CLOSING THE LOOP:

BUILDING THE ENVIRONMENTAL SUPPLY CHAIN

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Globalized business was built on the back of cheap oil, near-unlimited access to resources and a culture of discarding. Companies created highly dispersed globalized sourcing, production and sales footprints. Products and materials crisscrossed the world on their journey from manufacturing to market. Considerations about the environmental impact of this highly extended supply chain model took a back seat to growth.

All that is changing.

In 2008, The Economist Intelligence Unit identified the supply chain as "the weakest link" from an environmental sustainability perspective. Growing public concern for the environment is driving companies to pay more attention to their 'green' footprint – not just in the products they manufacture, but also in the supply chain that carries them.

What first started as an image improvement effort has evolved into a business imperative and, in the most advanced companies, a competitive advantage.

The environmentally sustainable supply chain can not only deliver cost savings and efficiencies, but can also generate new sources of revenue by capturing residual value from products at end of life. Companies with the foresight to transform their view of environmental sustainability – from meeting obligations to seizing opportunities – can capitalize on this strategic approach.

Part 1: Current state and driving trends

"Sustainable supply chain management," according to the Sustainable Supply Chain Foundation, "involves integrating environmentally and financially viable practices into the complete supply chain lifecycle, from product design and development to material selection (including raw material extraction or agricultural production), manufacturing, packaging, transportation, warehousing, distribution, consumption, return and disposal."

Unlike the traditional one-way supply chain, the environmental supply chain creates a closed-loop system that manages products and materials through to end-of-life disposal. Environmentally sustainable supply chain management and practices can help organizations reduce their total carbon footprint, and optimize their end-to-end operations to achieve greater cost savings and profitability.

Three major forces are driving the shift toward the 'green' supply chain:

- Escalating consumer pressure
- Pressure to improve efficiency and reduce costs
- The compliance squeeze

Additionally, companies are starting to realize that there is a direct link between a green supply chain and profitability improvement. This improvement stems from either direct revenues from capturing value from the recycling waste stream, or indirect savings stemming from elimination of waste throughout the supply chain.

Escalating consumer pressure

Consumer pressure on companies to be more sustainable is escalating. According to the Carbon Disclosure Project (CDP) Supply Chain Report 2013-2014, 56 percent of companies surveyed for the report identified changing consumer behavior as the biggest driver of change toward expanding sustainability efforts.

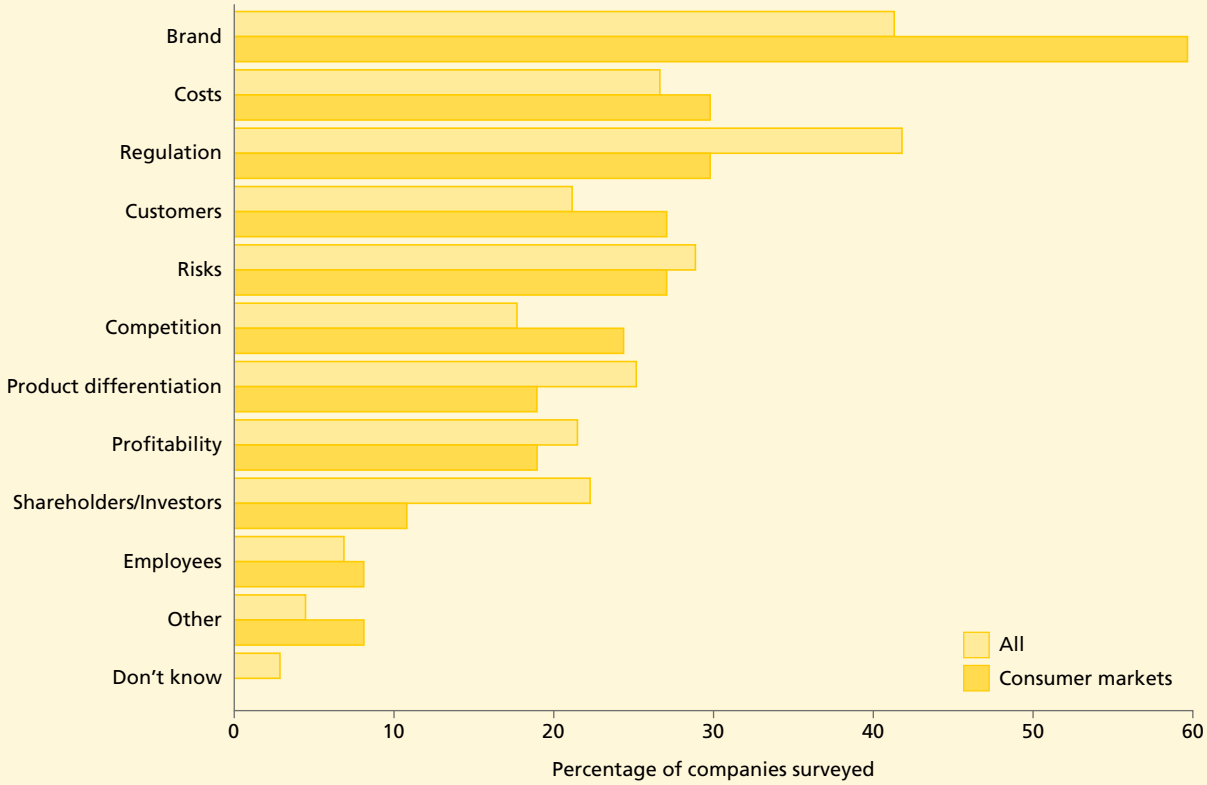
Social responsibility is now a business imperative. "Gone are the days when a brand name can distance itself from a far-away manufacturer or landfill site where their products end up," asserts one supply chain executive from a global high-tech company. "In an era of social media, where commercial reputations can be smashed overnight, there is no alternative but to take a holistic view, and be responsible environmental stewards along the entire lifecycle of a product, from raw material to disposal."

The retail consumer goods sector is particularly influenced by customers' growing concern for sustainability. A study by consulting firm KPMG found that brand perception and enhancement is the number one reason why companies adopt sustainability practices (see Figure 1).[1]

This brings another important factor into play: the risks of liability and loss of brand image. "For example, if waste for recycling or reuse is handled poorly," says Chris Jackson, Vice President, Envirosolutions at DHL, "and goes to a country that doesn't have the infrastructure to deal with it, you end up with a photograph in the international press showing a child handling glass from a smashed TV with the brand name clearly visible. That's the last thing a brand wants to be associated with."

[1] KPMG International, Corporate Sustainability: A Progress Report, 2011, p. 7.

Figure 1: Top drivers for adopting sustainability practices



Source: Corporate Sustainability: A Progress Report, KPMG International, 2011

Pressure to improve efficiency and reduce costs

Five years ago, most businesses viewed sustainability as something that added cost and hurt the bottom line. Leading companies today know differently. Well-executed sustainability programs drive efficiency in the supply chain – efficiency that translates directly into savings.

"Leading companies create value by modifying their supply chains to manage the key inputs and outputs: energy, carbon, water, materials and waste," states a report by Deloitte Consulting. "These are ubiquitous throughout the supply chain and thus offer vast potential for improved efficiency and cost reduction. Energy is expensive to use; carbon, in the form of emissions, represents dollars gone up in smoke; scarcity and commodity inflation are driving up the price of water and materials; and waste is potential profit thrown away."[2]

Adopting a more sustainable approach to managing all of these supply chain inputs and outputs frequently uncovers opportunities to reduce costs while at the same time improving a company's environmental footprint. For example, reconfiguring the transportation network to either use more efficient modes or reduce empty miles conserves energy and improves the supply chain's carbon output, while at the same time saves money.

"You don't have to sacrifice profitability to achieve sustainable logistics," stressed Huw Waters, Product Supply Director for Procter & Gamble UK and Ireland, in a recent essay.[3] "The two go hand in hand." Since 2002, according to Waters, P&G has worked internally and with its supply chain partners to more than halve the impact it has on the environment across energy usage, CO_2 emissions, waste disposal and water usage. These operational results have led to nearly $1billion in cost savings.[4]

[2] Deloitte, The Evolving Supply Chain – Lean and Green, 2012, p. 1.
[3] Huw Waters, www.theguardian.com, April 17, 2013.
[4] Ibid.

The compliance squeeze

Countries around the world are struggling to deal with environmental degradation, resource scarcity and waste streams. As a result, they are issuing more and more regulations around environmental sustainability – covering areas such as waste stream control, packaging, greenhouse gas emissions and extended producer responsibility. “Legislative and cost imperatives are pushing companies to think about waste and recycling,” notes Simon Potter, Business Director, Envirosolutions Europe at DHL. “It’s only going in one direction: reduce waste as much as possible.”

IRIS OHYAMA: Profiting from the control tower advantage

As more companies seek to reduce their energy consumption and improve the carbon footprint of large facilities, one of the areas they look to first is replacing fluorescent lamps with LED lighting. In serving this replacement market, Japanese lighting wholesaler IRIS OHYAMA wanted to create an efficient end-to-end supply chain service to support large-scale projects. This service would include the sale and installation of LED lights, and the collection, disposal and recycling of the replaced fluorescent lamps. IRIS OHYAMA expects to supply over two million LED light units to Japan in the first year of operations.

IRIS OHYAMA worked with its 3PL to implement a reverse logistics control tower solution that collects used fluorescent lamps, transports them as industrial waste, monitors the recycling process, and then transports the recycled raw materials to either IRIS OYHAMA or other manufacturers for use in new products.

"When we started this program two years ago, it was the first in our industry," reports Mr Ishida, Corporate Executive Officer, LED Division. "It was a conscious decision by the company to lead the way, and it has given us a competitive advantage. We are a new manufacturer in the industry, so this is a differentiator for us."

Waste stream control

The world is awash in waste – things that people throw out. The European Commission (EC), for example, estimates a total waste burden of 1.3 billion tons per year, or 530 kg annual average waste production per person. The EC has set aggressive targets for landfill waste reduction by 2016.[5]

Electronics waste (e-waste) is of particular concern – primarily because of its exponential growth. In the United States, recycling industry leaders estimate that 50 to 80 percent of all electronic waste collected is not really recycled at all. Rather, it is exported via container ship to developing countries, particularly in Asia and Africa.[6] The same holds true for the EU. According to United Nations data, about 70 percent of electronic waste globally generated ends up in China.

The UN StEP (Solving the E-waste Problem) Report from 2013 concluded that e-waste is the world's fastest-growing waste stream. Left unchecked, this e-waste stream will develop into what the United Nations calls "an environmental catastrophe."
In an effort to gain some control over this problem, countries are issuing regulations governing e-waste disposal. Unfortunately, there is no consistency or standard format for these regulations, further adding to the complexity of the problem.

[5] European Commission Roadmap: Review of Waste Policy and Legislation, February 2013.
[6] http://www.electronicstakeback.com/promote-good-laws/federal-legislation/, 2013.

Packaging

Packaging is another area seeing a rise in regulatory requirements for sustainability. For example, the UK's latest packaging waste directive (94/62/EC) requires: [7]

- Packaging to be minimized
- Packaging be designed for recovery and reuse
- Companies to meet waste recovery targets
- Restrictions on use of heavy metals in packaging

Many differences also exist in environmental packaging design requirements and material restrictions (or bans) worldwide. For example, some countries have specific empty space and layer limitations for certain types of packaging (such as Taiwan and South Korea), while others entirely ban, or restrict, certain materials in some, or all, types of packaging, such as PVC restrictions in South Korea and EPS bans in the U.S.[8] Japan instituted a recycling tax for all packaging at the source on a per kilo basis. The heavier the packaging (e.g. more plastic in the bottle), the higher the tax.

[7] https://www.gov.uk/environmental-regulations#packaging, 94/62/EC.
[8] http://www.packagingdigest.com/sustainable-packaging/packaging-compliance-complex-reality.

Greenhouse gas emissions

Human activity generates annual greenhouse gas emissions of about 50,000 megaton CO_2e globally. The logistics and transportation sector contributes an estimated 2,800 megaton – or 5.5 percent of the total. Logistics and transport emissions are 5 percent to 15 percent of product lifecycle emissions.[9]

Declining air quality and other environmental issues are prompting developed nations to require significant cuts in greenhouse gas emissions. For example, the European Union's Energy Policy stipulates a 20 percent reduction in greenhouse gas emissions by 2020. And China's newest Five-year Plan on Greenhouse Emission Control calls for reducing the amount of carbon emitted per unit of GDP by 17 percent by 2015, compared with 2010 levels.[10]

[9] World Economic Forum & Accenture, Supply Chain De-carbonization, 2009, p. 4.
[10] http://www.china-briefing.com/news/2012/01/18/china-sets-new-greenhouse-gas-emission-reduction-goals.html#sthash.mVfx14LB.dpuf

Extended producer responsibility

Perhaps the most significant change in the compliance picture is the adoption by a growing number of countries of extended producer responsibility (EPR) rules. Under EPR, a producer's responsibility for a product is extended to the post-consumer stage of its lifecycle. An EPR policy is characterized by: (1) the shifting of responsibility (physically and/or economically; fully or partially) upstream toward the producer and away from municipalities; and (2) the provision of incentives to producers to take into account environmental considerations when designing their products.[11]

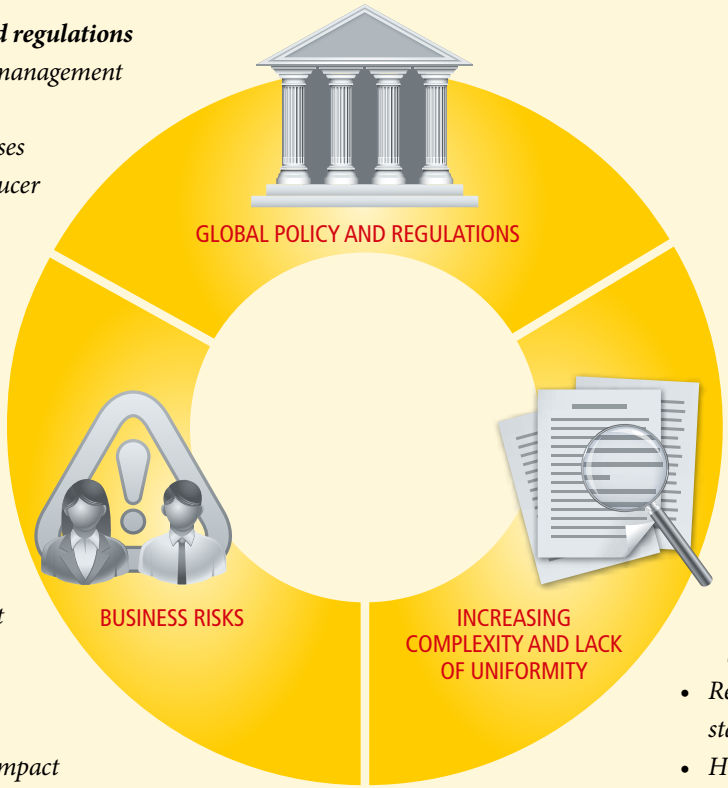
Simply put, the 'polluter pays' principle is spreading across the globe. Companies will be responsible for what happens to products at end of life, and must observe regulations regarding material collection, recovery, recycling and destruction/disposal. Non-compliance with environmental regulations poses business risk – in the form of fines, negative publicity and a potentially adverse impact on sales. Figure 2 illustrates the challenges companies face in regard to compliance.

[11] http://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm.

Figure 2: The compliance challenge

Global policy and regulations

- *Waste stream management*
- *Packaging*
- *Greenhouse gases*
- *Extended producer responsibility*



Business risks

- *Adverse impact to brand*
- *Competitive disadvantage*
- *Profit erosion impact*

Increasing complexity and lack of uniformity

- *Regulations vary by state, country, region*
- *Highly complex*

Using 'green' to drive profitability

Leading companies no longer view supply chain sustainability as an added cost; they now see it as a business opportunity. Green practices in the supply chain reduce energy consumption, reduce or eliminate waste and deliver other similar benefits.

Beyond that, however, embracing environmentalism in the supply chain can drive profitability by creating entirely new revenue streams, securing sustainable supply sources, or simply improving consumer opinion about the company.

British Airways: Recovering value from waste

"We get more feedback from customers on waste than virtually any other environmental subject, because our customers see it when they fly," says Jonathon Counsell, Head of Environment, British Airways, part of the International Airlines Group. "From a customer engagement perspective, it's difficult to engage them on the other issues if they don't see us recycling waste on board."

Even though waste management represents only 10 percent of its overall sustainability effort, British Airways recognized the opportunity to make high-profile changes that would show its customers it was serious about environmental stewardship. The airline worked with a third party logistics service provider (3PL) to implement a multi-faceted plan that included food recycling and waste recovery.

From this program, British Airways achieved the following:

- *A 70 percent reduction in food waste transport costs due to the installation of food recycling equipment*
- *Elimination of landfill tax charges by achieving a zero 'waste to landfill' target*

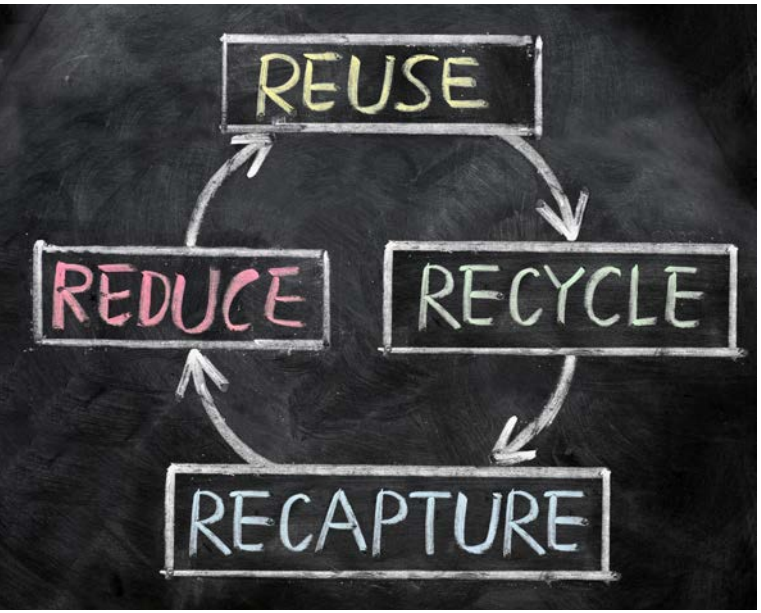
British Airways is also investing in a plant that will convert 575,000 tons of waste each year normally destined for landfill or incineration into 120,000 tons of clean-burning liquid fuels.[12]

BRITISH AIRWAYS

[12] Machinery Market, BA to convert landfill waste into jet fuel, April 24, 2014.

Part 2: Building the new environmental supply chain

The new environmental supply chain is based on managing inputs and outputs according to four principles: reduce, reuse, recycle and recapture (the four Rs of supply chain sustainability). These apply to the supply chain itself and the waste it produces, as well as to the products it delivers and returns.



Examples include:

- Reduce: eliminating waste in the supply chain by installing high-efficiency lighting in the warehouse, reducing empty truck miles, switching from all-truck to truck-rail intermodal, using less packaging material
- Reuse: reusable pallets, collection and refurbishment of consumer electronics products
- Recycle: recycling waste
- Recapture: breaking down end-of-life products to harvest residual value in the materials (e.g. precious metals, plastics)

Early efforts to green the supply chain focused on 'low-hanging fruit', such as reducing energy consumption in warehouses by switching to LED lighting, installing rooftop solar panels and shifting to more efficient transportation modes.

These efforts remain important. However, companies are expanding their activities to encompass more complex solutions. For example, Unilever has set a target of cutting the

environmental impact of making and using its products by 50 percent by 2020. It will accomplish this goal by reducing greenhouse gases, water consumption and waste. As part of this endeavor, Unilever is in the process of reconfiguring its U.S. supply chain network to reduce unnecessary transportation.[13]

Building the new sustainable supply chain is a virtually untapped opportunity to capture value and potentially drive new topline revenue. "Think of waste disposal management as the mirror image of the complex supply chain processes that go on at the front end of the production of any product, and then add in new processes that help manage this stream while at the same time adding value," says Jackson. "This is the opportunity proposition – to add or capture value from what once was just considered waste."

What kinds of solutions can companies deploy to capitalize on this opportunity? In leading supply chains, best practices and solutions are emerging.

These include:

- Lead Environmental Partner (LEP) and the control tower approach
- Closed-loop supply chain management – includes integrated waste recycling, value recovery and EPR compliance management
- Carbon and energy management

[13] Unilever (http://www.unilever.com/sustainable-living-2014/reducing-environmental-impact/greenhouse-gases/).

LEP and the control tower approach

Control tower solutions are commonplace for managing material and product flows in supply chains. The supply chain control tower concept means a company has a dedicated staff of supply chain experts monitoring the forward and reverse flows of the supply chain to provide an integrated solution. The logistics provider works with the customer to orchestrate the myriad flows within the supply chain.

Control towers are relatively new to managing sustainability in the supply chain. In these emerging applications, companies utilize a lead environmental partner (LEP) to manage all material streams and to constantly seek out improvement opportunities that make both environmental and economic sense. The LEP uses real-time visibility tools together with analytics to monitor and assess the condition and performance of the supply chain. An LEP can act as a single vendor for a company's waste management requirements, simplifying these services for it. In turn the LEP can manage multiple waste management vendors to achieve the lowest costs, highest recyclables rebates and necessary compliance standards.

The LEP applies a process checklist at each stage of the transportation/distribution supply chain that helps ensure that the most appropriate sustainability practices, as well as compliance requirements, are employed and met. It also creates a mechanism for continuously scanning the supply chain for opportunities to improve sustainability, and monitoring compliance developments to anticipate future requirements.

Closed-loop supply chain management

Maximizing the collection of recyclable material helps execute on the 'four Rs' of sustainability. It enables companies to regain control of important raw materials or components – toward the end goal of resource reclamation and value harvesting. At the same time, it provides tangible benefits in the realm of corporate social responsibility.

In such a system, a logistics service provider would perform a number of services for the manufacturer, retailer or other type of company, including:

- Collection, sorting and recycling for all waste streams as part of a comprehensive EPR system, and as a mechanism for capturing value from products at end of life

- Set-up of collection points or regular/one-off pickups ensuring cost-efficient transport through a control tower approach
- Managing trustworthy recycling partners to ensure waste streams are robust and the customer's corporate brand is protected

Carbon and energy management

Companies utilize a third party logistics firm to provide supply chain carbon footprint tracking and management. This is a natural extension of the services already provided by a lead logistics provider – i.e. forward and reverse transportation and distribution management. The logistics partner also typically works to identify carbon impact reduction and offsetting opportunities.

Where carbon reporting is required, the logistics partner collects, manages and handles this data-intensive task. These reports provide further insight into improvement opportunities.

Delivering peace of mind: Environmental compliance across borders

For a leading telecommunications company that owns and operates mobile networks in some 30 countries, ensuring compliance with environmental regulations was a growing concern. This was especially true in Europe, where the company was subject to stringent regulations affecting product manufacturing content and end-of-life responsibility. The company needed a way to ensure compliance, but lacked the processes and capabilities to do so cost-effectively.

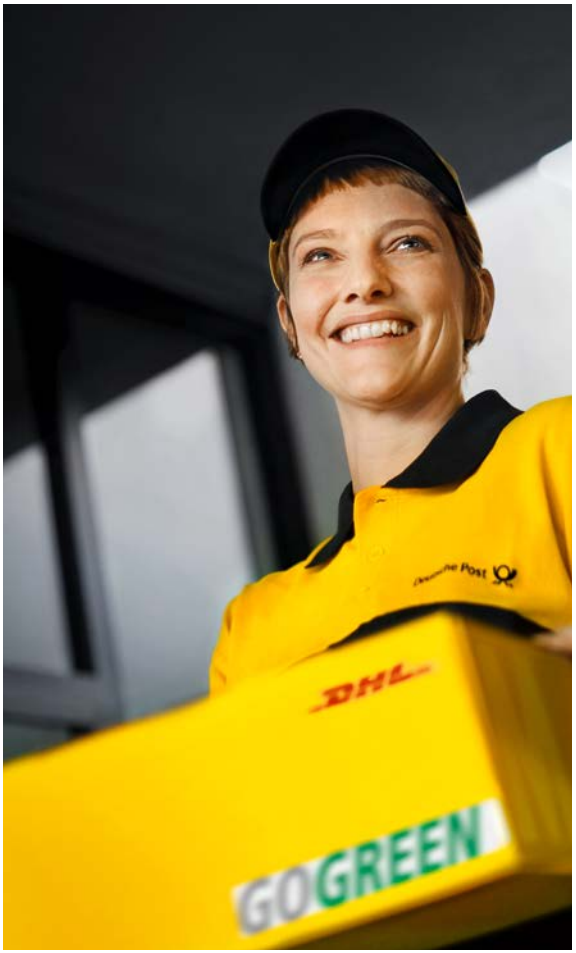
The telecom firm turned to its logistics partner for help. DHL developed a control tower solution to serve as a single point of contact for tracking all suppliers and approved compliance schemes across all countries. The team proactively monitors suppliers for compliance anomalies and works to account for any discrepancies. It also pays country-level recycling fees on behalf of the customer and provides a quarterly, consolidated European compliance report.

The control tower solution has reduced the telecom company's technical and administrative burden, while protecting its international brand reputation. The result: the company can focus on its core business activities – developing new products and serving its customers.

Gaining first-mover advantage

Beyond the obvious benefits of reducing overall carbon footprint, and reducing energy and resource consumption, there are many other reasons why embracing supply chain sustainability makes good business sense:

- Improved bottom line. Sustainability eliminates waste and cost throughout the supply chain, delivering cost savings benefits. It also offers potential for a new revenue stream – from recovered value. Forward-thinking companies are already turning waste into cash and this is likely to be recognized more widely as a significant business opportunity.
- Consumers and investors recognize the importance of green practices and sustainability. Increasingly, they will make buying and investment decisions influenced by their perception of a company's sustainability strategy.
- Governmental initiatives provide tax and investment incentives to companies that employ sustainable practices.



- Sustainability equates corporate social responsibility and stewardship with being a good global citizen. The positive public relations exposure from identifying and implementing sustainable supply chain practices can yield numerous benefits.
- Companies increasingly make supplier selection decisions based on the sustainable practices of the vendor.

With a focus on efficiency and value creation, leading companies and their supply chain partners are taking a proactive, rather than reactive, approach to supply chain sustainability. They are innovating to create new revenue streams, anticipating and mitigating material or energy volatility risk, operating ahead of the regulatory compliance curve, reducing costs, and streamlining operations – all while benefiting the environment. In so doing, they are gaining a first-mover competitive advantage. This is the definition of adaptability, creativity and resiliency in business.

This is the face of the next-generation environmental supply chain.

About this paper

Strategic consultant, academic and co-author of three books, **Lisa Harrington** offers a global supply chain perspective.

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Lisa's articles have appeared in Fortune, Industry Week, The Economist, Inbound Logistics, The European Business Review and many other publications.

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