the products. The table below shows the ratings for Grow-to-market as well as sample rating for the other industry segments.

Segment\ Degree of Reliance	Plan	Buy	Make	Move	Sell/ Serve
MTS	H (5)	M/H (4)	M/H (4)	M/H (4)	M/H (4)
ATO	M/H (4)	M/H (4)	M (3)	M (3)	H (5)
BT0	L/M (2)	M/H (4)	M/H (4)	M (3)	H (5)
G2M	L/M (2)	L/M (2)	H (5)	M/H (4)	H (5)

Assume that High (H) = 5 points; Medium (M) = 3 points and Low (L) = 1 point. M/H is 4 points and L/M is 2 points.

The second stage shown in Table 2 uses the same scoring construct as the one above but applies it in terms of mobility's relative applicability to each of the mega processes—regardless of industry type. As discussed earlier in the article, the Plan, Buy and Make processes are lower on the mobility applicability scale than are the Move and Sell processes. Therefore, Plan, Buy and Make are given a L/M score (2 points); Move and Sell/Service receive a M/H rating, or 4 points.

Supply Chain Process	Mobility Importance
Plan	L/M (2)
Buy	L/M (2)
Make	L/M (2)
Move	M/H (4)
Sell/ Serve	M/H (4)

The final stage takes the scoring in the first two steps to derive the composite score for each segment. The composite score is the industry segment mega process (Table 1) times the Mobility importance score (Table 2). The example below is for the MTS segment.

SCM Process/ Segment	Plan	Buy	Make	Move	Sell/ Serve	Total
MTS	5x2	4x2	4x2	4x4	4x4	58

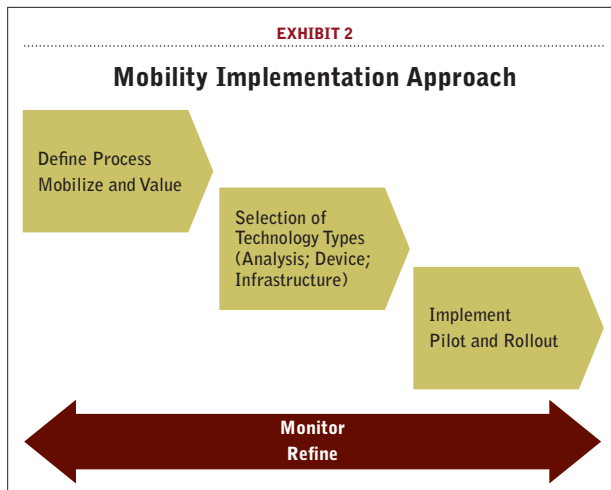
Finally, to derive the Mobility index, divide the composite score by the maximum possible score of 125 (ratings of 5 across all processes and a 5 rating on mobility importance) to derive the mobility index for the industry segment. Table 4 shows the M Index for each segment type:

Segment Type	M Index (total score/125)	Sample Industry Association
MTS	0.47	Consumer Products, Electronics, Chemicals, Pharmaceuticals), Automotive
ATO	0.43	High Technology (hardware), Semiconductor
BT0	0.42	Engineering and Construction, Heavy Manufacturing, Aerospace and Defense
G2M	0.43	Agriculture

The M scores in general are not very high. Make to Stock, which scored highest on the M Index, came in at a little under 0.5. The findings suggest that while opportunities exist to gain cost and service benefits from mobility, the case for adoption needs to be carefully considered. The findings further suggest that the adoption curve will tend to be fairly slow. Adoption likely will not proceed in a single sweep across all processes, but will follow a sequential approach—for example, distribution first, followed by transportation, and so on. Importantly, we are not asserting that mobility in the supply chain processes is in any way unnecessary or undesirable. Rather, we believe that the use of mobility will continue to be spot based and sporadic across the industry segments and will not necessarily be a candidate for massive adoption and rollouts.

Structured Implementation Approach

If a decision is made to move forward on a mobility initiative, we recommend the following structured approach. It consists of four activities—define, select, implement, and monitor. (See Exhibit 2.) Following this methodology will enhance the potential of capturing the benefits of M.



Define. The first step is to define the process and associated sub-processes that are proposed candidates for mobility. We suggest utilizing some variation of the SCOR (Supply Chain Operations Reference) model or a derivative that accurately describes the company’s supply chain operating model. It is important to carefully define the candidate processes and sub-processes since we have seen the variation in results and applicability even within the mega process. We also suggest mobilizing the implementation team—which should include the business process owner, IT, and data security professionals—at this stage. Finally, a key output of this step is creation of a value generation and delivery model that will enable a reasonable ROI. (Reasonableness of ROI’s would be determined based on the company’s internal hurdle rates for financial investments.)

Select. The next step is to select the technology enablers. These can be classified in three categories: devices, back-end infrastructure, and rendering platform.

Regarding the first category, a wide selection of devices now is available from companies like Apple, Samsung, HP, RIM, and more. The choice of device can often be coupled with selection of back-end operating and storage technology (MS/Mac/CE) as well as the integration technology required to connect the devices to the

infrastructure. The market has yet to shake out and it will likely be at least four to five years before clear winners and losers emerge. The final piece of the puzzle is the rendering and business process analytics layer. This platform is used to deliver the M capability and receive the results back from any process/data manipulation that may have been done by the front-line users. (We note here that mobility without interactivity and analytics is really useless.) Once again, there are many platforms available from business intelligence providers as well as providers of analytic capabilities. The main output of this step is the creation of a technology roadmap that supports results of the “Define” step.

Implement. The third step in the process is to implement the enablers selected above. Before any large scale employment across the processes and sub-processes, however, we encourage the use of pilot launches and tests. This will enable the company and the front-line users to adapt and adopt the changes in the business process and technology enablers for optimal benefit. Remember, for people using the M technology, there’s big shift in operating model and mindset from a “batch” to “real time.” So there are change management issues that need to be dealt with.

Monitor and Refine. The fourth and last step is often forgotten in many technology-centric business process transformations. Yet, it’s crucial to monitor and refine the sub process and associated usage since the adopting of mobility typically is a learning experience in and of itself—that is, users learn more as they work with the technology and become more adept in utilizing analytics and applying the results to drive decisions. Hence, we recommend a bimonthly review-and-refine process for at least six months after initial implementation.

A company’s M index is defined largely by its supply chain operating philosophy as well as the particular industry segment to which belongs. From our vantage point, the use of mobility in the supply chain is still in its early stages and the M index scores we posited demonstrate why widespread adoption has not already occurred. There are, however, a number of ways in which the early adopters can gain significant advantage. As the value proposition becomes clearer going forward, expect to see more and more companies embracing M. ∞

Author’s note: A good source on mobility that I have relied on for this article is “Mobile Supply Chain Is on the Move,” by Bob Trebilcock, Executive Editor, Modern Materials Handling, March 2011



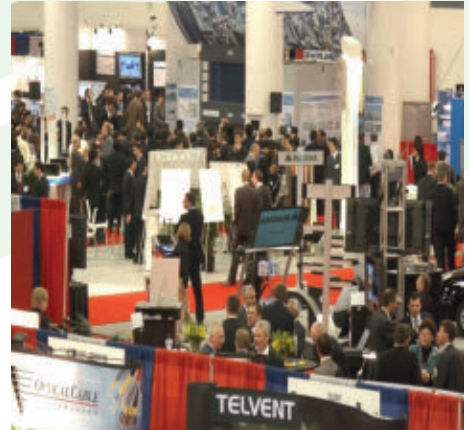
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ITS AMERICA ANNOUNCES FINALISTS FOR 2011 BEST OF ITS AWARDS

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The Intelligent Transportation Society of America (ITS America) announced the list of finalists for the 2011 Best of ITS Awards. The awards will recognize the best and the brightest in the high-tech transportation industry during the 18th World Congress & Annual Meeting in Orlando, Florida. Besides having the opportunity to learn about the best new products, services, applications and practices within the transportation industry, attendees will have the opportunity to meet and network with the award finalists and winners.

The finalists were announced in the categories of **Best New Innovative Products, Services, or Applications** and **Best New Innovative Practices**.



BEST NEW INNOVATIVE PRODUCTS, SERVICES, OR APPLICATIONS:

- Carnegie Mellon University, “Tiramisu Transit”
- City of Minneapolis, “First Avenue Dynamic Parking Lane”
- Florida DOT District Four, “Maintenance Inventory Management System”
- Houston TranStar, “Cost Effective Arterial Network Travel Times”
- ICX Transportation Group, “New Jersey 511 and Data Fusion Engine”
- King County, DKS Associates, and ConSysTec, “King County Metro Transit ITS Architecture Deployment”
- Mississippi DOT, “Video Migration”
- San Diego Association of Governments, “T-PeMS Development & Deployment”
- University of Maryland CATT Lab, “The Regional Integrated Transportation Information System”

BEST NEW INNOVATIVE PRACTICES:

- Chicago DOT, “Chicago Traffic Tracker”
- Florida DOT District 6, “95 Express MKTG and Outreach Program”
- Florida Turnpike, “Specialty Towing and Roadside Repair Program”
- Houston TranStar, “Real Time Travel Time Monitoring System for Hurricane Evacuation Routes”
- Iteris and the City of Long Beach, “Douglas Park Adaptive Traffic Control Program”
- New York State DOT, “Universal Smart Roadside Electric Screening Platform for Commercial Vehicle Infrastructure Integration Program”
- Pinellas County Public Works, “The Integration of Environmental Sensors into Pinellas County’s Smart Tracs Advanced Traffic Management System”
- TransCore and NYC DOT, “Large Scale Urban Traffic Management Using a Wireless Network”
- Vermont Agency of Transportation, “RWIS-VMS Automation”

Finalists will be recognized and the winners announced during a special awards ceremony during the 18th World Congress on Intelligent Transport Systems, a unique opportunity to join more than 10,000 of the world’s leading transportation professionals, learn from several educational opportunities, participate in new technological demonstrations, and groundbreaking exhibitions.

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THE CASE FOR INFRASTRUCTURE INVESTMENT: Lessons from Medco and Staples

By Karl B. Manrodt, Michael Ogle and Lisa Harrington

In August 2003, Medco Health Solutions, Inc. spun off from former parent company Merck. With \$34 billion in annual revenue, Medco was the largest domestic corporate spin-off of that year. Despite its size, the new company had a lot to prove—and a lot to lose. But eight years later, Medco is one of the nation's leading health care companies, managing pharmacy benefits for one in five of all Americans, with 2009 annual revenue of \$60 billion. Its clients are the employers, health plans, trade unions, and government agencies that hire Medco to keep their members healthy while keeping prescription and medical costs down.

How did the company achieve those results in such a short time? Not in the ways you might expect.

David Snow, the company's chairman and chief executive since 2003, credits Medco's success to a decision made nine years before he took the company public. In 1994, then-CEO Martin Wygod sought to design and build something that didn't exist: a completely automated high-volume pharmacy. Wygod essentially bet the company on a one-of-a-kind automated materials

handling system. The bet paid off, not only catapulting Medco ahead of its competition, but enabling it to revolutionize the pharmacy fulfillment business.

In the same period—from 1994 to 2009—Staples Inc., the world's largest office products company, grew from \$2 billion to \$24.3 billion in annual sales. That 2009 figure represented 5.2 percent growth compared with 2008, a notable accomplishment given the state of the global economy at that time. Staples' performance put the company squarely in the lead in the office products market. By contrast, Office Depot had revenue of \$12.1 billion in 2009, a 16 percent drop from 2008, and OfficeMax had sales of \$7.2 billion, down 12.8 percent over 2008. Since 1996, Staples' 2009 performance gave the company the distinction of being the only one of the three office supply companies to post positive profits in 2009—a robust \$739 million.

In the face of tough competition and even tougher times, Staples credits much of its success to its willingness to invest in and experiment with its supply chain infrastructure—which includes state-of-the-art material handling technology—and to streamline and update processes that reduce errors and costs. While most senior managers view materials handling as simply a means of moving product within their distribution centers (DCs) and perhaps their supply chains, some of today's leaders look at it as a means of moving their companies' strategies to new levels.

Let's take a closer look at the Medco and Staples stories to see what we mean.

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Companies like Medco and Staples share a common belief: The innovative investment in supply chain infrastructure—and in particular automated materials handling and distribution systems—is a foundational element in market leadership and business success. Their stories point to seven key takeaways that supply chain professionals in any business sector can learn from.

Yves Lefevre

Medco Finds a Way to Scale Up

IN THE EARLY 1990s, chief executive Wygod realized that Medco could not grow simply by hiring more people to handle prescription fulfillment. The CEO recognized a growing shortage of pharmacists in the U.S.—a constraint on growth in any case. Pharmacists are highly trained, highly paid and in high demand; having them work as pill counters and bottle cappers didn't seem the best use of their talents. Wygod wanted to put their knowledge to work in more value-adding ways and to minimize their most tedious work.

Additionally, Wygod knew he could not scale to high volume and high velocity with a manual system without risking a spike in errors. People, no matter how professionally trained, can make mistakes. "Those mistakes can have serious consequences," notes Chris Hess, Medco's vice president of engineering.

Medco needed a solution that would guarantee accuracy, no matter how high order volumes went. Using technology could create a sustainable competitive advantage; it would erect high barriers to entry and provide a platform for continuous innovation. The time had come for a brand-new business strategy: the development and implementation of a system that would automate the prescription fulfillment process from start to finish.

Automation Holds the Key

Today the system, which contains more than 1.1 million lines of code, can perform 1,500 database transactions per second. It is the key to Medco's kingdom, and the company protects it as such. Medco holds 31 U.S. patents for patient-data management and automated pharmacy-dispensing technologies, and 33 international patents for automated pharmacy-dispensing technology.

In 1996, Medco opened its first 230,000 square-foot automated prescription fulfillment center in Las Vegas. Five years later, it opened a 280,000 square-foot automated pharmacy in Willingboro, New Jersey. The two facili-

ties focus on high-volume, widely prescribed drugs, each handling roughly 2,000 stock-keeping units (SKUs) ranging from pharmaceuticals used in the treatment of diabetes, cardiovascular diseases, hemophilia, and HIV/AIDS. Work began in 2007 on the company's third automated pharmacy; when it reaches full capacity, this \$150 million, third-generation fulfillment center, located just outside Indianapolis, will process 1.5 million prescriptions a week.

In 2009, Medco's automated pharmacies filled 103 million prescription orders annually. Prescriptions can be received, dispensed, packed with customized patient literature, posted and loaded on the mail truck in less than 25 minutes; 99 percent of all prescriptions received are filled and posted for delivery within 24 hours. To increase patient safety, each prescription passes through more than 100 automated control check points during the dispensing process.

The automated pharmacies are manned by robots, automated pill counters and dispensers, high-speed rotation and materials handling equipment, and automatic identification systems. They are managed by a proprietary production control system adapted from a solution developed to manage aircraft manufacturing, capable of continuously tracking every single aircraft bolt and screw throughout the entire production cycle. Medco needed to do the same—but with pills.

"We rebuilt the whole production control system," recalls engineering chief Hess. "We tested, validated and documented every change." Without such a painstaking documentation effort, Medco ran the risk of hard-wiring errors into the system. "The worst thing we could do would be to automate an error," Hess notes. And with Medco's volume, such mistakes would quickly mushroom in number.

Today, Medco manages roughly 20 percent of the universe of pharmacy benefits in the United States. By automating its prescription fulfillment process, the company cut its cost to fill an order by 80 percent,

Can Automation Give You a Strategic Advantage?

Here are three sets of questions to ask yourself to determine whether investment in automated material handling infrastructure can give you a strategic advantage:

1. Scalability/Mix: Are you experiencing significant growth in the quantity and range of products your company is providing (increased SKU count, increased volume per SKU)? Are you seeing smaller, more frequent orders of a wider range and larger volume of products?

2. Best Use of Scarce/Expensive Resources: Are your

skilled workers and professionals performing activities that can be better supported (speed, accuracy, etc.) with automated systems? Are they becoming a much more scarce resource or becoming much more expensive (salary/wages, benefits, workers' compensation)?

3. Information Requirements: Are your supply chain partners putting more emphasis and value on sharing real-time, reliable information flows regarding your material flows?

repaying the investment in automation in less than a year. According to a study conducted with Auburn University and published in the November 2005 issue of *Pharmacotherapy*, automated prescription fulfillment is 23 times more accurate than the industry norm at the traditional pharmacy level.

By automating its pharmacy, Medco solved several problems. “We solved for cost and scalability,” says CEO Snow. “We brought the cost of dispensing way down, and our processes and technology enable us to fill more than 48,000 prescriptions an hour. A traditional pharmacy dispenses 48,000 prescriptions a year.” At the same time, Medco has been able to eliminate 11 of its 12 manual pharmacies, a significant savings in overhead and labor. The one remaining manual pharmacy handles specialty drugs and narcotics which require in-person processing by pharmacists.

A Foundation for Innovation

After 15 years of gathering health-related information on its rapidly growing subscriber base, Snow realized that Medco was in a position to affect healthcare costs—and patient outcomes—on a significant scale. How? By capitalizing on the most valuable by-product of its automated pharmacy: information. Medco’s customer database became both the enabler and the backbone of the company’s growth strategy—supporting expansion into new business areas and medical research.

For example, Medco set up nine therapeutic resource centers (TRCs) staffed by more than 1,100 pharmacists specially trained in one of more than a dozen chronic diseases. Medco focuses on helping patients with chronic and complex conditions—people who account for 90 percent of all drug spending and 75 percent of all healthcare costs, and who suffer from conditions such as diabetes,

cancer and cardiovascular problems. The pharmacy specialists assigned to a TRC are experts in certain conditions, and they leverage the information available through Medco’s vast database to help patients better manage their health problems. They also identify opportunities for the patients to close gaps in the care of their condition. Because of this database, a Medco specialty pharmacist can tell if a patient is not taking their medication as often as they should, or if they should get a certain test. Such interventions can improve patient outcomes, but they also translate into cost savings for Medco’s clients.

“Medco has won more than \$21 billion of business from competitors because we have built this brand-able difference that is very difficult to replicate,” Snow says. “Our technology is not available in the marketplace. It is a huge advantage for us. Also, you can’t get to the higher level of cognitive capability in which we operate without having that technology on the back end. So for Medco, our technology is the foundation for innovation.”

Staples Pursues the Perfect Order

THE SUPPLY CHAIN IS OF STRATEGIC importance for Staples, too. “Competition is difficult in an industry that sells like products for like prices,” observes Roger Will, the company’s vice president of global supply chain. But Staples believes, particularly in its delivery business, that its supply chain gives the company a competitive advantage because it delivers customer satisfaction. “We made our mission very simple,” says Will. “We earn customer trust and loyalty by delivering the perfect order every time. We deliver the ‘easy.’ We have the product in stock when the customer orders it, we deliver next day complete with no damage, and the only returns we have are when the customer makes a mistake in ordering. Nothing else is acceptable.”

In Staples’ delivery business, which represents 60 percent of the company’s sales and is the fastest growing area of the company, the study findings spawned the overarching perfect order strategy that drives the business today.

Staples’ dedication to the perfect order isn’t just something the senior management team dreamed up as nice to have. It is based on hard facts. In 2005, the company conducted a study to quantify the cost of customer dissatisfaction resulting from order errors. The study, which looked at the company’s North American delivery operation, evaluated how customer retention was affected by out of stocks, late deliveries, fulfillment center errors, and product/handling errors. Staples compared retention rates for equal-order sample sizes of orders delivered next

At Medco, Automation Changes the Competitive Landscape

- System is 23 times more accurate than a traditional pharmacy.
- Fills 48,000 prescriptions in an hour—what a typical pharmacy will do in an entire year.
- Enables scalability.
- Utilizes scarce resource—pharmacists—in a more efficient manner.
- Disrupted the pharmacy-benefits business by using technology as a strategic weapon.

day—on time—versus orders delivered late. It also compared retention rates of customers with perfect orders against those with problem orders. Finally, the study looked at the impact of problem orders by examining the correlation to those customers' share of wallet.

The results of the study were eye-opening. "We found that for every X number of errors, we actually lose a customer," says Donald Ralph, senior vice president, supply chain and logistics. "So there is a real quantifiable value to being able to fulfill orders perfectly. Based on customer retention numbers and the correlation with defects, we use the lifetime customer value, new customer acquisition costs, and the cost of rework to show why doing things right the first time has significant economic value."

Developing Supply Chain Infrastructure

It's no surprise then that Staples' goal is to operate the best supply chain in its industry. That requires a significant investment, in talent, process and technology. Part of that investment is in new distribution infrastructure.

To understand Staples' strategy about supply chain infrastructure investment, Ralph says it's important to look at where the company is on the scale of supply chain development. In the executive's mind, that scale has three stages which transition from a partitioned, segmented view of company operations in stage one to a more holistic view of operations in stage three. Ralph explains the stages as follows:

1. Integration: an understanding that upstream and downstream logistics activities are connected, and that a decision taken in one area impacts other areas.
2. Synchronization: actively making tradeoff decisions based on this larger understanding.
3. Optimization: viewing, analyzing and optimizing the entire supply chain as a whole.

"Staples is somewhere between stages two and three," Ralph indicates. "This means we have a lot more opportunity to harvest from our supply chain. In the process of pursuing this opportunity, we have to test new innovations—things like technology and logistics infrastructure. We have many distribution-related facilities, so it is not difficult to conduct a test in one of them. Ultimately, we want to standardize on a few distribution/fulfillment operating models, but to do that, we have to test them first to see how well they perform." This effort is particularly important as Staples integrates the operations of Corporate Express, which it acquired in 2008.

Experimenting with a new approach to distribution operations is exactly what the office products company did at two of its North American fulfillment centers, located in Denver, Colo, and Harrisburg, Penn. The

question for Staples in these two sites: How can we help workers be more productive, improve order fill accuracy, add capacity, create a better work environment—all in a two- to three-month time window at each facility?

Traditional warehouse solutions didn't provide the flexibility, speed and cost profile that Staples needed to continue its exploration into high-efficiency supply chain configurations. The company had to re-think the physical process of filling orders—and take a risk on deploying innovative material handling solutions. It also wanted to study how well such systems performed against existing facility solutions in meeting customer service requirements and managing cost.

Staples opted for a system that turned traditional fulfillment on its head. Rather than have employees waste time and energy scurrying about the warehouse picking product, why not use automation to bring the work to the worker? Staples' fulfillment system solution relies on mobile inventory delivered to operators at stations around the perimeter of the facility. Sophisticated control software guides autonomous mobile robots along an invisible grid pattern, enabling very fast cycle times with reduced labor requirements, from receiving to picking to shipping.

The idea behind Staples' test was to see what happens when you free people up to do what they do best. The highest and best use of order pickers, Staples reasoned, was to let them do just that—fill orders by picking, packing, and replenishing rather than walking.

The pilot projects at the two facilities were a success. Employees can fill orders twice as fast as workers at other existing Staples' facilities. Denver's picking error rate is the lowest in the company's North American delivery operation and ranks well above industry standards. That all goes to customer satisfaction—and the bottom line.

Automation Enhances Flexibility

While many companies worry that automation puts limits on operational flexibility, Staples' experience has proved just the opposite. With the mobile system, Staples can scale up and down according to demand fluctuations. "We can add throughput and cycle time capabilities in very fine increments," says Will. Also, the fulfillment centers can dynamically assign capacity to jobs. Explains David Carr, fulfillment center manager of the Denver facility: "If you're trying to meet a truck departure deadline, and you have five picking stations right across from the truck, you can shift workload around and dynamically assign all five work stations to that truck. You can't do that in a fixed material flow facility." The upshot: Staples can meet tight order shipping times and peaks at lower operating costs.

The mobile inventory system has another benefit. It's

Staples' Investment in Automation Brings Lasting Benefits

- Greatly increased productivity of order pickers by bringing product to them.
- Became a continuous learning organization—encouraging experimentation in all parts of the supply network.
- Developed new picking and replenishment process, providing real-time flow of reliable information.
- Reduced errors—the costs of customer losses per error are quantified and closely tracked.

a lot less physically demanding on the workers. In a traditional fulfillment operation, employees spend three to five minutes of walking per each order. They also do a lot of bending, reaching and lifting while they're picking product—all of which leads to fatigue and potentially to injuries. The mobile system's order-picking equipment is designed to present product to workers within easy arm's reach. It's the automated fulfillment systems that do the walking.

Staples' continued investment in its supply chain and its willingness to experiment with new handling technology and processes have paid off. "We lowered our supply chain costs significantly," Ralph reports. "We've seen double-digit increases in productivity for four straight years. The materials handling and warehouse management systems allow us to prevent and, to some degree, predict where errors will occur so we can fix them before shipping the order to the customer. The key here is that we can prevent errors from occurring."

Seven Key Takeaways

Discussions of order fulfillment and automated distribution infrastructure don't make it to the boardroom as often as they should. Medco and Staples provide clear examples of what happens when they do. These two companies have a lot to teach us about how creativity and a willingness to experiment on the "back end" of a business does far more than just push product out the door. Innovation in product handling actually drives a better bottom line. So what lessons can we take away from the Medco and Staples stories?

Lesson 1: Internal back-end infrastructure makes a difference. In 1962, management theorist Peter Drucker said, "We know little more today about distribution than Napoleon's contemporaries knew about the interior of Africa. We know it is there, we know it is big, and that's about all."

Since 1962, knowledge of the supply chain has increased, as has interest in it at the highest levels of the organization. More CEOs understand that managing their supply chain is critical for growth and sustained profitability. But while senior management has a much better understanding of supply chain in general, this understanding is largely directed outward, toward relationships with customers and suppliers.

As the Medco and Staples narratives clearly illustrate, it is just as important to understand and excel at the internal "how" of getting product to the customer. These two very different companies see logistics as core to their ability to perform in their respective market segments. They build the business by creating the physical infrastructure to fill orders perfectly. That focus and their resulting ability to serve customers become key competitive differentiators.

Lesson 2. Take a broader, more appreciative view of the impact of fulfillment systems on the organization. What else can directly impact costs, improve customer service and increase flexibility while providing a platform on which to build a sustainable competitive advantage? Medco's foundational business model is based on the company's ability to perform its materials handling activities more effectively than its competitors can.

If companies don't experiment with alternatives and new thinking with regard to internal product handling—as Staples is doing—they may miss an opportunity to transform their businesses, dramatically reduce costs, bind customers to them through unparalleled service, or even build a platform for entirely new businesses.

Product differentiation, and the competitive advantage it delivers, is fleeting in today's world of instant replication. The competitive differentiation delivered by automated systems approaches, however, can last far longer—years, in fact, as Medco amply proves. Because innovative handling systems have the potential to deliver two to four years of significant competitive value to a product-based corporation, they warrant closer consideration by senior management. In Medco's case, its competitors are rushing to automate their pharmacies in much the same manner as Medco did years ago. Medco is already on to the next new thing.

Lesson 3: Material flow infrastructure and customer satisfaction are directly linked. For both Medco and Staples, automated handling systems enable delivery of the perfect order. That has a direct impact on customer satisfaction, retention and even on acquisition. And in Medco's case, where mistakes can be potentially life-threatening to customers, accuracy translates

directly into lower risk exposure. At the company's New Jersey facility—the most technologically advanced pharmacy in its network—each prescription passes through more than 100 critical control check points during the dispensing process, delivering a Six-Sigma level quality of service (99.9997% accuracy).

Imagine how Medco or Staples would compete in their crowded markets if they did not have these advantages. How would they keep their costs low and still provide the level of service their customers have come to expect? The answer for these two companies lies in the infrastructure they put in place—an infrastructure which has given them sustainable competitive advantage.

Lesson 4. Automated handling processes drive a lower cost structure. In the current volatile economic climate, companies find it increasingly difficult to manage their revenue streams. What they can control are their costs. Looking beyond the products, and thinking about new processes, can lead to significant wins. It's worth noting that the cost savings achieved by Medco are not merely an incremental change—they constitute a large step function that radically reduced the company's operating cost structure.

Staples is pursuing these same types of costs savings in order to benefit the business as a whole. The office supplies giant is working to develop a few standardized distribution/fulfillment operating models to apply throughout its distribution network. To do this, Staples must experiment, apply what was learned, then develop a best-practices base that ultimately will evolve into a more standardized supply chain that delivers a sustained cost and service advantage.

Lesson 5. Customer value may be delivered by means that the customer feels but doesn't see. Most customers have no idea how a product they ordered actually gets to them. They are unaware of the huge back-end “machine” that kicks into gear when they place an order. All they know is that their order arrives. It's either on time or not; exactly what they ordered or not. In case it is not, when an order process breaks down in any way, customers' tolerance thresholds are exceedingly low. The consequences are substantial, and quantifiable in terms of customer dissatisfaction, lost sales, lost customers or, in Medco's case, potentially harmed customers.


Thus, the customer “feels” or experiences the output of supply chain infrastructure and votes on its performance by ordering again, or defecting to a competitor. Companies that understand this connection, and make the necessary investments to support it, consistently outperform their competitors. They do so not merely by small increments but by orders of magnitude. These

companies make profits when their competitors don't; they thrive when their competitors struggle.

Lesson 6: Invest in infrastructure that enables people to do what they do best. Strategic investment in materials handling systems frees up employees to perform more value-adding activities. In Medco's case, highly trained and highly paid pharmacists were relieved of having to carry out so much manual work, and were redeployed to provide knowledge services to customers. By having machines put caps and labels on pill bottles, Medco slashed fulfillment costs by 83 percent and vastly improved order accuracy. At Staples Denver fulfillment center, workers are twice as productive as employees in other facilities because they don't spend as much of their time walking. The workers are more engaged in the higher level processes that support perfect order execution. In both instances, the savings go directly to the bottom line.

Lesson 7: Information about your product or service may be more valuable than the product or service itself. Years ago, when Walter Wriston was chairman of Citicorp, he said that “Information about money is more valuable than money itself.” In many ways, leading companies are starting to realize that coupling information flows with material flows provides the visibility needed to create dependable strategic plans. Clearly, Medco has capitalized on the massive amount of information it collects from its fulfillment operations, and has leveraged it across the organization to build out its future. For its part, Staples learned from its fulfillment performance data about the impact that errors have on customer retention, share of wallet and, ultimately, on the company's profitability. Without the ability to capture and analyze this information, Staples would be in the dark on critical success issues.

The infrastructure of a warehouse or fulfillment center will never be as glamorous or headline-making as the latest game-changing product, corporate merger, or international expansion move. But it certainly can spell the difference between success and failure in achieving customer service excellence.

Staples and Medco are in the vanguard of a wide movement to capitalize on that realization. Take a closer look at market leaders across vertical manufacturing and retail sectors and you'll find a few insightful companies in each industry paying very close attention to what goes on inside “the four walls” of their supply chains—that is, the internal capabilities of their distribution and fulfillment centers. Those companies understand that innovation in supply chain infrastructure really matters. Like Medco and Staples, they will soon have the track record of competitive advantage to prove it. 



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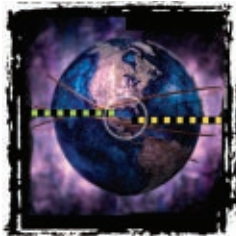
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The Evolution of Supply Management

The supply management function—and the professionals working in it—have made steady progress from an administrative afterthought to a strategic driver of business success.

By Carrie Ericson and Simon Rycraft



Over the last 90 years, economic, political, social and technological evolutions have all impacted the operating models, technical skills and leadership styles critical for supply management pro-

professionals to succeed.

As supply management now is sitting comfortably in the boardroom of many leading organizations, a reflection on the history of the function and how it “arrived” at the leadership table may provide guidance on the profession’s next evolution and how best to anticipate and adapt to future changes.

Prior to 1914, supply management, or procurement as it was then called, was a purely clerical function. The first evolution of perceived importance was validated in the academic world in 1917 when Harvard began offering a course in supply management. And then in 1933 Howard T. Lewis authored the first college textbook on the subject. World Wars I and II presented the function with a critical imperative to obtain raw materials, supplies, and services to keep factories in operation. This not only changed supply management’s stature within the organization, but also drove a need for enhanced skills in sourcing, logistics, and supply management.

The evolutionary process continued after the war, driven by the supply chain professions’ increasing involvement in and support of tactical operations. The advent of just-in-time purchasing techniques in the 1980s—with its emphasis

on inventory control and supplier quality, quantity, timing, and dependability—all influenced the introduction of supply management into the company’s overall corporate strategy. This development, in turn, demanded a greater competency in strategic sourcing, competitive tendering, and supplier relationship management. However, this evolution was largely restricted to those companies that manufactured a product. Supply management still had not arrived as a service discipline.

Then along came the 1990s, which brought us supply market globalization on a completely new scale. As India and China began to flex their economic muscles, global competition for resources skyrocketed and raw material prices fluctuated violently. Transportation options became ever more complex, as supply chains were extended. Labor arbitrage became increasingly popular as companies looked for competitive low cost sources of supply. This new focus for supply management increased the profile of the profession not just in the manufacturing sector but in the services sector as well.

E-commerce Spurs Progress

The next step in the evolution of supply management began as the paper-based supply chain organization started giving way to e-based approaches. A key driver of this transition in document exchange and data storage was the emergence of e-commerce platforms such as Freemarkets, eBreviate, Ariba and CommerceOne. ERP giants such as SAP and Oracle quickly revisited their purchase-to-pay (P2P) offerings, although actually developing the new functionality took them

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some time. The end result of the shift to e-commerce was an unprecedented acceleration in the speed at which purchasing transactions could be completed. At the same time, competition could be injected into the deal making process. With an advanced tool set and data availability, supply management now was able to transition to a strategic, proactive function.

Supply management's growing involvement in outsourcing was the next evolution. As the 1990s progressed, most organizations were challenged to deliver year-on-year cost reductions. This target drove them to consider a number of outsourcing opportunities covering functions such as accounting, human resources, data processing, internal mail distribution, security, and plant maintenance as a matter of "good housekeeping." Supply management's involvement in identifying and evaluating outsourcing options required the profession to become proficient in the management of complex third party services. Moreover, it moved the function beyond the traditional buying of products/goods and solidly into the realm of complex services sourcing.

The need to incorporate elements of corporate responsibility and sustainability into an organization's business operations—while holding the line on costs—was the next step in an evolution that continues to challenge supply management professionals today. The definition of social responsibility has now expanded to include not only economic goals, but also social, political and environmental considerations.

By engaging suppliers, R&D, manufacturing, marketing and sales, supply management professionals have taken a leading role in developing sustainable sourcing practices. Such practices, in turn, often result in organization-wide competitive advantage that create additional revenue and/or cost avoidance through better management of supply chain risk.

Supply management professionals now find themselves in the driver's seat, helping to not only identify, but also to integrate, innovation into their company's supply chains. Through supplier relationship and performance management programs (SRM/SPM), now commonplace in leading organizations, supply management can not only track compliance to purchasing policies and contractual commitments, but also open the door to innovation through its strategic suppliers. This advantage often comes via effective relationship management, open innovation and joint process improvement programs. In fact, over 75 percent of procurement leaders identified through A.T. Kearney's 2011 Assessment of Excellence Study cited innovation as a key objective of their SRM programs.

Risk management, which gained particular attention during the global financial troubles of 2008 to 2010, has

been as much an art as a science for supply management. The function has had to ramp up its financial analysis and due diligence in recent years to evaluate and anticipate the likelihood and ultimate impact of supply failure or erratic/unpredictable movements in commodity pricing. The elevation of risk management on the priority list of supply professionals has changed the way contracts are written, sourcing strategies are crafted, suppliers are selected, and contingency plans are documented.

Real-time Opportunities

While the previous evolutions have been based on assigning ever-expanding responsibilities to supply management professionals, we believe the latest evolution is being driven by increased access to and the availability of real-

Supply management professionals are helping to not only identify, but also to integrate, innovation into their company's supply chains.

time data. Investments in tools, technologies and business intelligence capabilities are finally starting to yield results and enable these professionals to drive proactive and sophisticated scenario analyses for internal stakeholders and influence decision making. For the supply managers who possess the analytical skills to leverage this increased capability, they will see the migration from the old way of doing business with suppliers to a new relationship founded on computational commerce and a buy-sell relationship based on clean, real-time, insightful and meaningful data.

These same business intelligence tools now provide supply management professionals with the data and dashboards to fully measure the impact and value their function delivers to the organization. The availability of this data and associated dashboards enable supply management leaders to drive better performance and more successful engagement with their business stakeholders (internal customers) and the chief financial officer (scorekeepers) communities to communicate the results achieved.

While no one can predict the future, it is helpful to pause from time to time to evaluate where we have been to help us anticipate what lies ahead. Over the past century supply management has transformed itself from a backwater, administrative function to a proactive, strategic function within the enterprise that delivers true competitive advantage. It is clear that the capabilities required within the profession to succeed going forward will not be the same as those that have helped us to get to where we are today.

EU LOGISTICS:

Meeting new challenges

Freight traffic in Europe is steadily growing, and most of its ports, air carriers, and third party logistics providers are making investments in infrastructure and networks to cope with today's new challenges and increase their safety and environmental standards.

By Dagmar Trepins, European Correspondent

It's been a turbulent eight months for European carriers, service providers, and ports as they faced rising fuel prices, the aftermath of the Japanese earthquake and tsunami, political unrest in the Middle East and North Africa, the international debt crisis, and slower economic growth that overshadowed business developments across the region and the world.

Nevertheless, freight traffic in Europe is steadily growing, and most of the ports, air carriers, and freight forwarders are making investments in infrastructure and networks to cope with today's new challenges and to increase their safety and environmental standards.

So, if you're a U.S.-based logistics professional looking to establish or strengthen your logistics

and transportation network across Europe, here's a comprehensive update on the state of European logistics as well as the challenges carriers and service providers are currently facing on the roads, on the rails, on the water, in the ports, and in the air.

Air cargo: Still cloudy

According to the International Air Transport Association's (IATA) recent 2011 traffic results, the global air cargo volume dropped by 3.0 percent, while European air carriers reported a 1.3 percent decline compared to June 2010.

Europe's two leading airlines certainly weren't immune to these challenges. In its April-June 2011 quarterly report, the cargo unit of Europe's largest carrier, Air France-KLM, posted an operating loss of 14

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million euros (\$20.2 million) due to the crisis in Japan and overcapacity on China departures. Revenues increased by 3.2 percent to 799 million euros (\$1.15 billion) compared to the same period last year. During the year, the carrier has concentrated its Air France-KLM Cargo and Martinair Cargo's Americas operations in Atlanta "under one roof" to streamline work and the flow of communication.

In the first half of 2011, Lufthansa Cargo posted an operating profit of 133 million euros (\$191 million),

purpose in the ongoing development of our products. We posted gains especially in the special services we offer customers to meet their specific needs," says Garnadt.

Expanding its network and improving services, the carrier has also opened a new office in Houston to extend its charter service in the oil and gas industry. The company also made investments into additional transport capacity and IT. "Order placements for five new aircraft of the Boeing 777F type, the re-design of our cargo center in Frankfurt, and modernization of our IT landscape will be of crucial importance for the success of Lufthansa Cargo in the years ahead," adds Garnadt.

**Top 15 European Container Ports
(Container throughput 2010, million TEU)**



Source: Port of Hamburg Marketing

falling by 7.6 percent compared to last year. The carrier's revenue increased by 17.1 percent to 1.5 billion euros (\$2.2 billion), while the cargo volume rose 14.8 percent to 953,000 metric tons.

The first half of 2011 saw a capacity increase that came mainly from the MD11 cargo aircraft reactivated following the crises, the 777 freighters delivered to Aerologic—a joint-venture with DHL Express—and Austrian Airlines' capacity that has been integrated into Lufthansa's system since July 2010. In conjunction with a 19.7 percent rise in capacity, the load factor dropped by 3.3 percentage points to 69.1 percent over last year.

Growth was particularly pronounced in the Americas, where tonnage climbed 19.5 percent compared to Europe where it rose 13.4 percent. "Lufthansa Cargo has harnessed the robust development of the global economy and sustained the growth momentum from the previous year," says Lufthansa Cargo Chairman and CEO Karl Ulrich Garnadt.

"We've made our network even more attractive with the addition of new destinations and invested to good

Complaints about ETS

It seems that 2011 will continue to be a turbulent year for the aviation and air cargo industry. The introduction of the EU Emissions Trading Scheme (ETS), which forces airlines flying through EU airspace to join the ETS system and buy carbon credits from January 2012 on, has provoked international protest in the industry during the last months.

"The EU is not sovereign over the U.S. or the rest of the world, and has no right to levy taxes outside of the EU," says Tom Petri, chairman of the U.S. Aviation Subcommittee. Petri suggested working with the international civil aviation community through the UN International

Civil Aviation Organization to seek a global solution.

European airlines also expressed concerns about ETS. Lufthansa CEO Christoph Franz, for example, fears a massive distortion of competition for European carriers and a shift of traffic via the Middle East. He estimates additional costs of 150 million to 350 million euros per year for his company to comply with the ETS system. IATA general director Giovanni Bisignani also calls for a global approach and warns against a "\$1.5 billion cash grab that would do nothing to reduce emissions."

EU Ports: Expansion time

The times of empty ports in Europe are finally over. Most of the ports have used the recession to make themselves more competitive, and their investments in infrastructure, IT, and networks are paying off—as results from the first half of 2011 clearly indicate.

Port of Antwerp: Europe's second largest port, Antwerp handled 96 million metric tons of freight during the first six months of this year, representing an increase

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of 10.4 percent compared with the first half of 2010. Container cargo went up 3.4 percent from 51.3 million metric tons to 53 million metric tons. In terms of standard containers (twenty-foot equivalent units), the volume increased by 4.3 percent to 4.4 million TEU. Conventional/breakbulk cargo also showed a high growth rate of 16.9 percent, while bulk cargo rose by 21.5 percent and ro-ro increased 16.3 percent over the same period last year.

The deepening of the Western Scheldt has made the port easily accessible not only to ultra-large container ships of over 10,000 TEU, but also to capesize vessels. These bulk carriers are too large to pass through the Panama and Suez canals and have to travel around the Cape of Good Hope or Cape Horn. The port has established the “dry bulk” workgroup, made up of various players in the port, to bring such large carriers to Antwerp and to boost its position as a leading hub for large-scale, coal handling and conventional breakbulk. The arrival of the first capesize vessel, MG Courage, in July is a result of this joint initiative.

Port of Hamburg: Germany’s largest seaport showed strong growth in seaborne cargo throughput in the first half of this year. Hamburg handled 64 million metric tons of cargo, which is 9.4 percent more than during the first half of 2010.

With a growth rate of 17.4 percent, container traffic via Hamburg amounted to 4.4 million TEU in the first

six months of this year. The biggest increase in Hamburg’s container trade was with the U.S. where the port reported an increase of 47.4 percent and was successful in winning back market shares in the European-U.S. Atlantic container trade.

New liner services and Hamburg’s geographic position, which offers very short distances to the growth markets in Eastern Europe and Russia, are advantages responsible for this positive development. In August, the PAX container liner service changed from their former German port of call, Bremerhaven, to Hamburg. This liner service, operated by the shipping lines Hapag Lloyd, NYK, and OOCL, now offers fast Atlantic passages for U.S. and European shippers via Hamburg.

Investments in infrastructure and development of new IT services further improve the service of Northern Europe’s hub port, a main distribution center for trade with Germany, the Baltic Sea region, Eastern Europe, Austria, Switzerland, and Russia. The port also invested in a new electronic road traffic management system to inform truck drivers about the current traffic situation on the port roads.

In 2012, the port is also going to implement a new IT system to optimize its rail traffic network within the port area. With more than 220 cargo trains per day, Hamburg is Europe’s largest rail port.

Port of Rotterdam: In the first half of 2011, 215 million tons of cargo was handled in the Port of Rotterdam, a

Geodis Wilson took two, 42-meter-long blades (inset) from a production facility in China and shipped them to Denmark—the longest, single cargo elements ever transported by air. Around 600 new offshore wind power stations are planned along the coasts of Great Britain, Denmark, Germany, Belgium, and the Netherlands through 2040.





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light growth of 1 percent compared with the same period of 2010. Europe's largest port showed an increase of 12.2 percent in general cargo throughput, which reached 74.7 million tons.

Container traffic went up by 9.7 percent to almost 6 million TEU, mainly driven by new services to and from the Far East and South America, increases in transshipment especially to and from Russia, and recovery in intra-European short-sea traffic. Trade with North America declined due to cuts in the number of services calling at Rotterdam.

"The significant unrest on the financial markets and its influence on the trust of consumers and producers can have a negative influence on world trade and thus on our throughput," says Hans Smits, CEO of the Port of Rotterdam Authority. "There is a significant need for quicker and clearer political decision-making to sway negative sentiments. I expect that throughput in the third quarter will stay on target." The port's main expansion project, Maasvlakte 2, is proceeding according to schedule and the first containers are expected to be processed in 2013.

Duisport: Europe's largest inland port, Duisport set a new record in the first half of the year. Container transport by ship, rail, and truck rose to 1.2 million TEU, up more than 10 percent compared with the previous year's period.

"If the development in container handling continues into the second half of 2011, we are optimistic that last year's record of 2.25 million TEU in total from can be increased again," says Erich Staake, CEO of Duisburger Hafen AG. According to Staake, the basis for this success is the port's business model as an integrated provider of logistical services.

The port attracted new investors this year, such as the international logistics company Samskip, with its subsidiary Van Dieren for its new intermodal transport terminal in Hohenbudberg. With a focus on the growing Brazilian market, Duisport and the Brazilian ports ministry also signed an agreement to support the government in drafting a logistics concept for the so-called Sao Paulo-Santos corridor for flows of goods between the Brazilian coast and hinterland.



Port of Hamburg has invested in a new electronic road traffic management system to inform truck drivers about the current traffic situation on the port roads.

EU 3PLs: Strong performance

Despite the debt crisis in Europe and a volatile world economy, Europe's leading third-party logistic providers (3PLs) are recording a strong performance. According to Transport Intelligence's (Ti) latest *Global Freight Forwarding 2011* report, European forwarders dominated the market in 2010 by occupying six of the Top 10 positions with a 44 percent share of the total global market.

The world's largest forwarder in terms of combined air and sea freight revenues was Kuehne+Nagel, followed by DHL, DB Schenker, and Panalpina. The U.S. forwarder Expeditors ranked fifth, followed by Sinotrans, CEVA Logistics, Agility, UPS Supply Chain Solutions, and DSV.

In giving an outlook for 2011, Ti's CEO John Manners-Bell points out the following: "Forwarders are enjoying somewhat of a golden period. Air and sea volumes are still growing, albeit not as rapidly as last year. In addition, extra capacity brought on by shipping and air carriers has meant that rates have softened, meaning that forwarders' gross margins will expand. Our research suggests that this should be by around 2 percentage points."

During the first half of 2011, the Kuehne + Nagel Group achieved growth above the market average in all business units. Despite considerable negative currency effects, net earnings improved by 11 percent to CHF 312 million. Seafreight volumes increased by 12 percent in the first half of the year, doubling the market growth rate of 6 percent, mainly achieved by exports from Europe to North America and Asia as well as from Asia to Latin America and the Middle East.

Despite a sharp decline in volumes in the global airfreight market during the second quarter, the group increased its tonnage by 18 percent in the first six months. Kuehne + Nagel's expansion in perishable logistics following acquisitions in South America, as well as increased demand in the trade lanes from Europe to North America and Asia, contributed to the strong performance.

DB Schenker, the logistics arm of the German national railroad Deutsche Bahn and one of the leading transport and logistics providers in the U.S. and Europe, has restruc-



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tured and expanded parts of its transportation network. In July, the company announced that it would eliminate its U.S. air fleet and close its Bax Global cargo hub in Toledo, Ohio. “As a result of the prolonged recession and spiking fuel prices, more customers are opting for expedited ground-based solutions instead of domestic air freight,” says Schenker CEO Heiner Murmann.

The company will continue its air cargo business through a more flexible cooperation with other carriers and with a new focus on smaller clients who need transportation management. In Europe, DB Schenker, which combines the units DB Schenker Rail and DB Schenker Logistics, has expanded its rail services to shift cargo from road to rail. In the summer, DB Schenker Rails ran the first European sized freight train via High Speed 1 in the U.K.

The curtain-sided swap bodies moved on this train, with an internal height of three meters (around 9 feet, 10 inches), provide significantly larger haulage capacity. In the U.K., they can only be utilized on the High Speed 1 route from the Channel Tunnel to London, as it's the only European-sized rail route in the country.

Following the success of this initial operation, DB Schenker Rail plans to run the first full train of European-sized swap bodies, and then initiate regular services to connect the U.K. to the rest of its pan-European rail freight network via the High Speed 1 route. This will open a new market for customers to export and import goods more efficiently using larger railcars.

New market for EU 3PLs

While looking for new markets, the wind energy sector offers new potential for EU logistics providers. According to analyses by the Prognos Institute, expansion in offshore wind energy production is strongly centered on Europe.

Europe now accounts for 86 percent of the wind power farms currently approved, in construction, or in operation worldwide. They add up to a total capacity of around 28 gigawatts. Around 600 new offshore wind power stations are planned to be built along the coasts of Great Britain, Denmark, Germany, Belgium, and the Netherlands through 2040. Depending on construction sites and water depth, transport and logistics are estimated to account for



DB Schenker, which combines the units DB Schenker Rail and DB Schenker Logistics, has expanded its rail services to shift cargo from road to rail.

roughly 20 percent to 25 percent of the project costs—and 3PLs can expect to see lots of work coming their way in this area.

For example, the global freight management and logistics company Geodis Wilson is a major service provider for the wind energy sector and has experience in this area since 1997. Since wind energy has become a key market within its vertical strategy, the company established a specialist team for wind energy logistics within its industrial projects division.

Henrik Funk, global manager for wind energy projects at Geodis Wilson, sees a trend within wind energy as manufacturers and suppliers are more and more interested in full-service providers that have their own equipment. “This is where we see our advantage. Being part of the SNCF Geodis group, we are able to deliver solutions and services along the entire supply chain using all modes of transportation within a worldwide network,” says Funk.

Informed sources also say Geodis Wilson plans to promote the European rail transport assets of its parent company SNCF to create new transport solutions for the wind energy sector.

One of the company's major global accounts is LM Wind Power for which it organized the transport of new LM wind turbine blades from China to Europe. Geodis Wilson's specialized Industrial Project division took over two 42 meter long blades from an LM production facility in China and shipped the blades to their final destination in Denmark—the longest, single cargo elements ever transported by air.

“The fact that we have an established network presence in both China and Denmark, along with a dedicated air charter division, on-site expertise, and technical support in this sector, certainly helped us to successfully manage this move,” adds Philippe Somers, senior VP of Geodis Wilson Industrial Projects.

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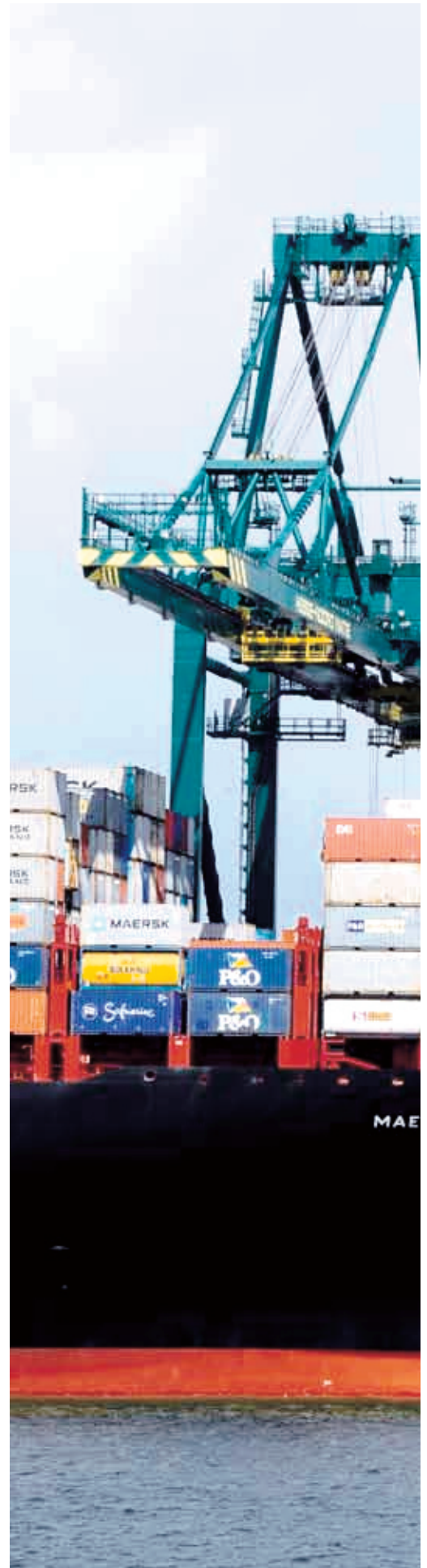
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Ocean Cargo: Regulations ahead

Europe's ocean cargo industry faces turbulent seas, just like the rest of the global community. In addition to the burden of the overall economic development, they have to cope with new environmental regulations.

Based on the latest proposal from the European Commission (EC) in July, the ocean shipping industry has to reduce sulfur dioxide emissions by up to 90 percent, and fine particle emissions by up to 80 percent by 2015. The EC is expecting a benefit for public health between 15 billion and 34 billion euros, far exceeding the expected costs—which are in the range of 2.6 billion to 11 billion euros.

The proposed legislation revises the directive on the sulfur content of certain liquid fuels and incorporates new IMO standards into EU law to ensure their proper and harmonized enforcement by all EU Member States. Under the proposal, as of January 1, 2015, the maximum permissible sulfur content of maritime fuels used in sensitive areas such as the Baltic Sea, the North Sea, and the English Channel will fall from the previous level of 1.5 percent to 0.1 percent.

Ships will be allowed to use equivalent technologies such as exhaust gas cleaning systems as an alternative to using low sulfur fuels. Other changes proposed include more unified reporting and verification as well as sampling provisions aligned with international standards. The proposal is to be phased in from 2015 to 2020.

European ocean carriers, such as Hamburg Süd, have responded by investing in new technologies. Most of Hamburg Süd's new vessels, for example, are fitted with a novel common rail injection system or electronically regulated fuel valves. These new injection designs result in better combustion and subsequent fuel savings, especially in partial-load operation.

Exhaust emissions are therefore lower than with traditional propulsion engines. The most recently ordered ships of the "Santa" class, with a slot capacity of 7,000 TEU, will also be equipped with diesel generators for energy production using common rail injection.

In addition, the use of modern compressor technology in most of its fleet enables Hamburg Süd to operate extremely energy-saving reefer transport. And as one of the first shipping companies worldwide, Hamburg Süd has championed efficient scroll compressors since 1997.

In July of this year, Hamburg Süd was honored for its commitment to sustainability and the environment in the U.S. The San Pedro Bay Ports Clean Air Action Group, which is backed by the ports of Los Angeles and Long



For Lufthansa, the first half of 2011 saw a capacity increase that came mainly from the MD11 cargo aircraft being reactivated following the recession.

Beach, awarded the company its Air Quality Award. In the same month, the company also won the Gulf Guardian Award of the U.S. Environmental Protection Agency (EPA).

Future developments?

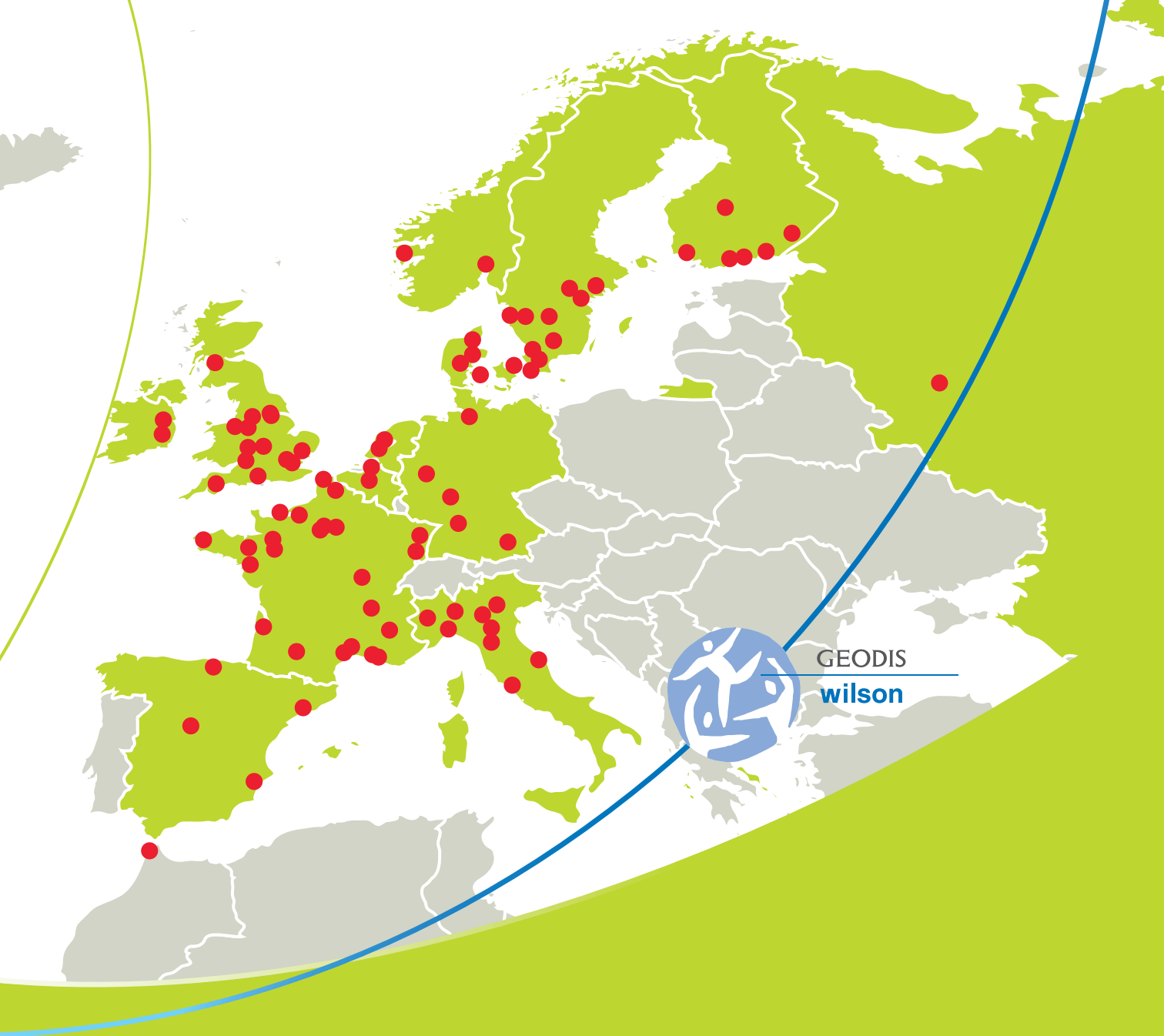
Many EU carriers and service providers have become very careful about making any predictions about the outlook for coming economic developments. The debt crisis in several European countries and the U.S., as well as the ongoing turbulence on the finance market, is a major source of concern for the transportation and logistics sector.

Since many investments require long-term planning, the overall market is hoping for favorable developments and to see positive results for the year as a whole—stay tuned.

—Dagmar Trepins is a European Correspondent to Supply Chain Management Review and Logistics Management

Web links to EU organizations mentioned:

iata.org
airfrance.com
lufthansa-cargo.com
portofantwerp.com
hafen-hamburg.de/en
duisport.de
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Global Sourcing Calls for Due Diligence

When considering sourcing from an offshore country, supply managers need to focus on more than just the cost of the product or material. To come up with the right decision, many other factors need to be examined.



**By Becky Partida,
Knowledge
Specialist-
Supply Chain
Management,
APQC**

Global sourcing has long been seen as a way to cut costs. If your organization is currently considering or reconsidering global sourcing, you're likely aware of the potential for obtaining lower prices on materials through global sourcing. But are you also aware of the potential for the other, sometimes hidden, costs associated with purchasing globally?

In deciding what and where to source globally, companies need to consider many factors over and above the attraction of lower priced materials. These span the entire range of the procurement process—from developing a global sourcing strategy to identifying suppliers to receiving goods and evaluating the delivery. Organizations must also remember that the global situation can change. Thus, they need to regularly revisit their sourcing strategies to maintain the best value over time.

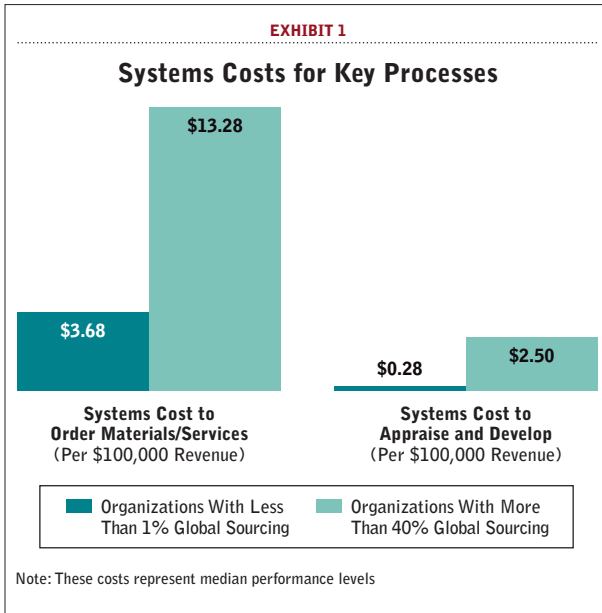
Identify the Upfront Investment

Organizations that are evaluating global sourcing should consider the complete investment needed. Data from APQC's Open Standards Benchmarking in procurement provides valuable insight into these costs. Participants in this benchmarking initiative indicated the percentage of their purchases sourced from other countries. For the purposes of analysis, APQC divided participants into groups based on the extent

to which they are sourcing globally. For this discussion, we looked at the two ends of the spectrum—that is, companies reporting less than 1 percent of purchases sourced globally and those reporting more than 40 percent sourced globally.

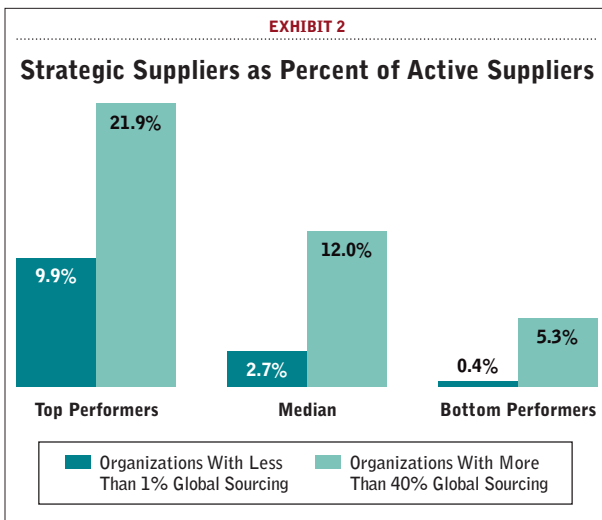
There were some notable differences in the metrics between these groups. At the midpoint (median) of the group conducting minimal global sourcing, their cost of developing sourcing strategies was \$.27 per \$1,000 in revenue. Organizations conducting the most global sourcing (i.e., over 40 percent) reported a cost of \$.46 per \$1,000 in revenue for this activity. For an organization with \$5 billion in revenue, this translates to \$950,000 in higher sourcing strategy costs. Part of the difference between the two groups is driven by systems costs. These were \$.96 per \$100,000 in revenue for the organizations with heavy global sourcing. By contrast, those with minimal global sourcing reported no systems costs per \$100,000 in revenue. (Later in the discussion we'll look at systems costs for two specific sourcing activities—ordering materials/services and appraising suppliers.)

Costs to develop a sourcing strategy typically include those related to clarifying purchasing requirements, matching needs to supplier capabilities, analyzing the spend profile to identify high-opportunity categories, matching the most effective sourcing strategy by category, seeking opportunities to improve efficiency and value, and collaborating with suppliers to identify sourcing strategies. However, there are other potential costs that organizations may



not consider when developing a global sourcing strategy. Matt Gersper, president and founder of the sister companies CUSTOMS Info and Global Data Mining (CiGDM), which provide data services on global trade, identifies the following factors that can influence the investment needed for a successful global sourcing strategy:

- Correct classification and documentation for materials leaving or entering a country.
- Requirements by other governmental agencies for materials entering a country.
- Foreign inland transportation costs and time, as well as foreign customs processing time.
- International transportation costs.
- Domestic customs processing time and inland transportation costs and time.
- Post-entry customs issues and delays.



- Additional costs in duties, taxes, and fees associated with importing materials.

- Changing variables and trends for a particular material.

The influence of each of these factors can vary based on the materials ordered and the timing of the order. For example, in January 2012 the World Customs Organization will release new amendments to the Harmonized Commodity Description and Coding System that will change the classification codes for many materials. These changes have the potential to cause delays in customs processing or impact tariff rates.

Appraising Suppliers and Ordering Materials

APQC's Open Standards data also indicates that organizations sourcing globally have overall higher costs associated with appraising suppliers and ordering materials. For those organizations conducting more global sourcing, the median cost reported for appraising suppliers was \$.48 per \$1,000 in revenue. They also reported that ordering materials cost them \$1.85 per \$1,000 in revenue. The median among organizations conducting less global sourcing reported that appraising suppliers cost them \$.33 per \$1,000 in revenue and that ordering materials cost \$1.21 per \$1,000 in revenue.

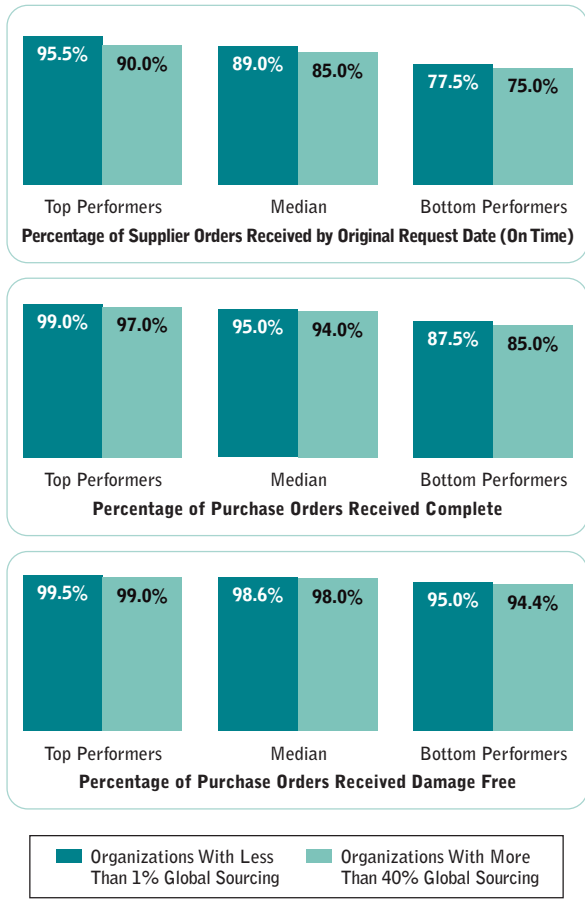
The data indicates that when an organization wants to source from another country, more time and resources must be devoted to researching potential suppliers, developing a method for evaluating those suppliers, and conducting any necessary supplier training and certification. This may be particularly relevant for suppliers located in still-developing countries that may need additional mentoring.

The heavy global-sourcing organizations reported dramatically higher systems costs related to the processes of appraising suppliers and ordering materials (see Exhibit 1). These higher systems costs may be attributed to the complex electronics systems needed to order from suppliers in other countries. At the same time, the Open Standards data indicate that organizations conducting more global sourcing devote fewer full-time equivalent (FTE) personnel (34.93 FTEs) to ordering materials per \$1 billion in purchases than do organizations conducting less global sourcing (47.62 FTEs). Global sourcing necessitates more sophisticated systems, but once these are in place fewer full-time personnel are required to purchase materials.

Organizations conducting more global sourcing take steps to streamline their procurement process by buying primarily from strategic suppliers (see Exhibit 2). Organizations in this category have significantly fewer active suppliers in their supplier master file per procurement FTE (3.96) than those conducting less global sourcing (77.88). The high global sourcing organizations also reported a significantly higher percentage of strategic suppliers among their active supply base and a higher annual

EXHIBIT 3

Timing and Quality of Delivered Material



purchase value from certified suppliers. They reported that 80 percent of their purchase value is from certified suppliers, compared to 70 percent reported by low global sourcing companies.

Another factor to consider in relation to global sourcing is the quality and timing of materials received from other countries. Within APQC's Open Standards data, organizations conducting more global sourcing reported lower percentages of orders received on time, orders received complete, and orders received damage free based on all orders received (see Exhibit 3). Ordering from greater distances appears to negatively affect both the quality and timing of receipts. However, an organization needs to balance any such impacts against the potential benefits of global sourcing.

Establishing and Maintaining a Global Strategy

Given the many factors that contribute to the cost of global sourcing, how can an organization determine the sourcing strategy that offers the best value? Potential internal costs may be relatively straightforward to determine, but identifying the full sourcing investment associated with a particular country is more difficult. Gersper emphasizes the importance of evaluating the total landed costs of purchasing globally. This includes not only the cost of the material itself, but also the shipping costs and any duty fees and taxes that will be assessed by the source and destination countries. He also encourages the use of predictive analytics to make the right sourcing decision. "There's a lot of data out there that can help you predict those countries with the highest sourcing demand and the lowest duties and taxes," Gersper says.

The global trade expert points to one other activity that can streamline the sourcing process and lead to important savings: Getting procurement involved early on in the design and development of new products. In the development process, Gersper notes, procurement can evaluate the proposed materials for a product and evaluate potential sourcing countries based on factors such as the amount of the materials needed; whether the countries have free trade agreements with the United States; and the respective duty rates of potential sourcing countries. Aspects of product design may be tweaked to obtain materials with an overall lower price. For instance, a company producing an article of clothing may be able to specify a different type of cloth to obtain the best value.

With all the attention being paid to global sourcing, organizations can't forget that they must still conduct a close analysis and review of all conceivable related expenses—both internal and external—to determine whether a given global sourcing initiative makes sense. These factors may change depending on the material to be sourced or the industry. Organizations that already have a global sourcing strategy in place need to stay informed of any political and economic changes that may affect their bottom line. Over time, they may even find that lower costs shift to near-shore or domestic suppliers. Having all the facts and paying attention results in smarter purchasing decisions.

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