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Lean and Green: Environmental Strategies for Manufacturing Operations

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Meeting environmental requirements set by regulators and customers can seem a thankless task. Yet minimizing resources consumed by facilities and products leads manufacturers to meet other needs—such as running lean operations, pleasing investors, and enlarging market share. Successful companies around the globe—including Texas Instruments (USA), BAE Systems (UK), Philips (The Netherlands), and NEC (Japan)—have proven that gains for business and the environment are mutual.

Lean Operations Achieved through “Green” (Environmental) Steps

Four common strategies emergedⁱ (Table) after investigating business benefits achieved by 20 organizations through minimizing environmental impact.

Table: Four Steps to Minimizing Resources to Benefit Both Profit and the Environmental (“Lean and Green”)

Step	Strategy
1	Question wasteful practices.
2	Gain endorsement for improvements by making sound business cases.
3	Involve executives and teams for the swiftest implementation.
4	Measure financial as well as environmental progress, and keep improving.

For example, to take step one—question wasteful practices—Texas Instruments’ practiced its philosophy of “zero wasted resources” by requiring employees to focus on eliminating anything that did not add value to the chip-making process. These activities fit well with TI’s business culture and long-term quality philosophy. VP Corporate Staff Manager of Worldwide Facilities Shaunna Sowell said, “Our focus on relating environmental, safety, and health to the cost of producing a chip resulted in real profit to TI.”

Next, as described in step two, use business language to characterize environmental improvements. At BAE Systems in Samlesbury, Lancashire (UK), each of the plant's business managers nominates a champion to tackle environment issues. These "environmental coordinators" rarely have backgrounds in the environmental field, so they take a course on teaching categories of manufacturing waste (e.g., general, metals, liquids, dry hazardous materials, chemicals, and recycled). Also covered in the training course are the affects of manufacturing waste on their plants' costs of goods sold and, as described by the company's Environmental Advisor Danny Martland, "the training also addresses how our children and our children's children will be affected by the environmental choices we make today."

Involving executives and teams when implementing the improvements will speed along the attainment of the business and environmental goals (step 3). Philips has an EcoVision award by which they make it clear to all employees that top management encourages environmental steps. An international jury judges employee nominations, then Philips' president or vice president flies in for the awards ceremony, giving two monetary awards: one for the most ecologically friendly product and the other for the best ambassador of ecological practice. One winning idea in the product category was for a resource-efficient monitor; an environmental coordinator in Mexico won for the ambassador category.

Finally, step four promulgates the "lean and green" equation and propagates further business-and-environment success. NEC Semiconductor Group worked with Japan's Ministry of International Trade and Industry (MITI) to introduce "environmental accounting" to its business. The new accounting procedures track resources used to protect the environment and resulting money saved or earned. In developing environmental accounting, NEC and MITI addressed these questions:

- Should potential lost revenue be incorporated into the accounting system? For example, if your company is not green enough, your customers may purchase products and services from your competitors. But by being green, you prevent lost revenues.
- How best should an organization calculate cost savings from recycling materials in one year when, for example, it recycled 50% of its waste two years ago and an additional 25% last year? Should the savings for this year be calculated as just 25%?

- How should an organization measure environmental impact uniformly throughout its locations and divisions and track project-specific cost savings to promote accountability?

Pleasing Investors through Lower Cost and More Innovative Products

In the four strategy examples noted above (and in hundreds more), companies taking environmentally beneficial steps are increasing profits by reducing operating and product costs as well as designing more efficient products. Savvy investors know that they profit from evaluating what success their portfolio companies have in reducing waste and designing competitively superior products—all leading to greater return on investment.

In fact, many mutual funds that screen companies according to environmental and social criteria have performed better than non-screened funds. For example, environmentally screened mutual funds from Pax World have garnered some of Morningstar's highest ratings.ⁱⁱ The Calvert Fund has a particularly large family of environmentally/socially-screened mutual funds; this fund, as reported by *Business Week* magazine, "ranked five stars by Standard & Poor's, has had strong performance with its use of strict social [and environmental] screens. As of July 29, 2005, the \$313.5-million portfolio registered a three-year annualized gain of 19.3%, vs. a rise of 10.6% for its large-cap growth peers and 12.6% for its benchmark, the S&P 500-stock index."ⁱⁱⁱ

Stock analysts have been writing favorable reports on electronics companies' "lean manufacturing" prowess—believing that reducing wasted manufacturing space, processes, and materials contributes to a healthier bottom line. What most stock analysts may not realize is that steps to "lean" a company nearly always "green" a company as well, as illustrated in Figure 1—a poster in the Shanghai, China, facility of Solectron Shinei.

Figure 1: Early in 2004, Solectron Shinei initiated its six-sigma lean manufacturing program, comprising Kaizen and 5S training, and obtained buy-in from workers.



Even stock analysts who never would have ranked environmental programs high in their company evaluation criteria are now taking notice. Stock analysts tracking companies selling electrical and electronic products are becoming aware that regulators and corporate customers in numerous regions have started requiring that these products be devoid of hazardous substances and that products be recycled after use. For example, six months from now (July 1, 2006), the Restriction of Hazardous Substances directive will block all non-compliant products from entering Europe, and countries will assess fines for failure to recycle products sold there. The availability of non-compliant components and materials is starting to dry up. To avoid product delays, engineers are redesigning products to be composed of benign parts; to meet recycling targets profitably, products now will be faster and easier to assemble and disassemble for recycling. With billions of dollars of revenue, market share, product shipments, and corporate image at risk, it's no wonder stock analysts are starting to notice the environmental responsibility of companies they track.

Figure 2 summarizes reasons why performance of leaner and greener companies pleases investors.

Enlarging Market Share by Anticipating Changing Market Needs

A long-standing recipe for being and staying successful in business is to...

- Find a new or changing market need,
- Fill that need,
- And repeat.

In the 1920s, my great grandfather had a successful shoelace business, Diamond Braiding Mills. In the 1930s—anticipating high demand for electrical wire—he determined that his machines could braid electrical wire; thus, he changed the name to Diamond Wire and Cable Company and received an award for quality products and excellent service to the military during World War II. When times were about to change again, one of my great uncles invented a rubber-extrusion method for complicated harnesses used in jukeboxes and other electronics made by Motorola and Zenith.^{iv}

Many businesses have not followed the recipe of finding new needs and innovating to meet them, and therefore their market shares have diminished or companies have failed. In the 1980s, Data Resources Inc. began to descend because it did not transition its services from mini-computers to personal computers, as did competitors. More recently, many photographic film-developing shops have gone out of business, for failing to anticipate plunging demand when customers bought digital cameras.

The preceding article “Adhering to Environmental Regulations...” compares the activities of an environmental manager ten years ago with his/her activities today in 2006. In ten years *from now*—2016—which companies will have failed because their management did not anticipate the needs of markets that no longer tolerate hazardous substances, are unwilling to live with mountainous landfills and poisonous incineration, and have less access to cheap petroleum resources (for making traditional plastics, chemicals, fuel, and power)?

- Chemical companies and users of those chemicals whose management fails to redesign products before approximately 30,000 chemicals are

banned by the European Union's Registration, Evaluation, Authorization of Chemicals (REACH) directive.

- Electronic and electrical companies that miss recycling thresholds in regions where producers are responsible for keeping their products out of landfills and incinerators.
- Companies whose products consume too much energy, after enactment of the Equipment using Power (an EU directive) and customers scrutinize their gas and electric bills as never before.
- Companies still relying on petroleum-based materials and experiencing supply-chain delays and higher costs, when their competitors have invented new uses for renewable (e.g., corn-based plastics) resources that are widely available, less expensive, and preferred by customers.
- Companies whose products and/or packaging are unnecessarily large and require far greater expense in shipping from manufacturing regions to customers.

To flip the question to the positive, which companies will enlarge their market share most based on anticipating changing environmental needs and filling those needs first and best? From today's perspective, it could be that Japanese companies will be the market winners, for these reasons:

- Numerous Japanese companies have invented ways to make electronic products as small and energy efficient as possible. Some companies, such as Sony, have been switching from petroleum-plastic materials to renewable plastics and virgin or recycled metals. These products are increasingly in demand for aesthetic as well and environmental reasons.
- Sale of hybrid-electric cars grew 960% from 2000 to 2005. And 95% of this niche is occupied by Japanese companies. At General Motors, GM Bob Lutz—who chose horsepower over efficiency—has admitted that his company missed the ball on hybrids.^v Though some American car makers are now introducing hybrid cars, these cars are much less efficient than their Japanese counterparts. In California, three models of hybrids—all Japanese—are now allowed in the high-occupancy-vehicle lanes.
- In September 2005, a commission of European scholars and business professionals toured Japanese recycling facilities, to witness practices that are 5 to 10 years ahead of recycling technology elsewhere. Many Japanese recycling companies have lucrative plans to export their advanced technology to other regions. Japan's clear goal is to progress home

appliance and other electronics recycling with an anticipation of Japan running out of landfill as early as 2008; to this end, Japan created aggressive recycling targets back in 2001 and so far is recycling about 30% above those targets.^{vi}

- Among the world's leading environmental engineering firms is Tokyo-based conglomerate Ebara Corp., whose management is dedicated to helping build a "zero-emission society."^{vii} It has developed numerous in-house-invented technologies for a range of environmental applications, including energy conservation, pollution control, advanced recycling, and closed-process engineering systems and services. Revenues for these environmental programs topped US\$2 billion back in 2004, and by penetrating the Chinese market the company's revenues should soar.
- Some of the world's most energy-efficient appliances come from Japan, such as Daikin Industries' air-conditioners. The products are smaller and far more efficient than other brands.^{viii}

Thankless Tasks, or Business Boosters?

In this time of escalating environmental requirements from both global regulators and the markets themselves, it is best for business to swiftly convert their products and way of thinking to sustainability. This year presents a critical decision point: do you scramble to meet a succession of environmental requirements, or "insulate"^{ix} your company and its products from regulations by being competitively superior? The latter choice will result not in "thankless tasks" but in "thank goodness our operations are running leaner, we are pleasing investors, and we have enlarged our market share."

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ⁱ Gordon, Pamela J., *Lean and Green: Profit for Your Workplace and the Environment*, Berrett-Koehler Publishers, 2001.

ⁱⁱ *E magazine*, November/December 2005, p. 19.

ⁱⁱⁱ "Smart Stock Picks with a Conscience," *Business Week* magazine, August 18, 2005.

^{iv} Gordon, Scott R., *The Life and Enterprises of Nathan Seifer*, 2004.

^v “The Hot Hybrids,” by Jim Motavalli, *E Magazine*, November/December 2005, p. 56.

^{vi} Interview with Professor Martin Charter, Director of The Centre for Sustainable Design (UK), November 2005, via phone.

^{vii} “Ebara Strives to Build Engineering Practice from Industrial Base,” *Environmental Business Journal*, November 11/12, 2004.

^{viii} Interview with eco-specialist-designer Steven Weininger, November 2005, Miami, Florida. And <http://global.daikin.com/global/index.html>.

^{ix} “Regulatory Insulation: a term created by Gil Friend, CEO of Natural Logic Inc., Berkeley, California. www.natlogic.com.