THE UNIVERSITY of TENNESSEE
Center for Executive Education

Supply Chain Game Changers

A Practitioner's Guide For
Driving Competitive Advantage within Your Supply Chain

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The Future is Now

The Great Recession of 2008-2009 and its enormous disruptions is a driving force causing many executives to fundamentally rethink their supply chain strategies. Times like these don't occur often; but when they do they bring vast opportunity for some firms-and enormous risk for others.

Firms who continue business as usual, rather than fundamentally altering or at least updating their supply chain strategy are truly playing dice with their future. Unfortunately based on supply chain assessments we do at the University of Tennessee, less than 15% of firms are truly engaged in revamping their supply chain strategy given the new post Great Recession world we will face. Those few who seize the day have an opportunity to change the game and achieve real competitive advantage. What are the potential game changers that firms should embrace as they face the future? This white paper will discuss ten *game changers* as well take a stab at anticipating the "next big thing."

This white paper is intended to be a resource guide for practitioner's, providing an overview of the ten Game Changers that we believe should be the foundation of any supply chain strategy developed today. Each Game Changer is addressed to assist practitioners gain an understanding of the trend and its importance as to the supply chain profession. Each section shares case studies, about companies who enlist the strategy to their competitive advantage, additional resource links, where you can learn more about each topic and our suggested action, to glide the practitioner.

We close the paper with a look at what could well be *the next big thing*, Vested Outsourcing. We believe this strategy could be the game changer of the next 5 to 10 years and will forever change the way companies approach their critical outsourcing relationships.

The University of Tennessee and the authors hope this white paper will become a must read for today's supply chain managers. As you read each section, we encourage you to ask yourself *"is my company adopting this Game Changing Strategy to drive competitive advantage in our supply chain"*. If you don't, your company is at risk of being left behind.

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With special thanks to Shawn Bhimani.

Fast Facts Companies Cannot Ignore

Identifying Trends

Although many changes are industry specific, some undeniably influence every supply chain around the world, such as the volatility in fuel prices or the current financial and credit crisis or the impact of a globally interconnected world. We believe it is important to highlight a few of the underlying **trends** that are driving our list of supply chain **Game Changers**.

A few of these, sometimes conflicting trends, are identified below and will be referenced throughout this white paper.

- Dramatic effects of the recession further bringing a firm's supply chain front and center as the key to its financial success.
- Record oil swings causing companies to reevaluate transportation and distribution tactics.[1]
- Retailers and manufacturers pushing inventories further up the supply chain.
- Warehouse building costs skyrocketing before the recession and expected to again.[2]
- Great swings in transportation costs focusing a corporate spotlight on this area.
- Total business inventories rising.[3]
- Spending on supply chain technology set to increase significantly. [4]
- Supply chain risk increasing, with an Accenture report finding that 73% of global supply chains have experienced supply chain disruptions over the past five years, 94% of these have impacted profitability and customer expectations.[5]
- The global environment becoming increasing volatile, with outsourcing trends fundamentally changing.

These external trends (and many more) are motivating companies to take a close look on how they are managing their supply chains

Trend 1: The Mandate for Measurement

Forces Driving the Change

In the post Recession future, a firm's supply chain will increasingly determine its success. We find in our supply chain audits, that properly measuring performance matters. When a company measures performance, according to the principles described below, it achieves lower cost, lower working capital, and higher product availability. But firms must be very deliberate in setting up their performance management system and performance metrics.

Without proper metrics, a supply chain could be much like a boat at high tide, unaware of the jagged rocks (problems) that exist underneath. Supply chain metrics are a way to identify issues in an organization and proactively address them before the inevitable low-tide swamps the firm. Therefore, performance management is the first Game Changer on our list.

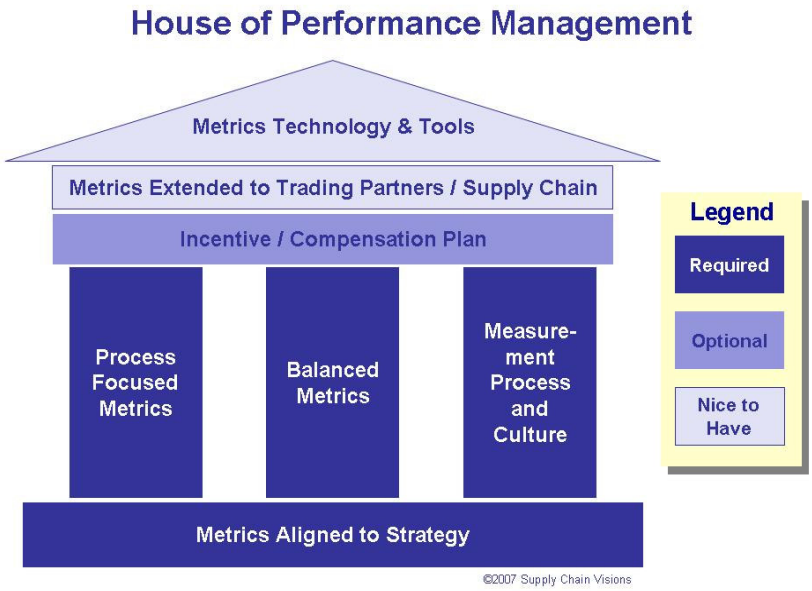
Performance management programs utilizing key performance indicators (KPI's) have grown in use because of their ability to tie corporate level strategy with operational practices, allowing companies to ascertain success and drive improvement. A 2008 Survey of Benchmarking Measures by the Warehousing Education and Research Council (WERC) reported that senior managers from companies large and small and across all industries have a significant interest in performance measures. [6] The survey reports that the interest in measurements since 2007 has increased by 57%.

The Successful Building Blocks of Performance Management

An effective performance management program starts with a clearly defined business strategy or objectives that are tied to tactical initiatives and measurable targets. With a corporate strategy and tactical plan, each functional area within the company can then develop process metrics which ensure that all groups are aiming for the same target. Or, put another way, each group's process metrics help to validate the group activities progress to the overall corporate goals.

From this solid foundation of corporate strategy, along with its goals and objectives the building blocks of a performance management program can be laid. A world class supply chain performance measurement system rests on the three essential pillars of process orientation, balance, and the role of culture in creating a discipline of continuous improvement within a company. As depicted below, the roof of the house of performance management is made up of incentive and compensation plans aligned to the corporate goals. In the ideal

model, these are extended to trading partners and finally capped by technology and tools. (See figure below)



Supply Chain Metrics: How to choose?

It can be a daunting proposition to decide which metrics have maximum utility for your company. While it sounds relatively simple, there are hundreds of possible metrics and deciding which metrics are useful can be an arduous task. Some key guidelines are:

- Take a balanced approach to metrics, it is critical
- Use customer focused metrics
- Don't measure everything, focus on a few key metrics
- Align metrics to your strategy

There are a number of supply chain oriented associations that can shed light on what to measure while providing some useful benchmarking data. We suggest APQC (American Productivity and Quality Center, the Supply Chain Council and the Warehousing Education Research Council (WERC) as three good resources.

The Importance of Benchmarking

We have seen that companies are not only measuring more but they are using metrics to improve their operations. WERC has been surveying key DC measures since 2005. What is evident in that time is that the good are getting

better but at the same time the gap between the median performers and the best in class performers has narrowed. (See table below)

WERC DC Measures
Trends 2005 to 2009

Measure	2005		2009	
	Median	Best	Median	Best
On time shipments	98.0%	> 99.3%	98.8% ↑	> 99.9% ↑
Order picking accuracy (percent by order)	99.0%	> 99.8%	99.0% ⇔	> 99.9% ↑
Fill rate - line	96.0%	> 99.0%	98.0% ↑	> 99.9% ↑
Order fill rate	96.0%	> 99.0%	98.0% ↑	> 99.9% ↑
Backorders as a Percent of Orders	5.0%	< 2.0%	3.2% ↑	< 1% ↑

↑ *Improvement* ⇔ *No Change*

The study also found that executives support measurement and benchmarking as a key practice in most organizations, supporting both “quantitative” and “qualitative” benchmarking.

Quantitative benchmarking refers to the practice of taking measurements of lead times, compliance levels, inventory levels, etc., and comparing them to similar measurements reported by other companies. Quantitative benchmarking is very useful, especially as it links to financial performance, and serves to determine how a company compares against its competition and top performers in all industries. Qualitative or process benchmarking uses descriptions of work practices and methods to make similar comparisons. However, to determine how to improve performance on measures, companies need to benchmark their processes. Once the gaps in performance are understood companies should prioritize improvements based on their strategies while effectively allocating limited resources.

Case Study – EMBARQ ™ Logistics

EMBARQ ™ Logistics is the fifth largest local communications company in the United States. EMBARQ ™ provides a suite of communications services to customers in its service territories.

After a quantitative benchmarking project in 2004, EMBARQ ™ decided to assess its processes as part of its ongoing initiative to improve operations. Its expectations for the benchmarking initiative were as follows:

- Improve supply chain performance
- Drive alignment on what is most important to the business, and focus on "root cause" problems versus symptoms
- Standardize metrics to be used on an ongoing basis and obtain more comprehensive information to drive improvements and priorities
- Understand what is possible and use that information to set goals and prioritize investments—with a clear focus on what is best for the customer

Two different assessments conducted three years apart, providing the opportunity to measure process improvements, refine the assessment methodology, and contrast the results from the first implementation to the next. The findings and resulting gap analysis were used to iteratively work toward the goal of becoming a top quartile performer across the entire enterprise. EMBARQ ™ Logistics also performed a qualitative process assessment in order to have a more complete picture as to what drove the metrics and to help guide improvement initiatives.

The assessments enabled the company to make detailed decisions regarding specific requirements for process changes. Within two years of the completion of the first assessment, EMBARQ ™ Logistics had achieved distribution productivity gains of 23.6% driving $1.7 million in annualized savings[7] showing that measuring performance and actively working to improve performance has tangible bottom line results.

Benefits

Companies that measure performance and who have a robust performance management program, including benchmarking, can achieve better performance by:

- learning how excellence is achieved in similar companies;
- sharing knowledge about common problems whining the company and with trading partners;
- setting appropriate performance measures and targets for improvement;
- enabling and empowering employees in making change happen;
- extending a culture of continuous improvement.

Companies measure performance in order to improve, and it works, according to Lisa Higgins, chief operating officer of APQC: "Top-performing companies spend 56% less on total supply chain management than median performers. Top performing companies' cash to cash cycle is 39% more efficient than the median performers and top-performing companies' perfect order performance is 5% better than the median performers." [8]

Call to Action: We find that many companies "game" their metrics, and in the process do themselves a great disservice. They manipulate numbers, often by throwing out items they don't like creating a disconnect in management's "perceived" performance level and those reported by their customers. The rationalizations for this practice are creative, but unfortunate. The Warehousing Education Research Council's (WERC) Annual Benchmarking study asks companies what level of performance customers would say the company was achieving. Statistically, 50% of companies must exist at or below the average; but in the survey, 84% of respondents marked themselves as at average or above average. This means that some companies are under the false impression that they are keeping up or surpassing their competitors and delighting their customers, thereby unknowingly giving their rivals an upper hand.

Action Item: Develop a supply chain strategy that is supported by a set of customer-focused metrics that challenge you to stretch beyond your comfort zone and become best in class.

Additional Resources

To read more about Supply Chain Metrics, Visit:

- The Warehouse Education and Research Council: Read ground-breaking reports on benchmarking and the use of supply chain metrics across industries. http://www.werc.org/
- Harvard Business Review: Metrics That Speak to the C-Suite, 04/01/05 – An older, yet well-written article, that gives a C-level look at supply chain performance metrics. http://harvardbusinessonline.hbsp.harvard.edu/
- APQC is a leading resource for performance analytics, best practices, process improvement, and knowledge management worldwide. It offers detailed supply chain benchmarking at no cost for organizations that enter their metrics into the Open Standards Benchmarking Collaborative℠ (OSBC) database. www.apqc.org

- Supply Chain Management Review: Two articles will give you a breath of information about benchmarking with SCOR and the issues with using metrics as employee incentives. http://www.scmr.com.
    - Article: Benchmarking: Get the Gain Without the Pain, 4/1/08
    - Article: Motivating Supply Chain Behavior: The Right Incentives Can Make All the Difference, 5/1/07

Trend 2: Collaboration

Forces Driving Collaboration

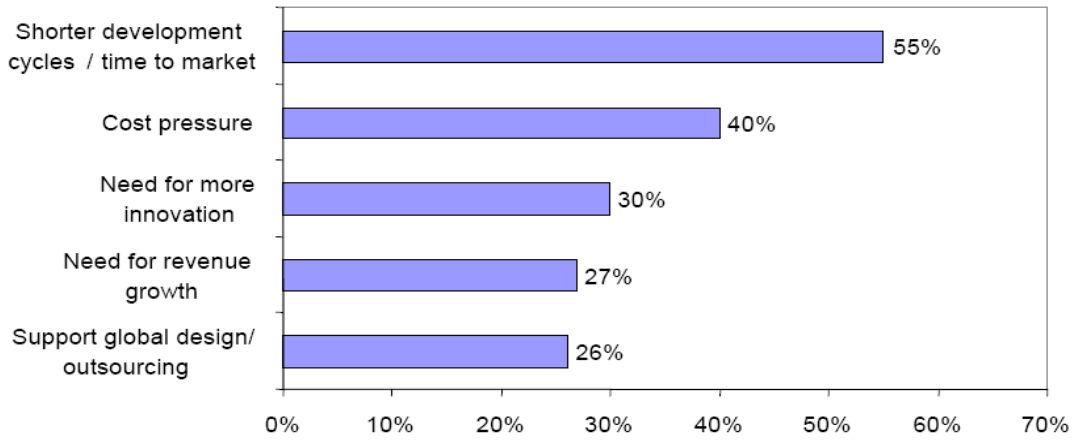
In the past, there has been a lot more talk than action in the area of collaboration across functional silos inside the firm as well as collaboration outside with trading partners. But that is beginning to change.

Research overwhelmingly supports that collaboration is on the rise.

- A recent APICS lean study reports that real-time demand collaboration has more than doubled in the last three years (5.1% to 11.2%).[9]
- A study by AMR Research shows a projected increase of 12 percent in spending for supply chain Product Lifecycle Management (PLM) technology.[10] This strong emphasis on spending has been for software relating to collaboration (especially regarding Sales and Operations Planning (S&OP) and Vendor Managed Inventory (VMI) models). [11]
- An Accenture study shows that 78% of executives voted that "developing collaborative relationships in supply chain planning and execution operations with your trading partners" as very important. This is an increase from 54% in the last four years. [12]
- Collaboration is a hot topic, in the last 2 years the number of books publised with collaboration in the title has grown over 500%.[13]

The Foundation of Collaboration

There are many types of supply chain collaboration, including but not limited to: design, value chain, projects, real-time, and modeling. Aberdeen research surveys have found that the most important forces for collaboration have been:



Source: Aberdeen*Group*, June 2006[14]

CPFR

CPFR (Collaborative Planning, Forecasting, and Replenishment) is essentially the broad integration of firms in the supply chain, working together to focus on customers through the creation of a shared forecast of demand. Successful CPFR implementations can reap rewards such as reductions in stock-outs, lower lead times, stronger relationships between trading partners, shorter cycle times, increases in sales revenues, improved inventory management , better overall system visibility and customer service, and improved cost structures.[15] CPFR is comprised of four over-arching activities:

1. Strategy and Planning – defining the relationship in terms of goal, scope, roles, and responsibilities.
2. Demand and Supply Management – Sales/POS forecasting, market data analysis, order/replenishment/demand planning.
3. Execution – Order generation and fulfillment.
4. Analysis – Exception management, execution monitoring, performance assestments with the use of scorecards. [16]

S&OP/SIOP

S&OP (Sales and Operations Planning) is the groundwork for integrated demand and supply chain planning. It allows marketing, sales, logistics, manufacturing and procurement to communicate, plan and identify every opportunity to replace inventory with information.[17] The goal of S&OP is to make superior tactical decisions with the mix of customers, products, channels, geographies, and price strategies. Companies that successfully implement S&OP are also able to deal more effectively with growing risks and uncertainties by developing contingency-planning based strategies.[18]

SIOP (Sales, Inventory, and Operations Planning) is the companion of S&OP, taking all of its advantages and adding a crucial element into the mix: Inventory. SIOP, similiar to S&OP, is designed to gain consensus between sales, finance, procurement, manufacturing and logistics. SIOP uses a structured planning process, allowing the supply chain to effectively utilize assets, increase service levels, lower finished goods inventory levels, and avoid lost sales.

What to Keep in Mind

Collaboration is a long, yet neccesary, journey that is both challenging and rewarding. Designing the process and implementing the technology comprise only half the battle. Culture plays a vital role in the success of a collaboration initiative. Companies that intend to implement enhanced collaborative

relationships must accept that true success is dependent on the culture of the company more than any other factor. The company culture must support a a foundation of trust between partners, along with the eradication of long entrenched fiefdoms, turfs, and silo mindsets. Not every company can make these changes.

Case Studies

CPFR in action: In 2001 Motorola turned to CPFR to improve sell-through performance to retailers. This meant realigning the companies business strategy, reworking key processes and organizational structure, and changing the overall relationships with its retailers. After CPFR was established, a process which took years, Motorola was able to reap the benefits of its investment. The result was were staggering: retailer inventory decreased by 30% (compared to non-CPFR retailers), transportation costs were cut in half, production capacity improved, retailer relationships were strengthened, and overall sales increased (in addition to promotion effectiveness). [19]

S&OP in action: "One of the earliest successes in the turnaround of Whirlpool's supply chain was the rollout of a new S&OP process. We soon pushed forecasting capability further by launching a CPFR pilot," says Reuben C. Slone, former VP of supply chain at Whirlpool. Within 30 days of launch, forecast error at Whirlpool was cut in half. For Whirlpool, each one point improvement in SKU / Location forecast accuracy yielded $3M in inventory reduction, as well as product availability improvements that imprcved customer statifaction and competitiveness.[20]

Benfits

Has collaboration lived up to the hype? The answer is a resounding "yes". Companies have realized the benefits of collaboration and make collaboration a key business priority. Best in class companies collaborate with supply chain suppliers more frequently than the other companies (72% vs 62%), and are 50% more likely to collaborate with outsourced teams. This has an impact on their ability to meet launch dates, hit target revenues, cut costs as well as increase lifecycle quality and value.[21]

Call to Action: As supply chains compete against each other for customer loyalty, collaboration is no longer an option. Collaboration involves trust between companies and the ability to overcome the barriers that have hindered

that trust in the past. Barriers include siloed organizational structures, resistance to change, lack of managerial support, process transparency and poor information sharing. If companies can overcome the barriers of collaboration, then they can enjoy lower costs, achieve higher quality, improve customer satisfaction, enhance visibility, and see greater levels of responsiveness in their supply chains.[22]

Action Item: Collaborate with your suppliers and your customers on win-win supply chain improvement initiatives; and just as importantly pursue process improvements like S&OP to break down the functional silos impeding your supply chain.

Additional Resources

To learn more about Collaboration, Visit:

- Voluntary Interindustry Commerce Solutions, *CPFR White Papers*. A collection of white papers detailing the implemendation of CPFR and a wealth of other information such as case studies, proposals, and data. http://www.vics.org/committees/cpfr/cpfr_white_papers/
- Aberdeen*Group* Research, *The Product Lifecycle Collaboration Benchmark Report.* This report highlights collaboration through the product lifecycle and throughout the supply chain, including measurements on best practices. http://www.aberdeen.com/summary/report/benchmark/RA_PLMCollab_JmB_3192.asp
- Supply Chain Mangement Review, *The Future of Supply Management - Part 2: Technology, Collaboration, Supply Chain Design*: The second in a series about the future of supply chain management, with a great deal of emphasis on collaboration. http://www.scmr.com/article/CA6492748.html

Trend 3: Lean/Six Sigma Applied to the Supply Chain

Forces Driving the Change

There are a number of factors that cause companies to start applying Lean and Six Sigma concepts to the extended supply chain. Let's examine warehousing as an example. In the United States, there is over 5 billion square feet of warehousing, which is the equivalent to a 4.1 foot x 4.1foot square for every man, women, and child in the U.S. [1] The costs of storing goods has gone up as the demands on warehouses increase, warehouse building costs have skyrocketed, and warehouse space has shortened in supply.[23] Transportation and inventory costs have increased substantially as well. In 2006, everyone started focusing intently on the financial impact of the supply chain as, transportation costs rose 9.4 percent, total business inventories rose 6.2 percent, and inventory carrying costs jumped by 13.5 percent.[24] These external forces, and many more, have motivated companies to take a close look on how Lean and Six Sigma can help them optimize performance in the extended supply chain – not just in manufacturing where lean concepts were first made popular.

The Foundation of Lean/Six Sigma in the Supply Chain

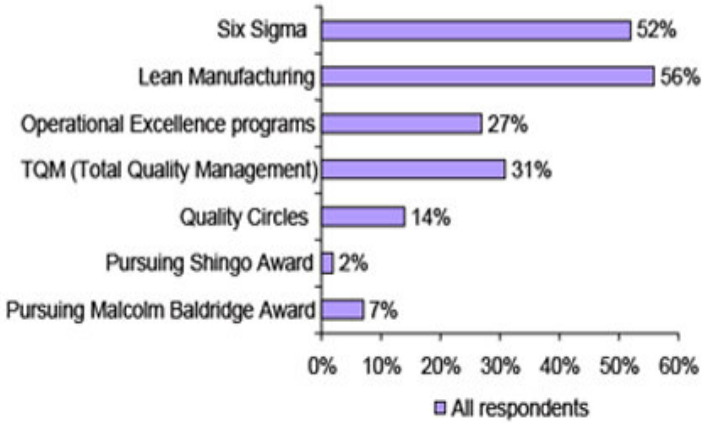
Lean strategy focuses on maximizing value through the reduction of waste in materials used and processes/activities performed. Lean has been used pervasively in manufacturing across a wide range of industries for decades. To realize the benefits from Lean, beyond the manufacturing floor, companies are adapting the key principles of Lean to build efficient, fast, flexible and collaborative supply chains.

Six Sigma a Powerful Compliment to Lean

Over the past ten years, Six Sigma has become a powerful compliment to Lean. Six Sigma is, at its root, a set of tools used to drive down process variation. The Six Sigma process strives to allow no more than 3.4 defective parts per million units produced. It is now often employed in tandem with Lean tools to deliver outstanding customer value, with minimum cost or asset investment. Working together as an extremely powerful combination, Lean eliminates waste and reduces cycle time, while Six Sigma reduces process variability. While both concepts have historically been applied in the manufacturing environment, they are now being used to revolutionize the way that the entire supply chain operates.

'Going Lean'

Companies adopt Lean/Six Sigma strategies for a variety of reasons. For the most part, those wanting to "trim the fat" choose Lean and Six Sigma to improve operational performance, reduce operating costs, shorten order cycle times, gain competitive advantages in price and service, and to meet consumer demand for lower prices. Although all major enterprises are engaged in some kind of quality related initiatives, Lean and Six Sigma are at the top of the list (Aberdeen Group) of strategies to lower cost, reduce assets, and increase efficiency. Part of this can be attributed to the success that Lean and Six Sigma initiatives have had in manufacturing. Indeed, as enterprises mature, their priorities shift from cost-cutting strategies on the manufacturing floor to the entire supply chain, and Lean/Six Sigma initiatives hold promise to achieve that next step.



Source: Aberdeen Group, September 2006

Speed Bumps

Implementing any type of change in an enterprise is undoubtedly met with obstacles which must be addressed, and enabling a Lean philosophy across the supply chain is no different. A research survey by Aberdeen found that cultural change was the largest challenge in enabling Lean. The cultural transition arises from a change in perspective, in metrics, and definitions of success. Bill Owad, Senior Vice President of Operation Excellence of Cardinal Healthcare stated "The biggest hurdle in the first 12 months of our Lean initiative was helping people understand the way they were now going to work. We had to communicate why the process was changing, and what it meant to each employee." Other issues, such as top management commitment and a lack of participation by suppliers/other partners make the list of the biggest hurdles in a Lean supply chain initiative.[25]

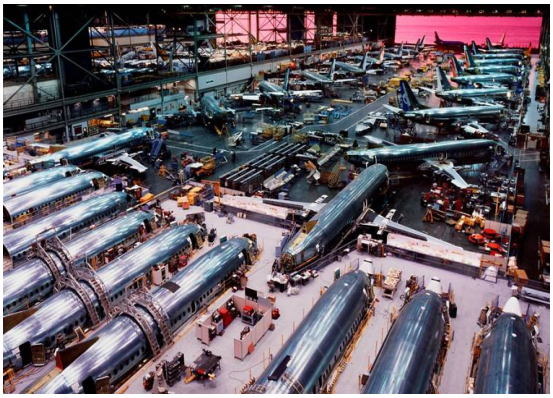
The Role of Information Technology

Although early proponents of Lean were not especially concerned with the help of technology, the modern idea of Lean as a supply-chain wide initiative has created the need for integrated processes. This coincided with the emergence of ERP (enterprise resource planning) software and decision support tools such as APS (advanced planning systems). Recent advances in information technology allowed for more robust analytical tools, web-based solutions, and real-time accurate access to production information (See Trend 5: Supply Chain Systems).

Case Study

A prime example of a supply chain going Lean is Boeing, which streamlined its operations in the mid 1990's. At that time, Boeing made substantial changes using Lean and is currently reaping the success of those changes. One goal was for the Super Hornet program to reduce defects by 90 percent from 1998 to 2003, but the goal was reached by 2001. The AH-64D Apache Helicopter used Lean/Six Sigma to reduce build hours by 54% and increase build rate by 218%. As early as 2002, the Boeing 737 program lowered flow time by 30 percent, reduced crane movements by 39 percent, lowered inventory levels by 42 percent, and reduced floor space by 216,000 square feet (see below).[26]

Boeing original 737 Plant (before)



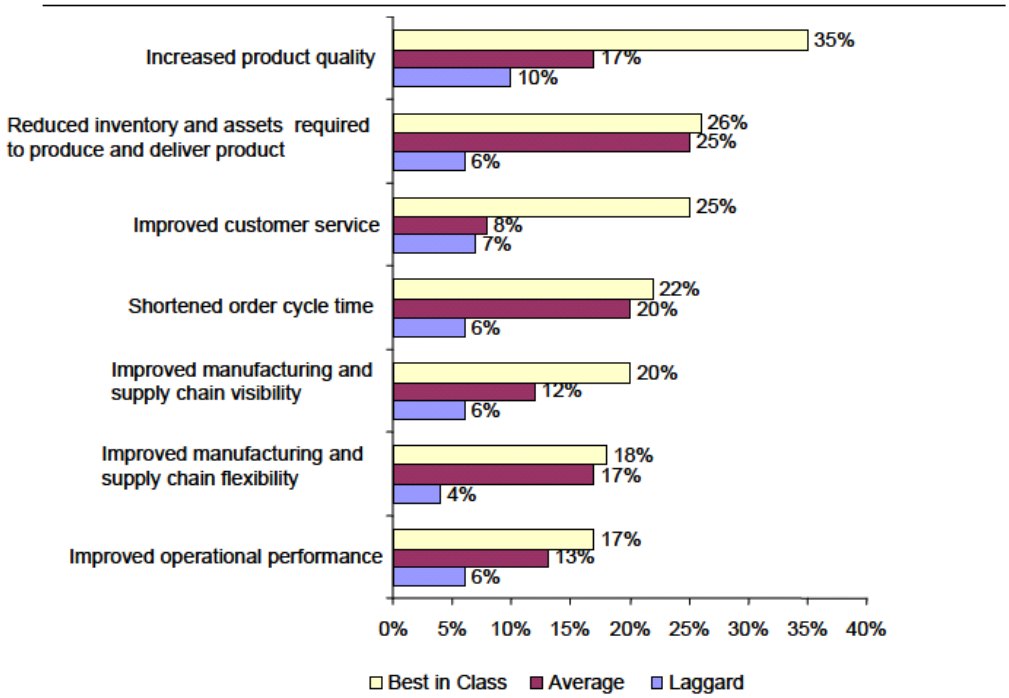
Boeings Lean 737 Plant (after)

Source: Boeing

What started as manufacturing shop floor focus has now expanded across the entire supply chain in some firms. However, Lean/Six-Sigma implementations are still in their infancy in most companies once outside the four walls of the manufacturing environment, offering an enormous potential opportunity for major advances in performance.

Benefits

Lean and Six-Sigma initiatives have led to a number of supply-chain benefits. Successful implementations have shown increased product quality, reduced inventory and asset requirements, improved customer service, shortened order cycle time, improved visibility/flexibility, and an overall increase in operational performance and cost efficiency. Business Metrics (such as schedule compliance, ROI, and Order Fill Rate) are used to drive the increases in performance. (See Trend 1: KPI's) Implementing Lean/Six-Sigma often involves an insatiable quest for process improvement. The following graph shows the major advantage in implementing lean:



Source: AberdeenGroup, August 2006

Call to Action: The current world economic state leaves no room for waste or inefficiency. Best in class companies who have extended Lean into their supply chains are witnessing cost savings improvements 40% greater than companies who only implement the basics of Six Sigma and Lean in manufacturing alone. Through proper and successful implementation, companies can protect themselves from the burden of extra costs or financial obligations, while running more efficiently and profitably.

Action Item: Start by doing a high level value stream map of your end to end supply chain, and then apply a full program of Lean and Six Sigma to your

operations. Getting a clear picture from the value stream map will likely surprise you with many opportunities for saving.

Additional Resources

To learn more about how Lean and Six Sigma, check out:

- APICS Lean Supply Chain Study, http://ww.apics.org
- Journal of Business Logistics , *Modeling Lean, Agile, Supply Chain Strategies*, Vol 27, No. 1, pg. 57, 2006
- AberdeenGroup, *The Lean Six Sigma Benchmark Report*, September 2006, http://www.abderdeen.com
- AberdeenGroup , *The Lean Benchmark Report: Closing The Reality Gap*, March 2006, http://www.abderdeen.com
- Supply Chain Digest, SCDigest Letter on Lean Manufacturing: Contains some excellent materials on various improvement program approach (Lean, Six Sigma, Theory of Constraints) as well as the move from Lean for manufacturing to Lean for Supply Chain http://www.scdigest.com/Lean_Manufacturing_Resources.php

Trend 4: Managing Complexity

Supply Chain Complexity

Complexity in the supply chain can take the form of product complexity or process complexity. Both can be driven by customers demanding more choice in products and services. *Unnecessary* complexity is an anchor on the firm and its supply chain performance.

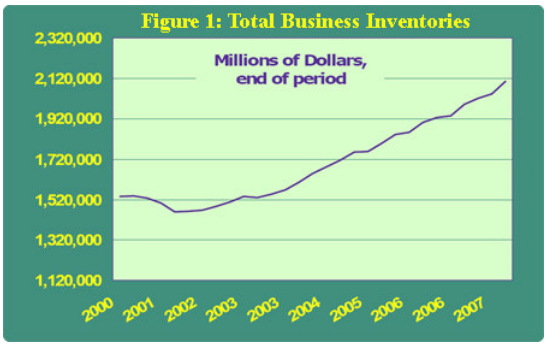
Product Complexity - Forces Driving the Change

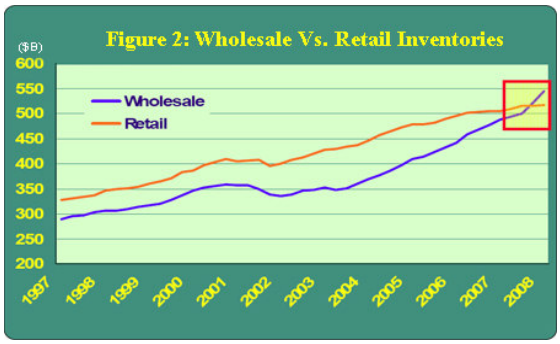
This is not your father's supply chain. Gone are the days of pushing products at consumers who are allowed to only choose from a handful of options. The complexity of modern supply chains is a testament to the shift of power from the company to the consumer. Consumers have come to expect value, features, and further innovation from companies at an unprecedented rate. Take for example Coca-Cola classic. The brand that made the world sing offered one taste that the whole family could love, or did it? Today, consider walking down the isle of your favorite retailer to find sixteen different types of Coke® in the United States alone. The Coca-Cola Company has more than 450 brands in over 200 countries world-wide. How did the change from 'the staple product' to a laundry list of variety occur? Adept market research capabilities, coupled with high-speed communication, are just two of the factors that made product proliferation possible.

Companies are quickly learning what consumers want and are taking aggressive measures to satisfy such cravings. The problem is that every product line that a company creates requires product roll-outs, more SKU's, more inventory, employees to monitor that product line, and an exponential increase in the challenge of providing suitable product availability.

Multiple product lines are not the only factor creating major challenges for supply chains. In addition to product proliferation, there are trends such as global sourcing, dynamic and tightening delivery schedules, pressures to reduce costs and to penetrate local markets, environmentalism, and an increased volatility in fuel costs. In addition, total business inventories continue to trend up (Figure 1), and warehouse inventories have surpassed inventories

at the retail level (Figure 2).[27] As inventories increase (especially as they move forward in the supply chain), complexity increases because of the necessity to store more products variety at more accessible locations.





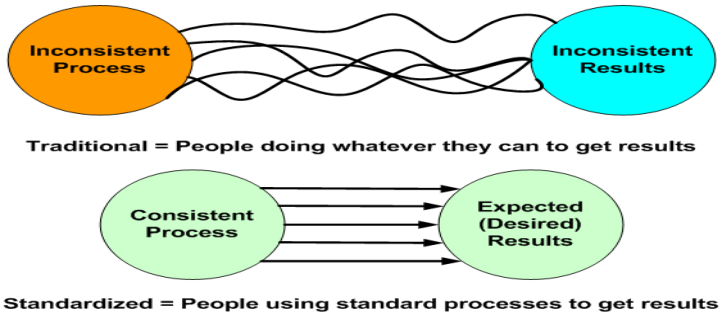
Source: CSCMP State of Logistics, 2008

The Foundation for Managing Product Complexity

Product life cycle management is essential to managing product complexity. The focus should be to simplify product lines as much as possible. This includes minimizing finished product SKU's, as well as minimizing unique components. Managing end of life processes is also important. Most firms do not aggressively manage products as they reach end of life. Best in class companies understand that products need to be retired as new products are brought on line; otherwise the number of SKUS continues to grow, along with cost and inventory, with the older SKUs contributing very little to overall profitability. Companies should continuously perform SKU rationalizations to keep their product lines fresh and competitive.[28]

Product Complexity

Just like products, processes and services can proliferate increasing the complexity and costs of operations. To reduce this complexity, many companies are focusing on process standardization. When standardizing processes, it is important that a company consider the firm's supply chain strategy with a constant focus on the customer.

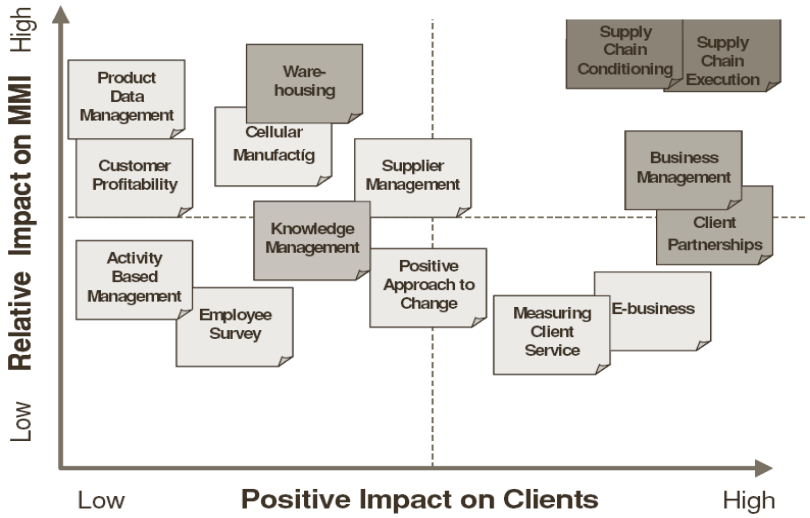


This concept is best explained using an example (see case study below).

Case Study

ModusLink (formerly known as Modus Media International) is an example of a company which successfully employed process standardization to simplify operations, reduce complexity, and achieve consistent results world-wide. Modus offers supply chain management solutions to technology-based clients. Modus found that its customers were being given varying levels of service despite its uniform global strategy. The firm used scorecards to rank its processes and then created a map to determine which four processes would first be standardized (as seen below). By focusing on what would impact clients positively, Modus was able to understand customer value and reduce waste, redundancies, and inventory levels while increasing customer service levels. One site in Scotland saw:

- 64% less working capital required
- 35% reduction in inventory costs
- 61% decrease in order cycle time as well as a 29% increase in inventory turns [29]



Source: Global Process Standardization: A Case Study

Benefits

Complexity can slow a company down in every functional area. Product development, IT systems, delivery methods, etc. are all negatively affected at an increasing rate by the proliferation of complexity. At the University of Tennessee, we found that Best in Class companies with lower than average SKU complexity in their supply chain had, on average 6% higher profit margins

than their competitors. So ask yourself, what could you do with that extra 6%? And what are your competitors doing with it?

Call to Action: The modern supply chain requires companies find ways to manage complexity in order to remain competitive and deliver value to consumers. Products are often delayed in shipment or in time-to-market because of the excessive complexity of processes. As the forces that drive complexity (such as globalization, customer needs, SKU/product proliferation, etc.) continue to grow, supply chain managers are moving toward the goal of establishing measurable and consistent global practice's that can efficiently attain organizational objectives.[30]

Action Item: Reduce unnecessary product complexity by installing a disciplined process to manage SKUs at both the beginning and end of their life cycle.

Additional Resources

For additional reading on Managing Complexity, visit:

- Harvard Business Review, *Drive Complexity Out of Your Supply Chain*, Rick Hoole, 2006: An article that describes supply chain complexity, a simplistic approach to the issue, and how to combat it with simplicity. www.hbsp.harvard.edu/products/hbr/index.html
- PRTM, *Deriving Benefit From Supply Chain Complexity*, Peter Vickers and Alex Kodarin, 2006: Written in tandem with HBR article, this is an overview on complexity (and the results of a survey on supply chain complexity) that shows how a firm can derive advantage from complexity. www.prtm.com/
- Journal of Business Logistics, *Global Process Standardization: A Case Study,* Karl B. Manrodt and Kate Vitasek, 2004: A step by step case study on ModusLink highlighting process standardization implications and offering implementation recommendations. http://cscmp.org/resources/jbl_public.asp
- Supply Chain Digest, The Supply Chain Complexity Crisis, June 12, 2008: Excellent article summarizing the costs of supply chain complexity and benefits of reducing it http://www.scdigest.com/assets/FirstThoughts/08-06-12.php

Trend 5: Supply Chain Technology

Forces Driving the Change

Years ago, the limited power of computers made practical optimization impossible, but the realization of Moore's Law (which states that computing power doubles every twenty-four months or less) has changed that. The assumptions of supply chain executives about what is possible can become obsolete almost overnight. For example, if Moore's Law continues as it has since it was declared decades ago in 1965, then computing power in just three years will be 300% greater than today! Things that used to be tedious will suddenly become simple. Therefore, it is essential that an organization stay abreast of the rapidly changing technological environment, especially in the use of optimization software.

The Foundation for Supply Chain Systems

The goal of end-to-end supply chain visibility has been limited by technology and the capital investment required to monitor inventory in real-time. Now, both of those barriers are falling as companies are pursuing inventory reduction using visibility solutions. The vision is to have a fully integrated supply chain, which despite the challenges of implementation, holds much promise to global companies. Two trends in technology, RFID and Service Oriented Architecture, are gaining traction and visibly changing the face of supply chain systems around the world. Other trends influencing the focus on supply chain systems include inventory optimization, functional outsourcing, globalization, and the growing need for supply chain transparency.

RFID

RFID dates back to World War II, when it was known as IFF and was used to identify friendly or hostile aircraft. In 1999 the Uniform Code Council, EAN International, Procter & Gamble and Gillette established the Auto-ID Center at the Massachusetts Institute of Technology (MIT) to research commercial uses of RFID. The Auto-ID Center created two protocols, the Electronic Product Code (EPC), and an internet-based network architecture which was able to remotely look up data on an RFID tag. The Uniform Code Council was granted licenses based on these protocols, and together with EAN International started the non-profit EPCglobal.[31]

A key drawback to the global advent of RFID has been the lack of standardization. Suppliers have used different sizes, frequencies, and coding

which caused RFID to lack compatibility between software packages. GS1, which now owns EPCglobal, has pioneered standards in RFID technology which allow for uniformity in protocols and interoperability between IT systems. With this standardization, RFID is shifting from hype to application. Although less than 10% of companies are committed to the technology[32], local installations of RFID for asset management have been met with tremendous success. The technology is now being bundled into enterprise software/ hardware solutions which has created packaged installations that require less change-over time. In addition, companies in the emerging markets of India and Brazil are using RFID as a foundation technology for building their supply chains systems from the ground up, showing that RFID is has scarcely met fruition and is here to stay.[33]

Widespread adoption of RFID still awaits more advances in cost and accuracy. As those barriers are overcome, it will emerge as a powerful tool to bring visibility to the supply chain, resulting in lower cost, lower inventory, and better product availability.

SOA and SaaS

For decades companies have relied on proprietary systems to provide support for reducing cycle times, savings costs, and increasing service levels. During this period, customizable packages, such as those available from SAP and Oracle, have dominated the market. While this has provided a company-wide solution, there are major disadvantages to proprietary systems, ranging from lack of interoperability with suppliers/customers, a redundancy of offerings tailored for each individual silo, to complex upgrade and removal issues. Now, the proliferation of the internet has changed the landscape of software, allowing it to break apart from a single proprietary package into smaller internet-based pieces.

Service Oriented Architecture (SOA) is based on the idea that each business activity can be supported by standardized web-based software that operates in conjunction with other pieces of web-based software, thereby forming the architecture of an entire suite that can satisfy the needs of any business. Each on-demand software is known as “Software as a Service” (SaaS), and is built with standardized protocols that are designed specifically for compatibility.

Imagine SOA as a shopping cart that you can fill with any software (SaaS) need for any activity you may have. The advantages of SOA are numerous allowing you to select best in class or best fit solutions allowing including the ability to add and remove certain pieces, upgrade seamlessly, and SOA negates the

need for an end to end package which can limit a company's future growth. Best of all, SOA can be out-sourced to reduce costs such as IT support, server costs, and mostly importantly the cost of proprietary software installation and maintenance.

The switch has already begun, with company's world-wide outsourcing their activity-based software to SOA providers. Microsoft recently invested $1.25 million in an SOA project that reduced the company's costs by $3 million annually.[34] While relatively small, it is important to point out that this was only a SOA pilot test for maintenance on a single IT system. The potential for SOA is boundless, and according to Adrian Gonzales from ARC Advisory Group, "SaaS deployment will continue to gain traction – especially in TMS (transportation management systems). Last year we conducted a survey of 28 leading TMS vendors and 60 percent of them expect subscription and transaction fees (a proxy for SaaS deployment) to grow significantly faster than license fees over the next five years. Not all vendors have a SaaS offering today, but they're all heading in that direction, including the large enterprise vendors."[35]

SOA is only a precursor of what is to come, as described in the AMR Book *2017: The End of IT as We Know It*, "As we head toward the future, the lines between technology and the business it supports continue to blur. In 2017, the applications will be the business processes, and companies need to start preparing now for that future."[36] In order to take full advantage of SOA, companies must re-organize their IT from a single entity existence to a collection of linked activities which operate toward one goal. Furthermore, replacing one or two activities with SaaS will reap rewards, but real synergy comes from re-engineering the whole company to become more focused, flexible, and efficient with a SOA as an IT backbone.

Barriers

RFID and SOA have a few barriers to overcome before taking the spotlight. RW Baird & Co. has identified three major barriers that are still hindering the growth of RFID: (1) common platforms that consider privacy, (2) regulation concerns, and (3) international standardization. Common platforms and standardization of the technology are moving forward by EPCglobal, but the privacy and regulation issues exist because every country or state can set their own laws on RFID.[37]

SOA installations have caused difficulty in some companies, especially when organizations purchase good software that simply doesn't fit the business need. Also, company IT implementers have underestimated the costs of SOA while

being unable to convey the flexibility and long-term savings to executives, turning many companies away from technology in the past.

Case Study

As regulation and compliance standards increased for employee safety standards, BP turned to RFID to go one step further. Over 6 months BP rolled-out a custom IBM-RFID system. The power of the RFID system gave BP the ability to reduce shrinkage by monitoring assets, increase productivity with proper spare parts management, and increase the accuracy of accounting and inventory reporting, all of which will save BP millions in future costs.[38]

Visa processed cardholder disputes manually in order to maintain compatibility with member bank's back-end and legacy systems. By taking a SOA approach, Visa was able to directly communicate with member banks legacy systems, allowing then to dispute claims, and request copies and original receipts automatically. System savings are approximated at $52 million per year in direct costs, and an additional $300 million in ancillary savings.[39] This exemplifies how taking even a small step toward SOA can revolutionize the way companies do business allowing them to run more efficiently than ever before.

Benefits

What happens when these two smaller trends, RFID and SOA/SAAS, come to fruition together? Supply chains around the world can move ever-closer towards end-to-end supply chain visibility. These technologies allow for real time event management, complete inventory visibility, lower system costs, and bringing the idea of a fully integrated supply chain to reality. RFID is heading toward usurping the ubiquity of the barcode by promising information at your finger tips while reducing overall costs. SOA/SAAS allows a company to cost-efficiently build an IT solution and escape the proprietary technology barriers that have shackled companies in the past.

Call to Action: Aberdeen research predicts that over the next five years, the top Global 2000 organizations have a potential to save $53 billion from their IT budgets as a result of SOA bearing fruit in reducing software implementation costs." How much are you willing to save?

Action Item: Evaluate the latest advances in supply chain technology, and implement the tools that make sense for your company.

Additional Resources

For more information on Supply Chain Systems, visit:

- The Service-Oriented Architecture in the Supply Chain Benchmark Report. A report that highlights the growth and implementation of SOA in Supply Chain's: www.aberdeen.com.
- Harvard Business Review, *The Next Revolution in Productivity*, David Plunkert. June 2008. This article covers the gamete on issues related to service-oriented architecture: www.hbr.com.

Trend 6: Network Optimization

What is Network Optimization?

Network optimization has been around for decades, but has had a recent resurgence because the tools have become better able to model complex supply chain networks. Companies are also facing a laundry list of external forces from changes in markets, widely fluctuating transportation costs and a host of regulations. These external demands all conspire against the ad-hoc networks of the past and are forcing companies to rationalize and fine-tune their networks in order to survive. Once a network optimization study is completed and a strategy determined, the following critical actions can be taken:

- Sources of supply are reconciled,
- Customer contracts and service levels are reviewed,
- Product mix is reviewed and optimized,
- Location, efficiency and duplication of facilities is addressed,
- Transportation lanes and contracts are reviewed,
- Leases and ownership are modified to meet current corporate goals.

Over the last decade the U.S. warehousing industry has experienced a rapid change in structure and a discernable geographic shift in the location of new facilities. Customer service requirements, supplier locations, inventory management requirements, and Lean manufacturing/logistics have caused warehouses to change in number, size and location according to the needs of the supply chain. It has also allowed the optimization of push-pull supply chain strategies.

- Over the last decade, the number of Mega-DCs has exploded as new technologies have enabled them to realize economies associated with both scale and flexibility. [40]
- ProLogis data indicates that growth rates were fastest among the largest warehouses (larger than 500,000 square feet) comprised more than 25% of all starts
- Mega DCs employing more than 100 workers grew in number at roughly double the rate of small and medium size establishments.

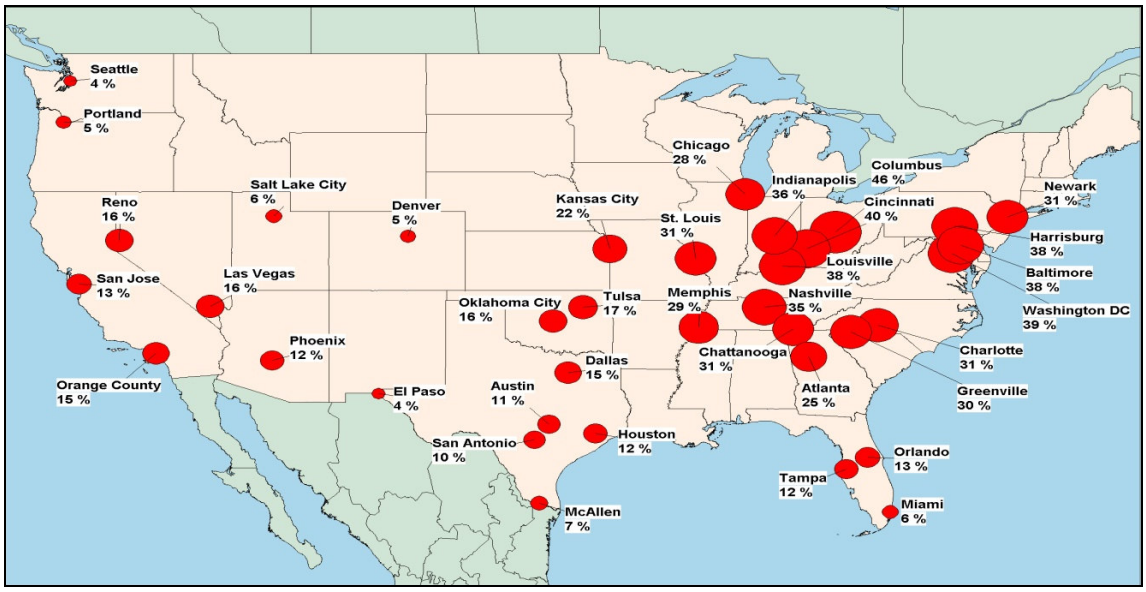
The trend to outsource to low cost manufacturing countries changed the focus of many firms from domestic oriented networks to import oriented networks requiring companies to re-analyze distribution routes. Wal-Mart, for example, shifted much of their import volumes to the Port of Houston in order to bypass

the congestion at the LA Port[41] and to move goods closer to the population in the Midwest and East Coast.

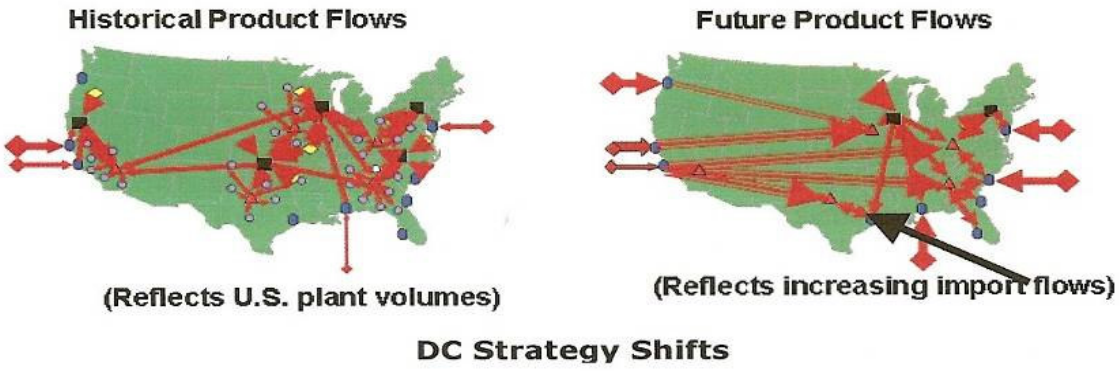
As supply chains have gone global, the layouts of their networks have expanded. Overseas manufacturing has changed many company variables such as: DC/warehouse space required, distance to market, time-to-market, safety stock requirements, and the necessity for intermodal movements to help off-set fuel prices.

Regional distribution strategies have allowed companies to strategically place distribution facilities closer to the end customer because more warehouses, rather than fewer, can help lower total transportation cost while increasing service levels. All of these changes have resulted in a significantly altered distribution patterns in the U.S. (see below).

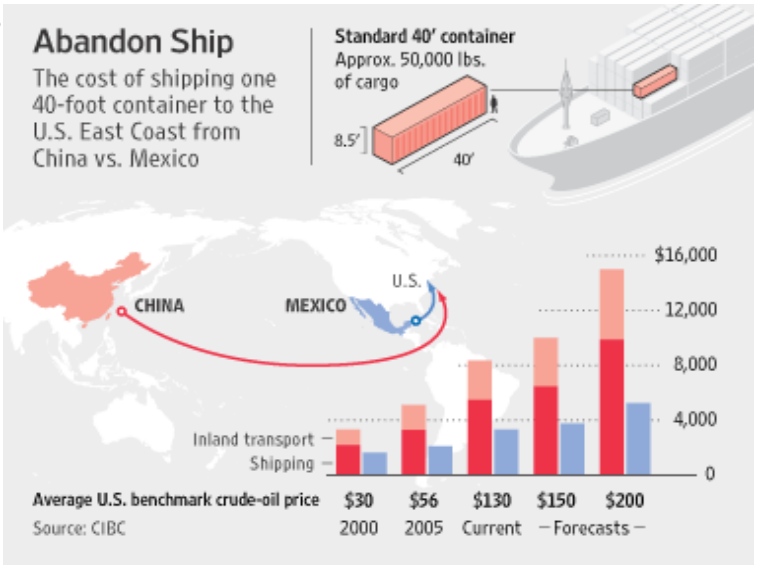
Regional Distribution: Percentage of U.S. Population Reached Within 500 Miles:



The impact is not just domestic. The outsourcing of manufacturing has caused a rush to developing countries. China has received $50 billion in manufacturing investments since it joined the World Trade Organization in 2001, and the companies that funded these investments were suddenly faced with different cultures, immature transportation networks, poor communication systems, onerous regulation and many other variables.



The dominant reason that network optimization has become an important Game Changer is that the cost of transportation has become so volatile in the last few years. A barrel of oil has fluctuated from 2008 summer rates of almost $150 a barrel to $40 a barrel in dramatically short time spans, bringing into question the appropriate physical location of a firm's warehouses and factories.[42] Transportation cost, therefore, is becoming more of an issue than other trends such as inventory and warehousing cost.



Globalization, despite its rapid growth, has recently been stunted by fuel volatility. Recent higher fuel costs have challenged the idea of outsourcing to the cheapest production location and shipping back to the home market. The lanes between the U.S. and China have slowed in growth because of the rising costs of transporting goods, especially impacting inexpensive products which are highly affected by shipping costs. This trend could play a part in the potential migration of jobs and production back to North America, where markets are closer and there is a higher level of control. Spurring this further has been the 30%+ plunge of the dollar against major world currencies coupled with the rise of wages and currency in China. The cost of shipping a container from Shanghai to LA surged 150% from 2000, and stood recently at $5,500. If oil hits $200/barrel in the next few years after the end of the recession, this

could almost double to $10,000. The major beneficiary of this may be Mexico, providing low-cost labor and proximity to the United States.[43]

The Foundation of Network Optimization

As software capabilities continue to advance, concepts like optimization technology (finding the best answer while accommodating realistic constraints) become more prevalent. Today, companies achieve great benefits by using software with optimization capabilities. By modeling and optimizing current operations, companies can identify options to achieve breakthrough savings in cost and working capital.[44] Network optimization is not only useful in network design, but can also be critical input for decisions on modes of transport, routes, and carrier selection.

Developing a network optimization project can be a formidable challenge. A valuable perspective to take when optimizing the supply chain is to start with the end-customer and work backwards into the supply chain, possibly as far back as raw material suppliers. This philosophy always keeps the customer's needs in mind, protecting the company from getting too caught up in the numbers.

A wide range of powerful software tools exist to handle network optimization, and the leading-edge tools also include the capability to run network simulations. It is important to avoid underestimating the challenge of running a network optimization. The task requires a vast quantity of data which, in most firms, also requires getting cleansed data in the right format, which often takes far longer than expected.

Optimization can also be out-sourced to a third-party company. Whether the software comes from in-house, a consultant, a 3PL, or network optimization projects we do here at the University of Tennessee, it is beneficial that optimization software be used regularly (rather than just the initial run) to ensure that that dynamic factors are taken into account as the environment evolves. Despite the initial pain of employing network optimization, a firm which successfully builds and maintains an optimization model can look forward to consistent returns (i.e. cost savings in the millions) while operating as efficiently and competitively as possible.[45]

Case Study: Opportunity Lost - Utah Bounty for P&G

In a 2 year network optimization project at Proctor and Gamble, Utah recently won out over Washington and Oregon in site selection for a P&G paper products plant and distribution center. Procter & Gamble's 1,000-worker paper-products plant is headed to a huge site in northern Utah. The Ohio-based

behemoth plans to spend $514 million on the project, aided by the state's $85-million subsidy package.[46] P&G says the decisive factors in the company's network decision were:

- The large pool of quality labor that P&G identified in the area, although P&G picked a small town site, two larger population centers are within a 10 mile radius.
- Comparatively low operating costs
- Low land acquisition costs and large plat of land (750 acres) suitable for expansion
- Strong logistics links were a significant factors in P&G's site pick

Benefits

Optimization has benefits in many levels of the supply chain. Operationally, it can help with asset allocation, route/carrier selection, and facility layout. Network optimization can be used to address customer service levels, allowing companies to better serve their current customer base at a reduced cost. Periodic network optimization also has the benefit of aligning current network flows and demands to the strategic focus of the company.

Call to Action: Your competition may be optimizing its network and well on the way to achieving competitive advantage over your firm. Companies world-wide are turning to network optimization in order to cope with the financial strains that recent economic woes have brought into the limelight. With the promise of better utilization of assets and networks, Optimization is a game changer which holds high promise for 2009.

Action Item: Launch a network optimization project and determine the best configuration for your facility network.

For more information on Network Optimization, visit:

- Deloitte: Unlocking the Value of Globalization: Profiting from Continuous Optimization. This report gives an overview of building a platform for continuous optimization, including insight on visibility, technology, and top management support.
  http://www.deloitte.com/dtt/cda/doc/content/dtt_mnf_UnlockValueofGlobalizationFinal.pdf
- Supply Chain Digest Articles: Industry thoughts on network optimization.
  - *Supply Chain Network Optimization and Competitive Advantage*
    http://www.scdigest.com/assets/FirstThoughts/07-04-05.php?cid=1012

- *Why Focus on Pennies When you Can Save Millions?* http://www.scdigest.com/Assets/Experts/Supply_Chain_InView_Drake_07-11-15.php?cid=1353

- Supply Chain Management Review: How Unilever Aligned its Supply Chain and Business Strategies An article highlights a five year plan taken by Unilever to gain competitive advantage on multiple-fronts, including optimization.
  http://www.scmr.com/article/CA6504629.html

Trend 7: Global Supply Chain Implications

Forces Driving the Change

Events such as the invention of the light bulb, the printing press, the automotive engine were all points of discontinuity. The quintessential difference however, between those times and today, is that never before has the world operated as a single market. The idea of a truly global supply chain is not novel, but it is quickly becoming a reality as the world increasingly lives without economic borders or boundaries. Today ideas and capital flow more freely between borders. If the light bulb, printing press, and engine were the catalysts of previous times, then globalization has certainly become the catalyst of our 'modern' time.

The Foundation of Globalization

To every great change there are positives and negatives. On the positive side, companies that establish themselves in the global marketplace gain a competitive advantage over those that do not. Such companies receive access to a larger market base, a larger supplier pool, a more extensive selection of employees, and more. On the negative side, there are baffling forces of global change that supply chains are currently facing; and these are creating significant risk. These have turned globalization into a dynamic Game Changer altering the way companies must manage their supply chain networks.

As companies create a larger global footprint they are dealing with more suppliers and more customers from more locations at a rapidly growing pace. Global business forces place tremendous strain on the capabilities and requirements of the supply chain. As the supply chain globalizes, lead times expand, higher costs are imbedded into the company, information flow becomes more complex and error-prone, and the amount of required working capital increases, all to the detriment of the supply chain.

Globalization Implications: Port Issues

Port congestion has abated temporarily with the economic slowdown and with a slowing in global outsourcing discussed below. But all of the experts agree that the future holds major infrastructure challenges. Therefore it is essential that the contemplated improvements to deal with port congestion continue to move forward.

The Panama Canal is a testament to the congestion that transportation lanes across the world are facing. Originally built in the early 1900s, the 48-mile canal

handles over 14,000 ships per year at a maximum capacity of about 5,000 TEUs (one TEU is the size of a container measuring 20x8x8.5 feet) per ship.

The largest container ships being built today, however, carry over 10,000 TEUs worth of cargo. In order to allow for more shipments through the gulf and east coast of the Americas, the Panamanian voters approved a $5 billion expansion plan which will hopefully double capacity when completed in 2014. Below (on the left) we see the Sealand Meteor Cargo Ship (3,800 TEUs) barely making its way through the canal and on the right we see the Emma Maersk (11,000 TEUs) in Singapore, at almost three times the capacity it is built to handle the needs of supply chains today.

The ports along the Gulf and East Coast are preparing for the increase in traffic from the Panama Canal, but will the expansion be enough to handle the cargo ships of the future?

Globalization Implications: Off-shoring Issues

When many companies went offshore, it often involved a myopic chase of cheap labor. Some counter trends are now forcing companies to re-evaluate that decision. These include transportation cost, supply chain complexity, visibility issues, long lead times, higher inventory requirements, larger carbon footprints, lack of quality, and labor/economic issues of host countries. Some companies have found that it is beneficial to move manufacturing operations to the market where goods will be sold because of lower energy costs coupled with more control over operations.[47] A large factor in this is also time-to-market, as supply chains switch from pushing products to customers to delivering the product on demand (also known as 'pull') driven models. Bringing manufacturing closer to home allows supply chains to quickly react to changes and nimbly deliver product as required by the customer.

Case Study

Disruptions on a global scale have a much greater impact than their domestic counterparts. Products traveling on inter- continental shipments are already subject to long lead times, and any kind of disruption can cripple a supply chains inventory forecasts and availability. An example of corporate responsiveness to disruptions occurred when a west coast U.S. strike stopped Asian container ships from delivering monitors to Dell. By working closely with overseas suppliers and acting quickly, Dell was able to satisfy customer demand until the strike was over, avoiding what could have been a supply chain disaster.[48]

Benefits

The globalization of supply chains has changed the landscape of the modern business. In order to gain and maintain competitive advantages, companies have adapted to a world-wide market/economy for suppliers, employees, and customers. Implications of global supply chains will continue to play an important role in the ability for supply chains to efficiently move product from one region to another. Supply chains must be able to successfully mitigate the intricacies of globalization while taking advantage of the opportunities to remain competitive for the long run.

Call to Action: An extensive list of trends continue to define globalization, some of these include: near-instantaneous information availability, differentiated costs of goods and labor among various countries, increased globalization of demand and supply sources and creative business designs.[49] Add -to these the global economic explosions in previously-considered 'third-world' countries, import/export focused distribution networks, growing consumer demands, government regulations, groundbreaking advances in communication and many other smaller forces, and you have an environment that not only incubates globalization, but in some cases requires it.[50] The list is long, daunting, and confusing. This makes the development of a global supply chain strategy even more important. Firms who "go with the flow" in this area will find themselves missing the huge opportunity that a well-crafted global supply chain plan can deliver.

Action Item: Assess the global environment facing your firm and its supply chain, and craft a dynamic strategy to take advantage of the opportunities inherent in the global environment.

Additional Resources

To learn more about Global Supply Chain Implications, Visit:

- Handbook of Global Supply Chain Management, John P. Mentzer, Matthew B. Myers, and Theodore P. Stank, SAGE 2007. This textbook covers a multitude of the issues related to global supply chain issues along insight into the future plus methodologies for advancement. http://www.sagepub.com
- World Trade Magazine, Exploiting the Global Supply Chain, Jeremy N. Smith, May 2008: This article goes into depth on the differences that exist between domestic and global supply chains. www.worldtrademag.com/

Trend 8: Sustainability

Forces Driving the Change

As the world-wide population grows, resources are increasingly constrained. In addition, factors such as the incintricities of global climate change create securities/regulations that governments have put into place in an effort to mediate damage to the environment. Add to the mix new markets, growing economies, graying and urbanization issues, and the explosion of information and new technologies available across the world, and you have a tidal wave of factors that may collapse an unsuspecting supply chain.

The Foundation of Sustainability

It was once optional to employ sustainability initiatives in an enterprise, but those days are long past. Today's supply chains are designed to be cost-effective in delivering customer value, maintain appropriate on-shelf availability with minimum inventory, and cater to the growing concern of environmental issues. This last goal is directly inspired by the issues of traffic congestion, growing energy consumption, CO_2 emissions, and permanent rises in transportation costs, all of which increase the ROI of sustainble programs. Supply chains, despite their size, have reacted with agility to cut costs re-think old ideas, and develop plans for future viability.

A recent research report, *2016: The Future Supply Chain* completed by GCI (Global Commerce Initiative), outlines the future of sustainability in the supply chain. The report recommends changes to current supply chain architecture and collaboration concepts, together delivering considerable benefits. Indeed, Wall Street once saw 'green' initiatives (those pertaining to eco-friendly changes that support sustainability) as a waste, but that is no longer the case as investors see green-initiatives as signs of good management. Green initiatives are often cost-effective for the enterprise and can offer better value to the consumer.

Companies are taking sustainability initiatives even further. Small steps include converting to flourescent or energy-efficienct fixtures, using LED lighting, installing motion-activated lighting, skylights, insulating walls and roofs, wind power rooftop units, painting roofs with energy-efficient colors or planting vegetation on roofs to provide climate control, solar power, and using geothermal heat pumps for cooling and heating. In addition, projects to increase the efficiency of the transportation fleet, not only in fuel efficiency, but

also in miles driven are extremely powerful sustainability initiatives, which pay back quickly in bottom line cost reduction.

Cost cutting is neccesary, especially when government regulations force sustainability upon companies. One example of this was the EPA mandate of new stormwater regulations without offering federal funds to pay for them, meaning that warehouses in those affected cities must bare the cost for stricter regulations. For example, in Minneapolis every square foot of warehouse space includes a cost of 12 cents per year in stormwater fees. This means a 550,000 square foot warehouse pays close to $65,000 per year in fees alone. Warehouses, therefore, have found that stormwater management is one key to operational success. Stormwater fees are being mitigated by new ideas such as permeable pavements, using green roofs to act as retention basins, or using native plants to reduce heat and stormwater. [51]

Case Study

Sustaining Big Blue When the technology-giant IBM decided to become envrionmentally friendly, the **company really took it to heart. IBM does not have** a 'green' silo, where a dedicated part of the company keeps track of recyclables or inefficiencies. Instead, the entire company has adopted the idea of environmental stewardship in all business activities. This integration means that employees across the company buy-in and are measured by the key performance indictators of sustainability, and that's where the true results come from. From 1990 to 2006 IBM was able to reduce the need for electricity by 4.5 billion kilowatt-hours, saving money and reducing CO_2 emissions by three million metric tons (one metric ton is the equivalent of taking 216,000 passenger cars off the road for a year).[52] In the recycling arena, IBM went from using 3.77 percent of manufacturing materials from recycled components in 2004 to 11.74 percent in 2006.[53]

Sustainability at Herman Miller Office-furniture maker Herman-Miller took a bold step toward sustainability when it asked not only its first and Second tier suppliers, but also its third and fourth tier suppliers to disclose their trade secrets: the chemical composition of each of their products. The goal, for 100 percent of products made by the company to be zero landfill and zero hazardous waste generating by 2020. Despite initial difficulty, the goal is on its way to being achieved after nearly 200 non-disclosure agreements have been signed. Herman Miller now has complete visibility of product composition across its supply chain. Not only does this allow the company to practice

environmental stewardship, but also to trim the companies that are sacrificing quality from their supplier pool. Currently 29 percent of Herman Miller products meet the 100 percent goal, with 50 percent expected by 2010. [54]

Wal-Mart's Packaging Scorecard Wal-Mart's goal is to reduce vendor packaging content by 5 percent by 2013, resulting in a decrease of about 700,000 metrics tons of carbon emissions, and saving the company roughly $3.4 billion over the span of years.[55] To help achieve this goal Wal-Mart has introduced a "Packaging Scorecard" which tracks a supplier's "greenness" against other suppliers. The scorecard is based on metrics including greenhouse gases/ton, material value, product/package ratio, cube utilization, transporation, recycled content, recovery value, renewable energy, and innovation.

By reducing packaging in just 277 SKUs at Wal-Mart, the company was able to use 727 fewer shipping containers, saving $3.5 million on transporatation costs. In addition, by using less packaging the supply chain was able to use 5,100 less trees, and prevent 1,300 barrels of oil from being used for package creation.[56]

Benefits.

The GCI report (*2016: The Future Supply Chain)* outlines the potential benefits of sustainability in the supply chain. The total impact of a supply chain sustainability re-design can reap benefits in the order of a 30 percent reduction in transport cost per pallet, a 20 percent reduction in handling costs per pallet, a 40 percent reduction in lead time, a 25 percent reduction in CO_2 emissions per pallet, all while improving on-shelf availability. Savings both: costs and the environment have become the goals of the modern supply chain.[57]

Call to Action: Although 'Green' is a buzzword, after the PR hype settles, green will show its true color by reducing cost while allowing supply chains to practice environmental stewardship.

Action Item: Agressively pursue green supply chain initiatives not only to support environmental consciousness, but also to achieve major cost reduction.

Additional Resources

To find out more about sustainability for your supply chain, visit:

- AberdeenGroup, *Building a Green Supply Chain: Social Responsibility for Fun and Profit*, March 2008: Key research on taking steps to go green. http://www.aberdeen.com/
- World Trade Magazine , *Eight Steps to a Greener Supply Chain*, March 31st, 2008: An article highlighting eight major steps which can make taken to go green. http://www.worldtrademag.com/
- GCI, Capgemini, *2016: Future Supply Chain: Serving Consumers in a Sustainable Way*. A research report giving insight into the sustainable future of supply chain., Global Commerce Initiative: http://www.gci-net.org/, Capgemini: http://www.capgemini.com
- TheGreenSupplyChain.com, a sister web site to Supply Chain Digest focused on specifically on Green Supply Chain issues. http://www.thegreensupplychain.com/

Trend 9: Risk Management

Forces Driving the Change

Risks are a fact of life for the supply chain professional. A survey by Accenture of 151 supply chain executives found that 73% of companies experienced a supply chain disruption in the past five years. Georgia Tech Professor Vinod Singhal analyzed 800 supply chain disruptions over an 11 year period, 1989-2000[58]. He found that in firms experiencing supply chain disruptions:

- Shareholder returns were 33-40% lower over a three year period
- Share price volatility was 13.5% higher
- Operating income declined by 107%, ROA declined by 114%, sales declined 93% and sales growth declined by 7%.

The repercussions of supply chain disruptions are far-reaching. Some of the key effects of risk in the supply chain are missed customer requirements, stock outs, reduced earnings, increased time-to-market cycles, reductions in product quality social accountability, lax organizational compliance, and negative impacts to brand perception.

The Foundation of Risk Management

The supply chain is subject to numerous types of risks, but the majority can be categorized into risks regarding:

1. Supply and Demand: Risks that deal with inbound and outbound flows.
2. Operations: Risks that deal with the possibility that an internal issue will affect the company's ability to produce.
3. Security: Risks that have recently played a more important role because of globalization and the ever-increasing requirements for inventory minimization, precision, and availability.

Risk management is critically important because companies must have a full understanding of the uncertainties that may arise in order to successfully meet organizational objectives.[59] To prepare for unknown risks, companies are directly addressing the forces which are causing risks to become more pervasive. These forces include longer lead times due to off shoring, supply scarcity, changes in customer preferences, regulatory pressures, transportation constraints, lack of information visibility, pressures to cut costs, issues regarding international labor forces, and many more. There are many extreme risks associated with global outsourcing, including: delays in delivery due to

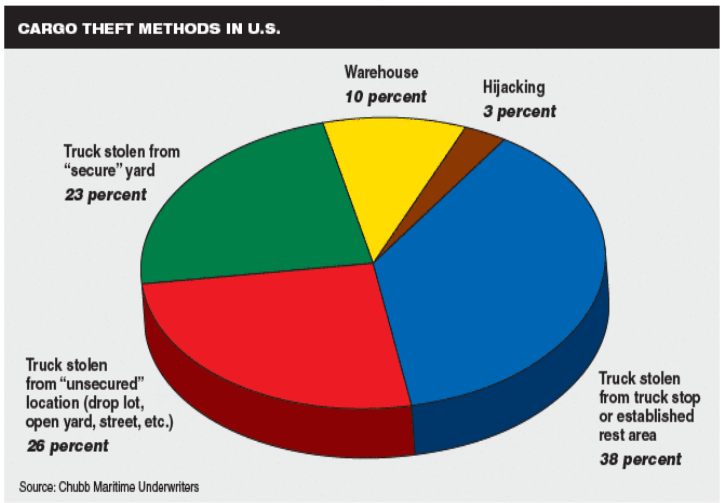
import issues, terrorism, force majeure, political instability in the source country, quality and safety issues, and changes in economics.

Using Risk to your Advantage

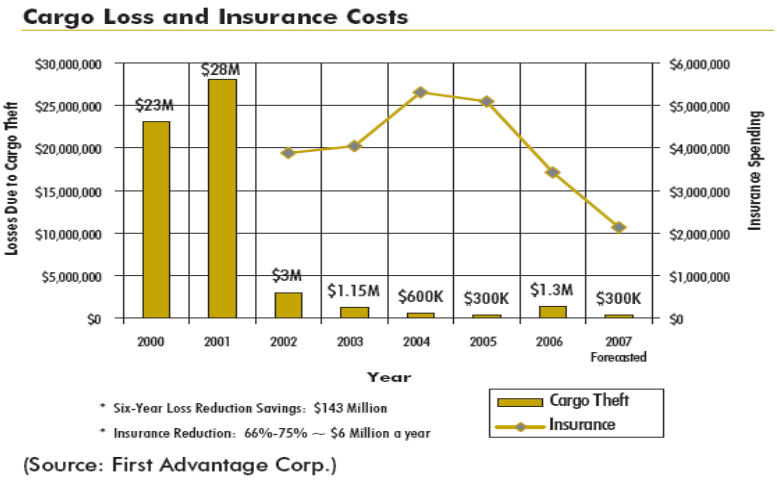
Although risk cannot be eradicated, it can be planned for and even used as a competitive advantage, especially since so few firms have a good risk mitigation process. Preventing disruptions down the supply chain can have a dramatic impact on competitiveness in general. This is due in large part to the global environment, especially with long supply lines originating from challenging parts of the globe which have increased supply chain risk exponentially. Companies can also benefit from more agility, a more secure supply chain, the understanding of controlled risks, and supply-chain-wide focus on uncertainties and their prioritization.

Cargo Theft – An example of risk

The graph shows the various methods of cargo theft in the United States. Additionally, from a retail perspective: in 2006 and 2007, 1.4 percent of revenues by online merchants were lost because of fraud. Not only are these crucial areas impacted, but the direct financial impacts of risks across the supply chain are substantial. The annual loss due to cargo theft has recently been reported as between $18 billion and $22 billion in the United States. World-wide, the loss was reported to be near $50 billion each year as of 2006 (when it was first required to be reported).



Costs can be minimized by taking advantage of lower insurance premiums that result from proactive risk management. Cargo theft is exceptionally expensive and insurance companies reward supply chains which take the initiative to minimize these costs. For example, a company was able to cut costs by $143 million over six years by lowering cargo loss and thereby reducing its insurance bill (see below).[60]



Case Study

Both companies were sourcing products from Phillips's plant in Albuquerque, New Mexico. On March 17th, 2000, a brief fire crippled the plant's production of chips that would be used by both companies. Nokia and Ericsson were alerted that it would take one week to have operations up and running. Nokia and acted swiftly, sourcing from other locations as well as collaborating with Phillips to temporarily use capacity at other plants. Ericsson, on the other hand, did not react quickly and by the time the company started asking questions, it was already too late. Excess capacity had been captured by Nokia and Ericsson had no choice but to manage without the technology that they were relying on. While Nokia survived relatively unscathed, Ericsson reported losses of $340 million that quarter, and at the end of the year the company's mobile phone division announced a loss of $1.68 billion.[61]

Ways to Mitigate Risk in the Supply Chain

Companies are dealing with risk management in many ways, including:

- Adding inventory (30 days in transit, 30 days safety stock. additional cycle stock, etc.)
- Planning for a realistic percentage of the shipments being air freight
- Developing import excellence and optimizing INCO terms
- Developing a second domestic source that can be quickly used
- Dealing only with competent world class suppliers (it can take two years to develop and certify an excellent source)
- Designing for globalization (parts standardization/postponement)

- Implementing event management technology to provide real time alerts when shipments are delayed
- Applying Lean/Six Sigma principles to compress cycle time and reduce variation in the new longer supply lines

Although risk management can be time consuming, it can help organizations develop advantages and secure themselves for the future.

Call to Action: Supply chain risk management has always been part of supply chain design, including such basic strategies as increasing inventory to avoid customer service issues. However, despite the indirect avoidance of risk in the past, risk management has become a game changer that many supply chains and software solutions companies have started to tackle directly. By mitigating risk, companies can have confidence in long-term forecasts, pre-empt devastating slow-downs in the supply chain, and insulate themselves from the negative effects of competitors, economic troubles, and many other issues lurking in the not-so-distant future.[62]

Action Item: In a group setting, identify and prioritize the risks facing your supply chain in general and your major supply chain initiatives in particular. Develop risk mitigation plans for the high priority risks.

Additional Resources

For additional reading on Risk Management, Visit:

- Supply Chain Management Review, *Can technology Handle Supply Chain Risk?*, Noha Tohamy, May/June 2008. This article provides a foundation on the reasoning of, and improvements in, risk management. www.scmr.com/
- *Handbook of Global Supply Chain Management*, John P. Mentzer, Matthew B. Myers, and Theodore P. Stank, SAGE 2007. This handbook delves in risk identification, evaluation, management, strategy implementation, and mitigation. In addition, Chapter 29 covers Supply Chain Security. www.sagepub.com.
- AberdeenGroup, The Supply Risk Management Benchmark Report gives insight into risk management reasons, challenges, and best-in-class use. www.aberdeen.com

Trend 10: Managing out Costs and Working Capital

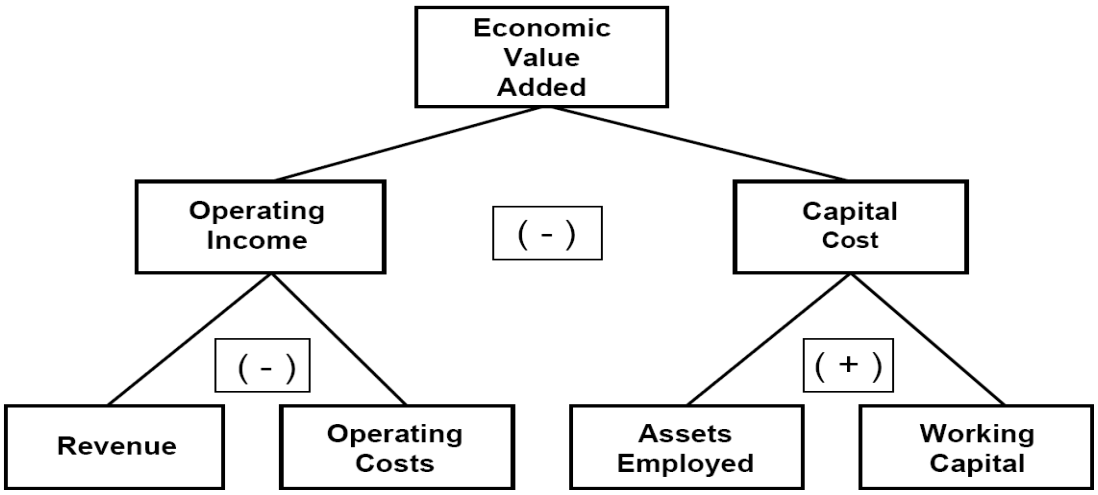
Forces Driving the Change

The culmination of all Game Changers is in managing costs and working capital, while continuing to improve product availability and service to your customers. The 19th Annual *State of Logistics Report* reveals that companies in the United States spent a record $1.4 trillion on logistics during 2007. This is equivalent to 10.1% of U.S GDP (Gross Domestic Product), a percentage we haven't seen so high since the year 2000. As can be expected, much of the increase was due to rising fuel costs as transportation costs alone rose 5.9% last year to make up 6.2% of GDP.[63] All of these costs directly affect the bottom line, and they are causing companies to react. [64] Companies are battling higher costs across the board. Fuel costs have more than tripled in the past decade[65], with only the recent recession to temporarily break the rapid increase.

The outlook for the future is not any brighter considering the threats of a return of higher fuel costs, stricter government regulations, capacity constraints, infrastructure issues, and a fragile U.S economy.[66] To combat the impacts of these forces, companies are learning to manage costs more efficiently and to optimize working capital.

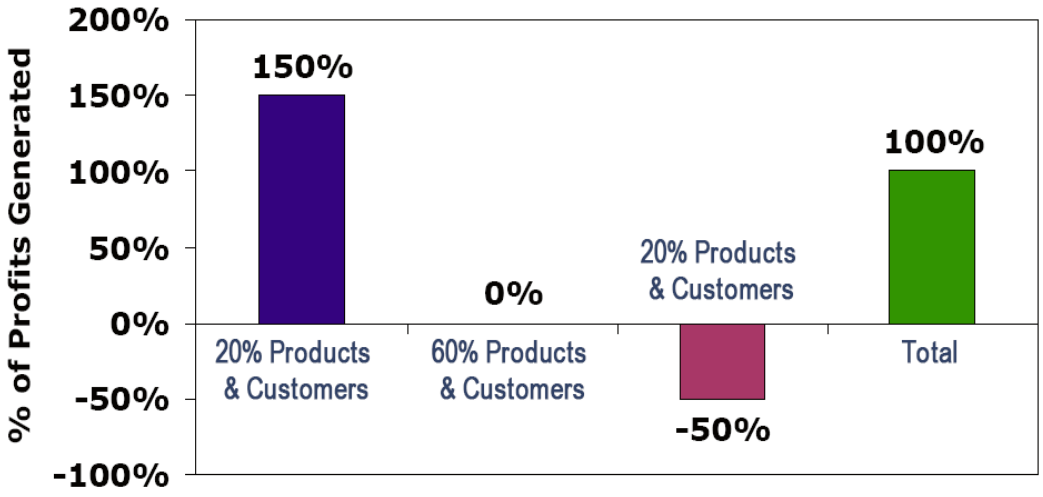
The Foundation of Managing out Costs and Working Capital

While minimizing cost has always been important, it cannot be a goal in and of itself. Cost should be managed in tandem with working capital. Working capital, or current assets minus currently liabilities, basically consists of inventory plus accounts receivables minus accounts payable; and has a direct impact on the cash flow of a company. By managing costs and working capital together, companies are striving to increase the EVA (economic value add) of operations to shareholders. EVA™ is a metric (trademarked by Stern Stewart[67]) that measures financial performance of a company and is of chief importance to investors and corporate valuators, having been shown to be closely correlated to stock price. Multiple variables make up EVA, as shown in the diagram below.



Corporate Reactions

World-wide, companies have set goals to counter-act the negative forces of change and improve their EVA. These goals have included reductions in cost (typically to the order of 5% to 10% per year, not accounting for inflation), which directly increases EVA. On the other side of the coin, additional revenue generation techniques are used to widen the gap between revenue and costs, thereby further improving EVA. Supply chain management techniques can help reduce working capital, therefore making significant contributions to the cash flow of a company.[68] Customer segmentation can reduce costs given that usually only a small portion of the customer pool accounts for the most profit creation (below). Therefore, by focusing available resources on profit-delivering customers, companies can increase financial performance.



Source: FinListics Solutions[69]

Strategies to Improve Working Capital

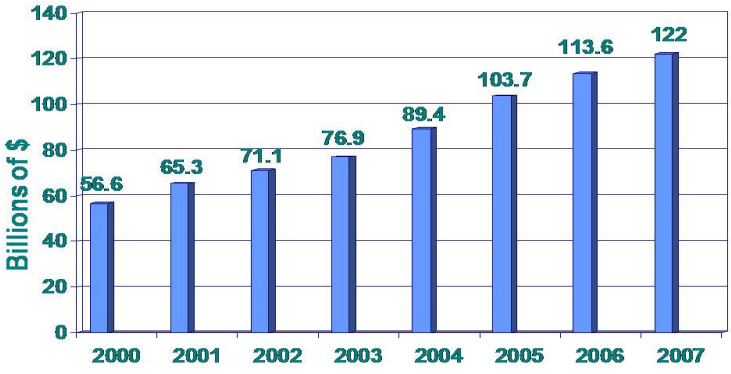
The synergy between logistics and finance has reached an all-time high as the need to optimize working capital increases. In a study by AberdeenGroup, the top four supply chain strategies (in order of importance) to optimize working capital were to: improve forecast accuracy, optimize inventory placement, reduce lead times, and enable collaboration with suppliers & customers. The same study reported that the top five financial strategies were (in order of importance) to optimize working capital are to: improve accuracy of operational budgets, improvement cash management, improve cash flow forecasting, and to extend payment terms with suppliers.

In an era of constrained capital availability, companies can tap huge capital resources by using their supply chain to unlock the working capital clogging their balance sheets.

Outsourcing: A Common Strategy to Control Cost

One tactic that is becoming increasingly predominant is to outsource non-proprietary logistics activities to third party logistics providers (3PLs). Rudimentary economics preaches that individuals/countries should employ the practice in which they have a competitive advantage. 3PLs make it their core competency to handle logistics so that their clients can focus on what they do best. By doing so, 3PLs can leverage large amounts of transportation, storage, and other aggregated volumes in the market place to achieve a better cost profile. 3PL clients take advantage of this service because it allows them to focus on what they do best, to reduce costs, and to free working capital. The growth of 3PLs has been phenomenal, the following graph shows the trend in 3PL revenues, which have more than doubled since 2000 (see below).

3PL Revenues 2000 - 2007



Source: *Armstrong & Associates*

Case Study

The Home Depot had a problem. During the spring and summer months, the demand for outdoor products increased dramatically, while during the winter months demand for such products lessened and left excessive inventories and vacant space. Not only that, but shipping during the summer months became difficult because of the dramatic spikes in demand and the limitations on shelf-space, and the inability of the current distribution network to flex with the changes in demand. The net result was stock outs on key seasonal products resulting in lost sales and steep discounts when product finally moved through the supply chain.

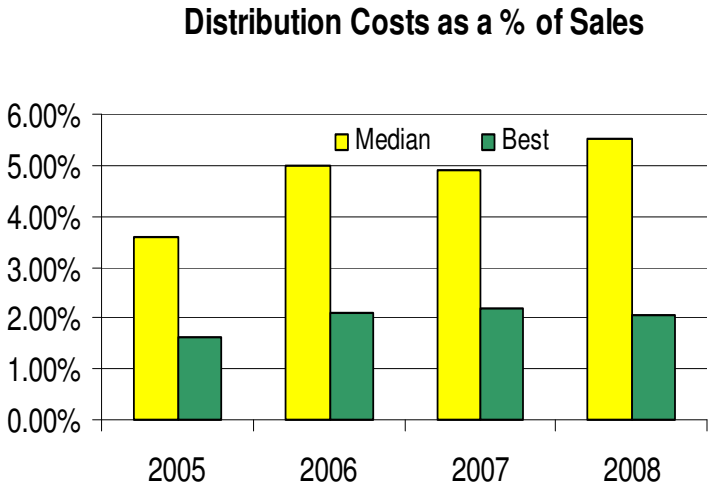
To solve these problems, Home Depot turned to Kuehne + Nagel (a provider of various 3PL services) for support. The 3PL answered with a plan to handle the delivery of over-sized items to stores in the Mid-West. After a successful launch, the 3PL dedicated 460,000+ sq. ft to the project to handle 5,500-6,500 units per day of 30 SKU's. With that success, The Home Depot increased the SKU count of large-items to 45 items with the 3PL to handle 30,000 to 36,000 units per day across a four-DC network.

By managing out costs to a 3PL (in this case, Kuehne and Nagel), The Home Depot was able to avoid extra lease commitments, reduce capital expenditures that were hurting the bottom line, and reduce out of stocks that were costing top-line revenues. With the savings, The Home Depot could invest into expanding its store-base and re-allocating assets to other areas of concern.[70]

Benefits

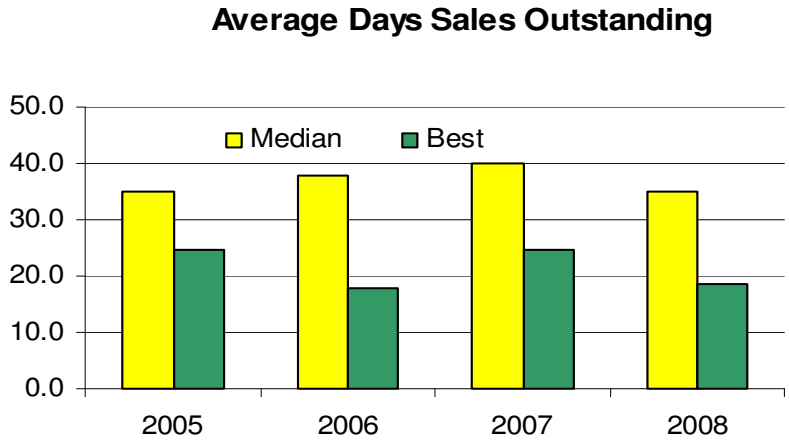
So how much can a company really benefit from their efforts to manage out costs? A WERC benchmarking study reveals two areas where companies can have a significant improvement; both distribution costs and working capital. In a study of over 700 companies, it was clear that best in class companies stand significantly above the average companies.

The study evaluated Distribution Costs as a percent of sales. While the study indicated that distribution costs have increased over the past 4 years, in part due to leaner / smaller lot sizes, at the same time it revealed there is continued price pressure reducing total margins. The study revealed that the top 20% of the respondents had costs almost 60% less than the median benchmark in the study.[71]



Source: WERC Benchmarking Study[72]

The study also evaluated working capital as days of sales outstanding or DSO. The best in class group reported improvement in DSO performance of 33% while the median group remained constant. In essence the best are getting better faster than the median companies making the gap between them even wider.



Source: WERC Benchmarking Study[73]

Call to Action: By successfully managing out costs and working capital, supply chains can become a critical element in improving the overall financial performance of their firms. Companies that do not address Game Changers will have difficulty competing and will likely meet the truth associated with modernizing; they will be left behind and could potentially face a world where they are forgotten and cease to exist.

Action Item: Use your supply chain as a tool to not only achieve major operating cost reduction, but just as importantly to make a major reduction in working capital to free up the cash currently locked on your balance sheet.

Additional Resources

For additional reading on Managing out Costs and Working Capital, check out:

- Supply Chain Europe, *Supply Chain Practices That Reduce Working Capital,* Camerinelli, Enrico, September 1 2007: This article gives an overview on implementable SC practices that can be used to improve corporate finances. http://www.allbusiness.com/company-activities-management/operations-supply/10590040-1.html
- AberdeenGroup, *Working Capital Optimization*, June 2007: A research study that delves into Improving Performance with Innovations and New Technologies in Inventory Management and Supply Chain Finance http://www.aberdeen.com/

The Next Big Thing

The Ten Game Changers addressed above need to be an integral part of your supply chain strategy. But it is equally important to anticipate the future. What is the "next big thing" in the supply chain arena? Of course, there are many opinions on this topic; but we would like to offer one that we believe has the potential to create radical breakthrough improvements, namely *Vested Outsourcing.*

Vested Outsourcing

Outsourcing can be a successful business strategy for virtually every imaginable process, from logistics to manufacturing to building maintenance to IT support to foodservice to customer service and beyond. In essence any process that someone else can perform better, faster, or more efficiently than you can in-house, and that is not your marketplace differentiator, is a candidate for outsourcing. Outsourcing has grown rapidly – with some industries seeing annual growth rates in excess of 20% a year, as companies work harder than ever to cut costs. In fact, more than three out of five companies (63 percent), participating in a recent study by PricewaterhouseCoopers, have outsourced a business process to a third party.[74] Outsourcing has become commonplace, although in some circumstances it has generated controversy, when properly deployed, outsourcing can be a strategic weapon that will significantly improve operational and financial performance, as well as increase shareholder value.

But outsourcing relationships have not kept up with the times and the overall importance that outsourcing has to a company's business strategy. Many companies jumped in without a full understanding of how to do it right. The result? Outsourcing deals structured with fundamental flaws in the business model and the relationship.

The authors see the next game changing business strategy to be the advent of Vested Outsourcing (VO). VO is a unique approach to outsourcing that will address the fundamental flaws in many outsourcing relationships. This strategy is not right for every outsourcing relationship. Let's place outsourcing relationships into the familiar terms of Strategic Sourcing; there are basically three types of suppliers:

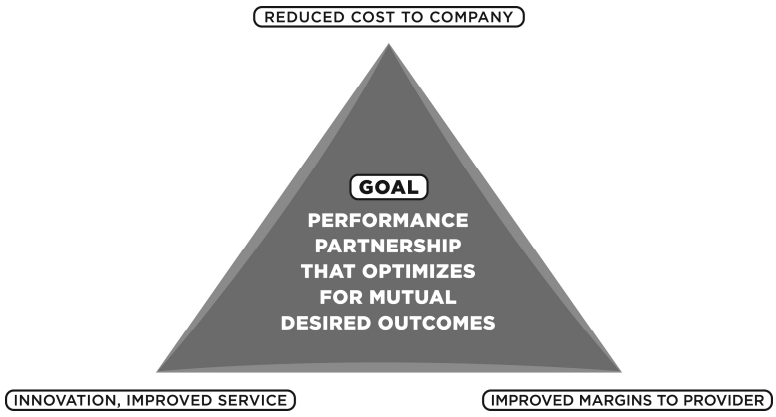
- *Transactional* – the supplier is effectively kept at "arm's length", and a PO is issued for every order
- *Preferred Supplier* – this supplier is pre-qualified, either by certification or years of experience. The Preferred Supplier is often

exempted from certain procedures, given releases against blanket PO's, etc.

- *Strategic Alliances* – this is characterized by a "C" level relationship between the companies, with shared intelligence and operational tie-ins. The two companies often develop working relationships that more closely resemble divisions of the same company.

Vested Outsourcing partnerships create a new level in between Preferred Suppliers and Strategic Alliances. The relationship is more focused than a Strategic Alliance, and does not require as much operational infrastructure. But it takes the Preferred Supplier relationship to a whole new level.

Vested Outsourcing is a fundamental business model paradigm shift in how the outsourcing company and the service providers do business. In VO the outsourcing company pays for specific outcomes, not a set of specific tasks and service providers are rewarded for meeting or exceeding those specific outcomes, not for performing a set of tasks.



The heart of the Vested Outsourcing is agreement on *desired outcomes*, which explicitly state the results on which both companies will base their outsource contract. A VO partnership clearly defines financial penalties or rewards for not meeting or exceeding agreed upon desired outcomes. In a VO agreement, regardless of what is being outsourced, the outsourcing partner has the ability to earn additional financial value (e.g., more profit) by contractually committing to achieve the desired outcomes. Simply stated: if the outsource provider achieves the desired outcomes (achieves results), they receive a bonus. It is important to understand that VO is NOT gain-sharing.

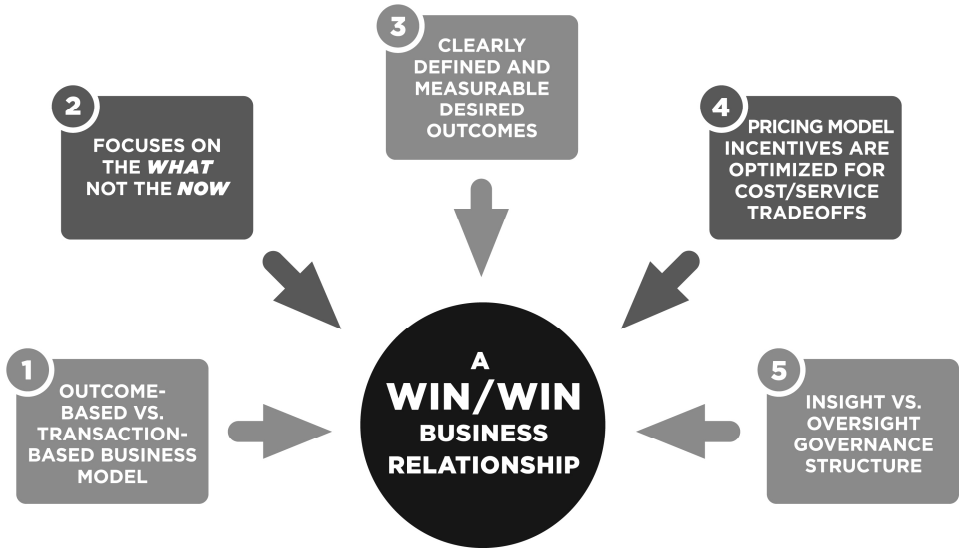
Under this dynamic the outsource provider is challenged to apply "brain power" and/or investments to solve the company's problem. They also take on risk to do it, in essence putting "skin in the game." The outsource provider looks at how they can best apply world-class processes, technologies, and capabilities that will drive value to the company that is outsourcing. This commitment to deliver against projected value for the company outsourcing (such as a

commitment to reduce costs or improve service or both) shifts risk to the outsource provider.

In exchange for taking on risk, the company outsourcing commits to allow the outsource provider to earn additional profit (above and beyond industry average profits for their service area) for achieving incremental value. The result is a win-win performance partnership—a paradigm shift in the outsourcing relationship.

The hallmark of any good PBO business model follows five major rules.

1. Outcome-Based vs. Transaction-Based Business Model
2. Focuses on the WHAT not the HOW
3. Clearly Defined and Measurable Desired Outcomes
4. Pricing Model Incentives are Optimized for Cost/Service Tradeoffs
5. Insight vs. Oversight Governance Structure



It's important to understand that Vested Outsourcing is much more than delivering a higher level of service on a given activity. A common mistake occurs when an organization *thinks* they have a VO relationship because they have taken their existing contract and simply added that if service provider achieves the metrics they are paid a bonus. This completely misses the mark.

In a VO partnership, the organizations work together upon a foundation of trust where there is mutual accountability for achieving the outcomes. Under VO, through the careful alignment of performance objectives, accountability, and control, the service provider, while absorbing additional risk, is empowered to pursue improvements that will deliver improved performance, higher profits, and lower total ownership cost. **Vested Outsourcing uses the power of free**

market innovation to improve the outsourcing relationship. This can be challenging to achieve, but the Vested Outsourcing journey should always strive to arrive at this idealized end state to achieve a partnership that optimizes the mutual desired outcomes.

To say that VO represents a departure from traditional outsourcing practice would be to seriously understate the case. VO changes the fundamental business constructs of the typical outsourcing approach. And it works.

The U.S Department of Defense (DoD) is probably one of the most active in promoting the application of performance-based outsourcing programs (known as Performance-Based Logistics in the DoD), with over 200 current and planned performance-based logistics arrangements in place. In the DoD, where Vested Outsourcing programs have been implemented since 1998, documented case studies prove that VO programs work, increasing performance while optimizing costs. The results are not limited to simple incremental improvements in performance—*it is not uncommon for Vested Outsourcing programs to report improvements between 40 and 70 percent.*

Many outsourcing arrangements suffer from issues that Vested Outsourcing can address. VO will lower costs of the outsourcing company and provide higher profits to the service provider, neither of which can be attained by each organization working alone. We believe that Vested Outsourcing will change the way companies outsource and in doing so will be the next game changing strategy.

Additional Resources

For companies that would like further information, we invite them to visit www.vestedoutsourcing.com where excerpts from the upcoming book, ***Vested Outsourcing: Five Rules that will Transform Outsourcing*** can be viewed.

Transform Your Game or it's Game Over

We believe that these ten trends have had, and will continue to have; such a large impact on the way that supply chains will be managed that not reacting to them will impact a company's ability to compete. We challenged you to ask yourself the question ***"Is my company adopting this Game Changing Strategy to drive competitive advantage in our supply chain?"*** How did your company meet that challenge? If you are like most companies your answer will likely be less than an unequivocal YES. If that is the case, pursue the ten action items discussed in the body of the report, and you will be well on your way to a world class supply chain.

Our top 10 Game Changing Trends

Trend 1: The Mandate for Measurement

Trend 2: Collaboration

Trend 3: Lean/Six Sigma Applied to the Supply Chain

Trend 4: Managing Complexity

Trend 5: Supply Chain Systems

Trend 6: Network Optimization

Trend 7: Global Supply Chain Implications

Trend 8: Sustainability

Trend 9: Risk Management

Trend 10: Managing out Costs and Working Capital

Future trend: Vested Outsourcing.

Companies that successfully transform their business strategies to adapt the industry altering Trends, our **Top 10 Game Changers**, will thrive; companies that do not will likely be left on the bench – or worse will be watching from the grand stands – as the game is played without them. We would encourage you to take the challenge and get in the game.

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