Sustainability's Staying Power

by Bill Schneiderman

Supply chain sustainability and waste reduction efforts take new forms as circumstances change.

In the first months of 2009 it was both easy and popular to believe that strategic business concerns with environmental sustainability, so important for world trade players, was a fad on the wane. Crude oil prices had fallen from their 2008 high near $150 to under $40 per barrel in the depth of worldwide recession. Companies and governments were too concerned with survival and economic stimulus, respectively, to pay much attention to global environmental issues. And, tapped out consumers were reining in spending in favor of saving for the worst in the shrinking labor market.

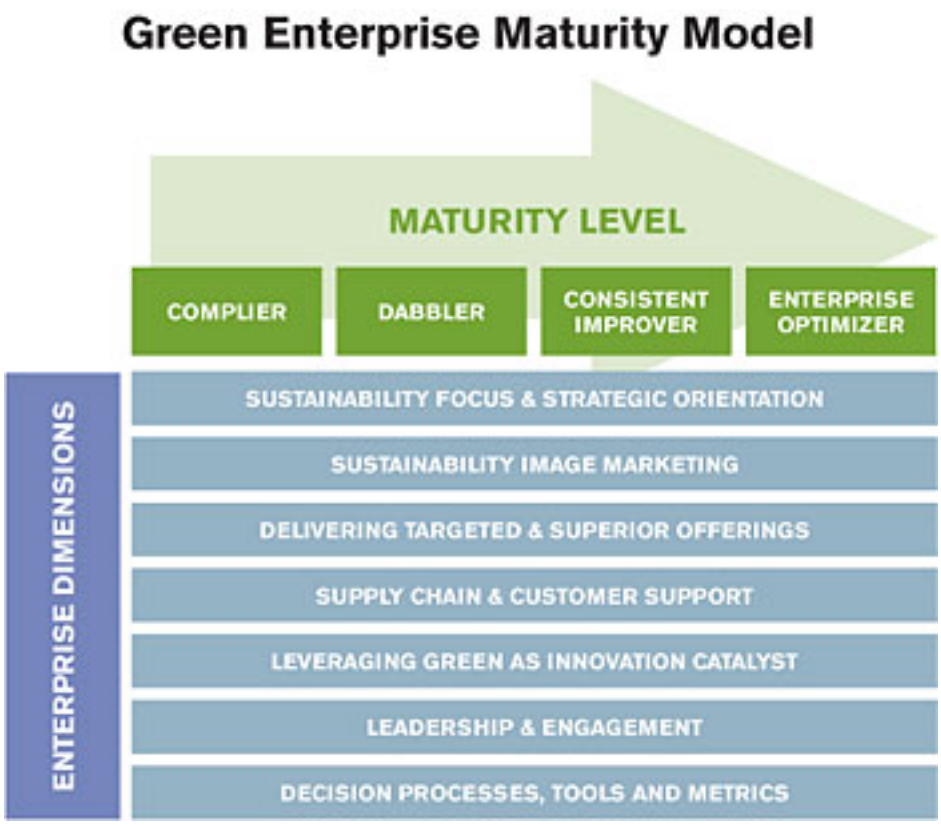
Yet in the summer of 2009, the business and regulatory landscape has diverged from the path outlined above. Although economic indicators in labor, aggregate activity and asset prices remain generally mired in recessionary territory, crude oil has already doubled in price from the recent low point, the cost of electricity (which did not take a recessionary holiday) continues to rise, and the United States appears close to enacting legislation to reduce total greenhouse gas emissions. On the consumer front, an article in the May 1, 2009 Financial Times by Andrew Edgecliffe–Johnson, quoting a just released study of 20,000 people by Havas Media, reported that, "half of them are willing to pay a 10 percent premium for sustainably produced goods and services in spite of the pressures of the economic crisis."

Did the world change so much in such a short time? The long-term fundamentals did not, but the short-term signals from the energy marketplace did. Fossil-based energy prices change very rapidly in response to variations in the balance of supply and demand, as well as perceptions of future scenarios. When the OPEC cartel supply and pricing behavior was coupled with (unjustified) perceptions of perpetual rapid growth, crude prices rapidly marched up. With the growth bubble burst and a worldwide recession in progress, the perception of future demand dropped much faster than actual demand, causing a steep downside pricing reaction.

The "real" price signal lies between these extremes, trending upward in real terms and tracking more closely with fundamental forces. As so well documented in Thomas Friedman's book, Hot, Flat and Crowded, rapid expansion of lifestyle demands from the growing middle classes in China and India continue largely

unabated and will continue to drive aggregate long-term energy demand. Public opinion, reflected in government action, and consumer preferences, reflected in purchases, also do not change as quickly as fossil-based energy prices. Supply chain players must take notice that once again the forces of demand, public opinion and energy input cost are aligning with sustainability actions. In any reasonably imaginable economic scenario through recovery, it is likely that these forces will remain aligned. The temporary "blip," as important as it is, will prove to have been this recession, not the push for more environmentally sustainable business. The key question going forward for any world trade protagonist is no longer whether environmental sustainability matters, but how businesses and various elements of the supply chain will respond to the threats and opportunities for innovation present in the business landscape.

Good decisions and metrics matter more than ever



Green Enterprise Maturity Model

The days of enlisting corporate employees to plant a few trees in the parking lot as an environmental sustainability strategy and trumpeting success to the world are gone. The Havas Media study cited above also found consumers perceived that company communications around sustainability "lacked authenticity." The authors concluded that brand image could easily be damaged by sustainability messages

that were neither well crafted nor backed with commitment and results. The scale of investment required for significant sustainability results, and thus any positive marketplace demand impact, has been ratcheted up. The best opportunities for getting these substantial results, through energy-related savings, lie mostly in the supply chain, especially for companies doing business on an international scale.

Decision making processes suitable for planting a few trees revolved around feeling good and corporate social responsibility; those are not the best bases going forward. Prior decisions could be reasonably separated from core enterprise processes and decision making. With sustainability-related decisions now having much larger consequences, whether carbon emissions are capped or not, they must be made in the context of a mature enterprise process that explicitly considers tradeoffs among various kinds of initiatives.

The Green Enterprise Maturity Model shown in the figure below illustrates enterprise process and maturity for not only decision processes and metrics, but also for the whole enterprise, integrating demand, supply and regulatory aspects of sustainability. Higher levels of maturity represent greater capability for competitive advantage through investing in repeatable processes. The model identifies four basic levels of enterprise maturity. “Compliers” see only burdens and do the minimum. Opportunistic “Dabblers” adopt easy, one-off initiatives. “Consistent Improvers” make continuing efforts, backed by processes in multiple areas, such as costs, corporate image and product offerings. Lastly, “Enterprise Optimizers” see a springboard to business dominance, and they pursue consistent, innovative, and strategically integrated, end-to-end efforts toward that goal.

Integrated decision processes represent best practice in getting the ball rolling toward substantial results. Keeping it rolling over a sustained interval is just as important. Metrics with regular reviews are an important element in ensuring progress. Here the message is not only integration with overall business metrics, but also having good coverage of the costs of both energy and carbon across segments of the supply chain. This kind of knowledge can not only help monitor progress, but also inform the next round of improvement efforts and investments.

Taking a page from lean operations

Armed with good business decision processes and metrics, what innovations will global supply chain players pursue? There are an almost infinite number of possibilities. We have chosen to focus, at the moment, on just a few innovations, through the lens of lean operations. One of the core tenets of this philosophy is that one must continually reduce and eliminate waste wherever it exists. In a

factory context, this means reducing the total factory system's: distance traveled end-to-end, inventory, cycle time, defects and rework, and total cost. The ideal factory immediately satisfies customer demand with zero inventory, cost and distance traveled. While this theoretical ideal is unachievable in practice, it forms a very useful guiding vision that has been extremely successful for companies such as Toyota.

The parallels between reducing waste in a factory and across a global supply chain are striking. A global supply chain system has all the same waste elements as a factory, albeit with much larger scale and scope. It is important to bear in mind that reducing waste in one category at the expense of increasing waste in another is not the goal. The goal is to reduce the system-wide waste, making the most favorable tradeoffs between waste elements when necessary. From the lean operations perspective, several trends should emerge:

- Shorter end-to-end manufacturing and supply chains centered around end-use markets

- The emergence and growth of "lean" rail and shipping services that minimize the inventory and cycle-time penalties associated with those transportation modes

- A much longer term (and more speculative) migration of manufacturing activity to regions that invest in alternative sources of electricity, such as solar

Shorter supply chains, local manufacturing

Lean factories persistently re-engineer operations closer and closer to the shipping door (even receiving!). This cuts the total distance material must travel before delivering value out the shipping door to customers. Both cycle time and work-in-process inventory are usually also reduced, along with defect rates when this takes place. This is often a win that simultaneously reduces all the major waste elements.

The lean manufacturing lesson should not be lost on global supply chains. Locating the final point of manufacturing close to major customer concentrations (or even co-located when appropriate) clearly maximizes responsiveness to customer orders while often reducing the headache and expense associated with customs clearance on the final fulfillment leg. Although final delivery transportation expense and carbon footprint are also reduced in this manner, even greater benefits can be had by locating as much as possible of the supply base close by. Not only is inbound transportation expense and carbon footprint reduced, but the

shorter inbound supply chain usually leads to lower inventory and lower defect rates. Disaster recovery is also much easier when several regional supply chains back one another up versus the single point of failure of the alternative. Thus emerges the "perfect picture" of short regional supply chains. As the costs of energy and carbon emission increase, this distributed production model becomes more and more attractive.

Where is the "fly in the ointment?" Short regional supply chains play best when at least a portion of the qualified supply base already exists close to potential manufacturing sites, when there are not unique raw materials needed that are not regionally available, when management and other talent is available in the region, and when economies of scale are well captured in smaller regional manufacturing plants. For many industries, these requirements are straightforwardly met. In others, some creativity may be needed, such as in convincing an especially important supplier to take the regional plunge together. In such cases, it is often possible to continue capturing purchasing economies of scale across your supplier's regional network. Companies managing short regional supply chains also need to make provisions in their Human Resource plans for a greater number of general and plant managers, along with more cultures. This requires more investment in training and career development. But, it also yields a bigger and more diverse pool of candidates for senior management positions.

The proof of the regional supply chain hypothesis lies in adoption by industry, or in the eating of the pudding, so to speak. In this vein, surely it cannot be an accident that an increasing number of restaurants are promoting local dishes and produce on their menus. Not only is it good marketing, but there are real cost savings and freshness benefits to be had. Moving beyond food, Dell, for example, has followed more regional production strategies recently, converting plants from product focus to multi-product facilities and basing real-time production decisions on logistics costs to market, as reported at the Council of Supply Chain Management Professionals 2007 meeting. Lenovo was recently reported in The Wall Street Journal to have decentralized production from Asia to include more locations closer to major markets. It was reported that the cycle time for delivering a PC to the U. S. could be 30 days from Asia; the delivery cycle from their Mexican location was only 3 to 4 days. Mexico in particular, and Latin America more generally, stand to gain market share from Asian countries for U.S. delivered products. Asian countries such as China, however, are at the center of a vast upswing in consumer demand that will be supplied from regional manufacturing sites. The notion of regional supply chains also suggests that it will become easier to ship intellectual property electronically over great distances than the associated physical goods.

While regional supply chains should reduce inventory, these take time to put together. In the meantime, businesses faced with increasing energy and carbon costs shift some transportation modes, from air to ship and from truck to rail.

These slower modes of transportation require longer inventory pipelines, raising aggregate inventory in the short run. As regionalization takes effect, however, one should expect aggregate inventory to come down commensurately.

Growth in lean rail and shipping

Rail and ships are much lower in both fuel and carbon cost per ton-mile of cargo than truck and air. The more energy efficient modes of transportation are now getting closer to taking market share. While this has happened to some degree, why hasn't it happened faster? The great penalties of rail and ship are the dramatically slower speed of delivery along with more unpredictability in delivery date. Rail and ship innovators have opportunities, however, to narrow the gap between themselves and the faster transportation modes. Innovators can also put distance between themselves and commodity operators within their own modal space.

One of the most important lessons learned from lean manufacturing has been that cycle efficiency is a fruitful area for waste reduction. In the early days of lean, it was not uncommon to find American factories operating at 1 to 3 percent cycle efficiency. This means that only 1 to 3 percent of the total elapsed time in factory was spent adding value. The rest was spent in queuing or waiting to be worked, or moving between production centers. Factories that raised this cycle efficiency to 20 to 40 percent saw huge gains in operational efficiency and effectiveness that translated into competitive marketplace success. While the absolute cycle efficiency numbers are likely somewhat different in transportation, the principle remains the same. Not all cargo end-to-end elapsed time is spent moving over the ocean or on rails. Significant portions of time are spent in queues, loading and unloading, or even transshipping around a network. These represent opportunities to reduce waste and create competitive advantage. Rail or ship transportation that could cut elapsed time by 30 to 50 percent from the norm, for example, could likely take some business from truck or air transportation. More importantly, innovators with this kind of advantage could charge more than same mode competitors while still significantly under-pricing their faster mode substitutes.

Factories raised cycle efficiency by several means, including replacing job shops with dedicated and multi-product flow lines, as well as by reducing lot sizes going through manufacturing processes. Innovative transportation providers are now starting to take these same approaches. For example, APL Logistics and Con-way Freight established their OceanGuaranteed service with both faster transit times and day-definite delivery to address customer needs. This was accomplished

through setting new dispatch, grouping, loading and unloading rules and priorities, and through coordination between ship and ground transportation, but without increasing vessel velocity. According to press reports, the usual elapsed time for LCL shipments from China to the U.S. have been cut by a third, resulting in business growing at up to 10 percent per month. Shipper Michael Kors reported that handbags that once shipped by air for $25 apiece, now go by this service for $5 apiece, and at 3 percent of the unit carbon footprint of the air service. With regard to smaller lot sizes, Maersk has deployed 17 new vessels at one quarter the usual tonnage. While sacrificing some economies of scale, these smaller vessels should enable improvements in cycle efficiency. It is intriguing to consider the cycle efficiency potential of combining the dispatch, loading and ground transportation coordination employed by APL Logistics and Con-way Freight with the smaller ships of Maersk, and running the ships faster instead of slower, per the common wisdom to save fuel and carbon footprint. While slowing speed clearly cuts fuel consumption per ton-mile at the ship level, in comparison to air transport, the ton-mile fuel consumption and carbon footprint is much less. Thus, if significantly faster ship transport can take business from air transport, it opens the way for aggregate carbon footprint reduction. It also points to a segmenting of shipping into various kinds of services with different tradeoffs.

Manufacturing follows the sun--sun power, that is

Both the cost of energy and the cost of carbon can be regarded as waste in a lean operations perspective. Why not reduce these as much as possible? The notion here is much longer term and more speculative than either a short regional supply chain and/or lean rail or ship services. Countries and regions are investing at different rates in alternative and renewable energy sources that can be converted to electricity. For example, the Financial Times reported in the May 19, 2009 issue that Australia is aggressively investing in solar power to replace coal-fired plants. If this investment strategy is followed up over time, could Australia, and other potential leaders, develop a new source of competitive advantage for attracting manufacturing business and employment?

Even aggressively investing countries will take considerable time to displace the majority of traditional electric power generation with renewable sources such as solar. However, a few favored manufacturing or other business sites tied to emerging solar facilities could be the vanguard of new business and employment generation. While many industries do not use large amounts of electric power in their production processes, we note that it is possible and likely that when renewable electricity is available in scale to users at a favorable price, they will

find ways to substitute electricity for other forms of energy. The most promising opportunity here lies with the development of economically attractive electric vehicles. Almost every business has workers commuting in autos with potential to substitute electricity for gasoline. Homeowners with installed solar capacity are already substituting electricity for natural gas for applications such as cooking, home heating and cooling, and clothes drying. With utilities currently reluctant to buy solar generated electricity from homeowners in excess of power consumption, substituting electricity for natural gas is a rational response that can teach us something about the future of the industrial power landscape.

Far from being dead, environmental sustainability and energy efficiency present a fascinating landscape that will unfold in a variety of complex interactions between various types of global supply chain players adjusting to the emerging realities of consumer sentiment, public policy and energy supply. It is a domain ripe for innovation and wealth creation by companies with foresight and fortitude. wt

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