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Eco-Growth: A Framework for Sustainable Growth

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Abstract

Growth is imperative for corporate success and yet the environmental impact of this growth is not sustainable. In this paper we offer a framework for thinking about the stages of tackling the environmental sustainability challenge. It ranges from eco-efficiency, which includes initiatives that reduce costs while reducing environmental footprint; eco-alignment, including initiatives requiring cooperation with suppliers and customers; eco-innovation, which includes initiatives based on innovative products and processes; and eco-growth which includes initiatives contributing to the company's growth, combining all the others. The second part of the paper offers a framework for analyzing the trade-off between shareholders objectives and sustainability objectives. The framework is based on the concept of the efficiency frontier and is used to tie to the four proposed stages of tackling environmental sustainable growth.

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Eco-Growth: A Framework for Sustainable Growth

When AG Lafley returned to P&G as CEO in 2013, his mandate was to spur growth, in face of increasing competition.¹ “I am confident that we will deliver strong innovation, productivity and growth to win with consumers, customers and shareholders,” Mr. Lafley said when appointed.² And when Tom Mangas was named CEO of Armstrong Corporation, the \$2.7 Billion flooring manufacturer, a trade magazine quoted him saying “I’m going to ask a lot of questions and figure out how we can accelerate the growth.”³ Nothing in these statements is unique or surprising. As Bain and Company (and many scholarly articles) state, “For a business to survive, growth is an imperative, not an option.”^{4 5}

Company growth, however, means growth across the supply chain and an increase of environmental impacts. Nike estimates that 16,000 different materials are used by its 1,500 global suppliers to deliver 900 million product units every year.⁶ The Nike material supply chain accounts for 56% of the company’s Green House Gas Emissions and 83% of total water consumption. Apple’s outsourced manufacturing operations account for over 60% of the company’s greenhouse gas emissions, three times larger than the estimated emissions from the use of their products by consumers.⁷

Achieving business growth while mitigating environmental impact, such as the vision proposed by Unilever,⁸ Nike⁹ or Starbucks¹⁰ requires the engagement of the entire supply chain: suppliers at all tiers, service providers, manufacturing and assembly plants, distributors, customers, and recyclers.

1 Green Supply Chain Strategic Options

Obtaining an accurate environmental impact of any product requires a life cycle assessment (LCA) across the entire supply chain – from extraction activities, to material processing, parts’ manufacturing, subassembly, assembly, distribution, consumption and disposal. This is a tall order. Tesco’s original attempt to label all of the 50,000 products carried in its stores with carbon footprints was abandoned as a result of both the technical difficulty and the costs involved, as well as the low adoption of its supply chain partners.¹¹ Walmart’s original labeling initiative was also abandoned for similar reasons but then resurrected as supplier engagement collaboration within The Sustainability Consortium.^{12,13,14}

Initiatives within a company’s operation, and involving Tier 1 suppliers, have been more successful. In most cases such initiatives have been aligned with the company’s main goals of increasing shareholders’ value. Subaru and Unilever, for example, are achieving zero-waste to landfill at their manufacturing plants.^{15,16} Many companies have reduced their energy consumption – for example, Marks and Spenser retrofitted store lighting,¹⁷ and over three years Wal-Mart was able to reduce the energy used in its stores by 7% per-square-foot, through many small changes such as installing LED lighting, high-efficiency ventilation, and energy

management systems.¹⁸ Staples and other retailers reduced their packaging sizes, using less material.¹⁹ In all these cases, the initiatives were successful, in large part, because in addition to reducing carbon footprint, they also reduced cost, thus aligning with the financial goals of those companies. For example, Walmart’s energy conservation efforts mentioned above had less than four years payback.²⁰

These business efforts can be characterized by two dimensions: (i) extent of congruence with the company’s basic goals, and (ii) the supply chain scope involved.²¹ *Congruity* refers to the fit of the environmental strategy with the financial corporate goals of providing shareholders’ value; *supply chain scope* refers to the number of supply chain partners that are involved, from deep tier suppliers, to customers.

Figure 1 depicts four types of strategies along the congruity and supply chain scope dimensions, including examples of specific activities. The four types of strategies are eco-efficiency, eco-alignment, eco-innovation and eco-growth.

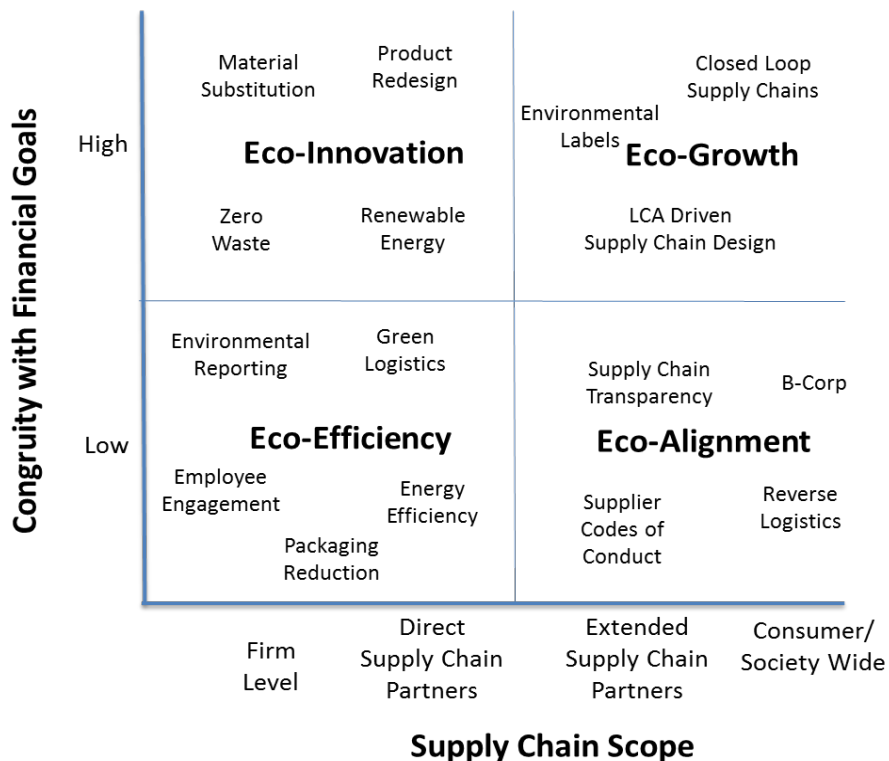


Figure 1 – Green Supply Chain Management Strategies

Eco-efficient strategies are those that contribute both to environmental sustainability and, at the same time, to profits -- typically, through cost reductions. Eco-efficient initiatives often focus on the company and do not require significant benefits/cost analysis. The returns are obvious and materialize in the short run; they also usually involve no (or a few) supply chain partners.

Eco-alignment strategies involve engagement with a larger and deeper set of supply chain partners to achieve environmental improvement. In many cases supply chain partners are brought “on board” using eco-efficiency arguments. The return

on these efforts typically takes longer time. For example, IKEA's code of conduct combined with a committed procurement organization and extensive suppliers' audits is designed to make all the company's suppliers more environmentally sustainable, while driving savings and productivity.²² Patagonia, in addition to their work with suppliers, is aligning with their customers by publishing The Footprint Chronicles.²³ This allows their environmentally conscious consumers to know where their products are made as well as the environmental and social performance of the suppliers involved.

Eco-innovation initiatives involve new products, business processes, or technologies that mitigate environmentally challenging elements in a company's operation. Industries in the energy sector such as BP or Exxon, invest heavily in research and development on clean energy alternatives. Such investments are carried out within the companies because they lead, in many cases to intellectual property, which provides competitive advantage.

As mentioned in the in preamble of this chapter, companies always strive for growth. The ultimate strategy is then one that includes a drive for environmental sustainability *and* growth – what we call *eco-growth* – environmentally sustainable growth. Such efforts may be based on efficient, aligned and innovative initiatives, but they aim beyond such initiatives. Based on a full life cycle view of their product and processes, leading companies are committed to reduce not only their relative environmental footprint (e.g., GHG per dollar of sales, or water use per kilogram of product sold); they aim to achieve absolute reductions in their environmental footprint while achieving aggressive growth targets. For mission driven companies like Seventh Generation, Patagonia, or Dr. Bronner's, eco-growth is what their customers expect and are willing to pay for. For large global companies – like Walmart, Nike, Ikea, Starbucks or Unilever – eco-growth requires taking bold steps, which have to be implemented at scale across a very large, diverse, and geographically spread network of suppliers, customers and consumers.

2 Eco-Efficiency

When introduced in 1992 by the World Business Council for Sustainable Development, eco-efficiency – encouraging businesses to find the economical production of goods and services with as little ecological impact as possible – was identified as the main strategy for private enterprises to embrace sustainable development.²⁴ Eco-efficiency often includes reductions in waste and economical use of factor inputs, such as water and energy, leading to tangible cost reductions. Owing to concerns about global warming, energy savings constituted the majority of eco-efficiency initiatives. In particular reductions in the use of fossil fuels contribute both to sustainability and the bottom line. According to the U.S. Department of Energy, “Energy Efficiency is one of the easiest and most cost effective ways to combat climate change, clean the air we breathe, improve the competitiveness of our businesses and reduce energy costs for consumers.”²⁵

2.1 Chasing Off Waste

“Zero-waste” initiatives at manufacturing sites have delivered multimillion-dollar savings annually for Subaru and Unilever.^{26,27} With 160 factories in 40 countries around the world, P&G’s manufacturing waste was historically seen as the cost of doing business. In 2007 the company committed to reach less than 0.5% of 2010 disposable waste in all manufacturing sites by 2020.²⁸ To achieve this goal P&G created the Global Asset Recovery Purchases (GARP), tasked with managing waste streams at sites around the world both to deliver cost savings and to increase reuse, recycling, and waste-to-energy generation opportunities.²⁹

Solutions began to roll in. P&G’s Budapest plant making Feminine Hygiene products started selling excess material to a cement kiln. Gillette excess shaving foam materials was sold to companies that grow turf for commercial uses; scrap from U.S. Pampers wipes was converted into upholstery filling; and sludge from toilet tissue paper in Mexico was converted into low-cost roof tiles. The drive for waste reduction uncovered new sales opportunities for off-spec products: off-spec baby wipes are sold to veterinarians in animal care and off-spec detergent and wastewater is sold to car washes.³⁰ Over the past seven years, P&G has been able to create more than 1.6 billion in value for the company.³¹

2.2 Taking Frustration Out of Packaging

Staples Inc. was able to reduce its packaging material by 15 percent by focusing on its internal distribution center operations.³² A similar initiative at Amazon is reducing cost and environmental impact while increasing customer satisfaction.

After years of frustrated customers receiving their products in “Russian Doll” style series of plastic and cardboard packaging, Amazon introduced its “frustration-free packaging” program in 2008.³³ “We’ve all experienced the frustration of trying to remove a product from nearly impenetrable packaging... We’ve worked with both manufacturers and customers to design Frustration-Free Packaging that is easy-to-open, protects the product and reduces waste,” said Jeff Bezos, Amazon’s CEO.³⁴ Amazon realized that traditional packaging, meant for in-store theft prevention (e.g. hard to open clamshells) or ease of retail display (e.g. oversized packaging), is not relevant for e-commerce. By removing excess packaging, Amazon estimates it has eliminated over 24.7 million pounds of material, both an environmental as well as cost benefit.³⁵

And customers responded; Amazon was able to show that products with reduced packaging also had a 73% reduction in negative feedback on Amazon.com.³⁶ For Phillips, having better reviews at Amazon.com was a big selling point. According to Stephen Cheung, Senior Consumer Marketing Manager for Phillips Oral Healthcare, “It wasn’t necessarily that the product was the issue, it was the unpack experience – you’ve got to get scissors and knives.”

Other retailers have also been prodding their suppliers to reduce packaging. As early as 2006, Walmart unveiled a “packaging scorecard” to help drive its goal of reducing global packaging by five percent compared to their baseline³⁷, a goal the company achieved in April of 2013.³⁸

2.3 Slowing-down Speeds Up Environmental Savings

Ralph Lauren eco-efficiency efforts included moving from replenishing its stores via airfreight to using ocean shipping or rail, which are more fuel-efficient and lower cost alternatives, albeit much slower modes of transport. Since 2009, Ralph Lauren has reduced their global air mix by more than one-third, avoiding 20,000 metric tons of in fiscal year 2014.³⁹ This was achieved by combining end-to-end visibility solutions with product segmentation.

Seasonal or “fast fashion” garments have uncertain demand and need to arrive quickly to stores for their selling period. Staple products, like the classic Polo shirts, on the other hand, are sold all-year long, stay in shelves for long time, have more predictable demand and their replenishment can be better planned. Working with suppliers to build longer lead-times into the production schedule of staple products, allows for an increase of ocean shipping, while restricting the use of airfreight to fast-fashion products.

Even traditional products can benefit from redesigned transportation networks. Fiji Water Company has been using a square bottle design to get transportation efficiency.⁴⁰ In addition, the company changed its distribution patterns and lengthened its island-to-store times. Instead of shipping water to Los Angeles and trucking to the Eastern US population centers, the company used ocean shipping through the Panama Canal to the Port of Philadelphia.⁴¹ The new route reduced emissions by 33% while reducing costs by 42%. The new route also increased distribution lead time by about two weeks, but owing to the relatively predictable nature of the demand for the product, this did not result in a significant increase in inventory carrying cost.⁴²

3 Eco-Alignment

In order to align entire organization behind sustainability goals, sustainability metrics have to be included in managers’ incentive compensation. For example, at Intel, 4 percent of employees’ annual variable compensation is linked to environmental goals;⁴³ Stonyfield Farms pays its employees a percentage of the energy savings in its facilities;⁴⁴ and according to Kevin Anton, Chief Sustainability Officer at Alcoa, “In 2010, 20 percent of our variable compensation plan was tied to achieving significant aspects of our sustainability targets. Across the entire workforce, the targets focused on improvements in greenhouse gas emissions and safety.”⁴⁵

However, the majority of carbon footprint for most companies is not in the operations under their control but in their supply chain. Consequently, greening the environmental impact requires alignment with their supply chain partners. Most companies demand adherence to their policies and “punish” suppliers who do not measure up. Leading companies, however, align their procurement practices with their sustainability goals and engage their suppliers in finding solutions.

Alignment, goes beyond supply chain processes to employee engagement and “green” culture. It goes from embedding these principles in hiring and employee training, as GE has done;⁴⁶ to governance from the board down, including clear

accountability, as practiced by Unilever;⁴⁷ and to external stakeholders' engagement which goes beyond feedback to meaningful dialogue not only with NGOs but with shareholders, customers, and communities. Such alignments are one of the hallmarks of committed companies such as Patagonia and Seventh Generation.

3.1 Suppliers' Alignment

A common first step in eco-alignment is to include sustainability targets in suppliers' codes of conducts. For example Section 9 of PepsiCo's Global Supplier Code of Conduct states: "The potential environmental impacts of daily business decision-making processes should be considered along with opportunities for conservation of natural resources, recycling, source reduction and pollution."⁴⁸ These codes are often paired with training both on site and online. Suppliers' compliance with such codes is typically monitored by self-reporting as well as audits.

To increase leverage, and reduce audit and compliance costs, companies often develop industry-level codes of conduct and audit protocols. The Electronics Industry Citizenship Coalition (EICC), for example, created the Validated Audit Process (VAP). The VAP "provides companies assurance in identifying risks and driving improvements and robust management systems for labor, ethics, health, safety and environmental conditions in the Information Technology supply chain."⁴⁹

However, traditional enforcement of codes of conduct may not be enough to achieve supply chain eco-alignment. Suppliers are always suspicious of buyers looking into their operations too closely, fearing that the information will be used to leverage price concessions. A large MIT study involving 900 factories in 50 countries demonstrated that cooperation between suppliers and buyers was more effective than audit-and-punishment regimes.⁵⁰

Based in part on these findings, Nike launched its "Rewire" program in 2009, focusing on incentives in addition to auditing compliance.⁵¹ Suppliers were rewarded based on quality, on-time delivery, cost, and sustainability performances.⁵² These four components are weighed equally in a Manufacturing Index, scoring suppliers as gold, silver, bronze, yellow, or red. As of 2013, 68% of Nike's 786 contract manufacturers were rated at least bronze.⁵³ The highest achieving suppliers can receive training on eco-efficiency issues such as waste and energy management. The goal is to engage and motivate suppliers to improve their practices on their own, instead of forcing them through penalties for non-compliance.

Several companies have even gone a step further. They are taking control of certain particularly sensitive or important elements in their supply chains.

3.2 Taking Control – Supply Chain Alignment

When Dr. Bronner's, the small and mission-driven soap brand, wanted to use palm oil from sustainable sources, it vertically integrated through an investment in a palm oil mill in Ghana so it could guarantee sound environmental practices all the way back to the smallholder farmers.⁵⁴

For Unilever, which uses about 1.3 million tons of palm oil annually (about three percent of the entire world's production), such vertical integration wasn't an

option despite its 2008 pledge to source only sustainable palm oil by 2015. Even though the company has been purchasing “GreenPalm” certificates since 2005⁵⁵ through the Roundtable on Sustainable Palm Oil (RSPO)⁵⁶ and was paying a premium, it was unable to distinguish sustainable from unsustainable product because palm oil is purchased through intermediaries on global markets

What Unilever wanted was proof. As a first step it contracted with Cargill to supply 10,000 metric tons of sustainable palm oil,⁵⁷ bypassing the palm oil commodity market. In November 2013 the company took a further step by investing in a palm kernel fractionation facility in Indonesia to increase traceability of the palm oil it uses. “With its combination of scale and capability, the plant is unique within Unilever and will help drive the transformation of the industry in implementing sustainable business practices,” said Pier Luigi Sigismondi Chief Supply Chain Officer at Unilever.⁵⁸

Other industries also moved to work directly with upstream supply sources and control larger parts of the supply chain. Aurora Organic Dairy, for example, began to acquire land to grow their own feed for their cattle.⁵⁹ This allowed the company to control the type and quality of feed, as well as the cost. The feed has a direct impact on the amount of enteric emissions of cows, which is responsible for 78% of the company GHG emissions.⁶⁰ Aurora also acquired milk processing capabilities, replacing a third party. The control across the supply chain allows the company “the greatest traceability, most consistent standards and highest quality available.”⁶¹

3.3 Shareholders’ Alignment

To be consistent with Unilever’s Sustainable Living Plan, Paul Polman suspended quarterly reporting. This decision sent a signal to shareholders regarding the type of financial guidance expected from Unilever. Indeed, holding of Unilever shares by hedge-funds decreased from 15% in 2010 to less than 5% in 2012. The company, however, was looking for long-term investors aligned with Unilever’s vision to own the stock, rather than speculators.⁶² Interestingly, during the same period, Unilever’s share price grew by 25.5%, compared to 17.5% for the S&P500 and 13.8% for its largest competitor, P&G.⁶³

An even stronger way to align the company’s shareholders and financial markets is to enshrine environmental sustainability in the company’s legal structure. In April 2010, Maryland became the first U.S. state to create a new legal corporate form known as “Benefit Corporation” or “Benefit Corp”.⁶⁴ Unlike corporations whose purpose is to maximize long-term shareholder return, a Benefit Corp allows managers to also consider environmental and social impacts in their decision making. As of July 2014, 22 U.S. states, including Delaware, allow for the creation of Benefit Corporations and there were 981 Benefit Corporations in the world.⁶⁵

The Benefit Corporation movement was spearheaded by B-Lab, a non-profit providing a certification process, known as “Certified B Corporation” or “B Corp” which is different from the legal Benefit Corporation status provided by states. Unfortunately, the term B Corp is often used interchangeably (and mistakenly) for both. The B Corp certification is similar to product credence-based labeling⁶⁶, where

companies pay a fee, fill a self-assessment questionnaire, submit supporting documentation, agree to a set of public disclosures, and allow for random on-site reviews to verify any information provided.⁶⁷ Some of the confusion is due to the “legal requirement” which is part of B Corp certification.⁶⁸ It states that companies that have the legal option to become a Benefit Corporation have to do so within four years following certification. Further confusion is rooted in the requirement that Benefit Corporations have to submit independent 3rd party reports about their environmental and social performance, and many have chosen B Lab for this purpose. Note that only a formal Benefit Corporation protects managers from investors’ law suits accusing them of not maximizing shareholders’ value.

Patagonia filed amended articles of incorporation for five of its corporations to elect Benefit Corp status in January of 2012 (on the first day California corporations could change their corporate status). “Patagonia is trying to build a company that could last 100 years,” said founder Yvon Chouinard on the day Patagonia signed for B Corp certification. “Benefit corporation legislation creates the legal framework to enable mission-driven companies like Patagonia to stay mission-driven through succession, capital raises, and even changes in ownership, by institutionalizing the values, culture, processes, and high standards put in place by founding entrepreneurs.”⁶⁹

3.4 Consumer Alignment

In a study of the Norwegian economy between 1987 to 2007, Carlo Aall and Idun A. Husabø noted that although “the overall environmental impact of production has been reduced substantially over the last decade, the overall environmental impact of consumption has increased.”⁷⁰

The lion share of the environmental impact of many household products is in the downstream part of the supply chain -- during the consumer use phase. For example, Unilever claims that 96% of GHG impact from one dose of body shower in Germany is due to the hot water people use.⁷¹ An independent LCA of the impact of washing 1 kg of cloths determined that 75% of the GHG impact was due to washing and drying, and not the machine or the detergent manufacturing and other upstream processes.⁷² And the GHG impacts of the entire supply chain for clothing break down as 18% fiber production, 16% shipping, 15% preparation, knitting, dyeing and finishing, 5% other raw materials, 7% making up, packaging, and retail transport, and 39% during the use phase (13% washing, 9% drying and 17% ironing).⁷³

The challenge facing companies trying to reduce the environmental impact of their products is that unlike upstream supply chain partners, these companies cannot “punish” consumers and force behavioral change. Thus, consumer alignment is limited to various forms of education and information dissemination.

Unilever has engaged in crowd sourcing to get ideas, displaying them on the web as part of its “Project Sunlight.” These include taking shorter showers (the “two songs” challenge), recycling suggestions, air-drying hair, etc. Levi’s put a tag on its jeans encouraging consumers to machine wash cold, line dry when possible, and donate at the end of life. Levi’s CEO, Chip Berg, also encouraged consumers to wash their jeans less frequently – he even suggested never washing them; just freezing

them occasionally in the home freezer to kill any germs. Berg made this statement during a May 2014 Fortune conference, while wearing the company's 501 iconic jeans which, he claimed are "a year old and have never seen a washing machine."⁷⁴

Note that some consumer engagements are now almost routine. These include hotels' towel and sheets re-use programs, bottle and can recycling, discounts on shopping with reusable bags (Target Stores offers 5 cents⁷⁵), low water toilets and shower heads,⁷⁶ hotel key cards that switch off guest room electricity when rooms are vacated,⁷⁷ etc.

Consumer alignment is, of course, the ultimate alignment because companies are geared to satisfy consumers. It is also the most difficult for companies to achieve when consumers are not clamoring for sustainable products and thus it requires new thinking and innovation.

4 Eco-Innovation

On May 9, 2005, General Electric Company Chairman and CEO Jeff Immelt announced a new environmental initiative. "Eco-imagination is GE's commitment to address challenges such as the need for cleaner, more efficient sources of energy, reduced emissions and abundant sources of clean water," Immelt said. "And we plan to make money doing it. Increasingly for business, 'green' is green. Eco-imagination is about the future."⁷⁸ As of 2013, GE's Eco-imagination program has generated more than \$160 Billion in revenue in addition to 34 percent reduction in greenhouse gas emissions and 47 percent reduction in freshwater use in its own operations.⁷⁹

Developing products aimed at the renewable energy market – such as GE's or Siemens' wind turbine business – is in line with corporate financial goals. Such innovations lead to increased sales of the new products in new markets; in this case, the market for renewable energy harvesting.

The focus of eco-innovation as discussed here, however, is on the greening of existing products and on new green products that can replace existing ones.

4.1 Green Products and Processes

By the end of fiscal year 2014, Dell had already increased the amount of sustainable materials in its packaging by 58 percent.⁸⁰ But once packaging material reaches customer sites, it may still not be recycled and end up in landfills. While package redesign was Amazon and Walmart's response to unnecessary packaging material, Dell explored a different approach: bamboo and mushrooms.

Starting in 2009 Dell approached Unisource Global Solutions, a small company that was developing bamboo-cushioning technology. When locally sourced, as Dell was intending to package its products in China, bamboo is a more sustainable material compared to traditional forest products due to its higher yield and fast growth rate.⁸¹ Dell developed the bamboo supply chain carefully, including a Forest Stewardship Council certification in China. By 2011 Dell was already using bamboo in 70 percent of its notebooks and Unisource had more than tripled its size.

But bamboo is not a global crop, diminishing its environmental advantages if exported to other countries as packaging raw material. Another innovator,

Ecovative Design, was pioneering a mushroom based packaging technology. Mushroom packaging is not manufactured but grown, reducing energy use and greenhouse gas emissions by over 90% compared to traditional packaging such as foam⁸². Furthermore, when Dell piloted the new technology with its PowerEdge™ R710 servers, the mushroom based packaging outperformed polyethylene foam in damping vibration.⁸³

Other companies are also developing sustainable alternatives to existing products. These can be classified into three categories: (i) consumer products which require the consumer to change behavior or habits, (ii) products made in sustainable fashion and (iii) products which, like the mushroom packaging, increase recycling and degradability. Examples of the first category include encouraging consumer to wash clothes in cold water, using products such as P&G's Coldwater Tide, or Henkel's Purex Ultra Coldwater.⁸⁴ Another such product is dry shampoo,⁸⁵ the formulation of which comes as a spray or powder; it soaks up excess oil from the scalp, allowing lower frequency between wet hair washes. Unilever claims that it can replace a wet wash 60% of the time.⁸⁶ Consumers, however, do not change easily. Coldwater Tide was introduced in 2005 and six years later, the share of laundry done in hot water had remained steady, and although P&G is the market leader, sales have remained stagnant.⁸⁷ Similarly, dry shampoos remain a small, 3% share of the market by 2012.⁸⁸ Changing consumer habits is difficult and neither of the remaining two categories requires it in order to increase sustainability.

The second category include examples such as Patagonia's wetsuits made from Yulex® bio-rubber extracted from the Guayule plant, which entered the market in 2012;⁸⁹ Nike's "TrashTalk" athletic shoe, launched in 2008, made out of manufacturing waste;⁹⁰ and Levi's 2013 jeans and trucker jackets lines incorporating at least 20% of post-consumer plastic recycled content. Just buying these products, instead of traditional ones, consumers reduce their environmental footprint. Furthermore, these products do not require any additional efforts on the part of consumers.

Puma's InCycle product line launched in 2013 is an example of the third category – it is a collection of recyclable and biodegradable footwear, apparel and accessories.⁹¹ Consumers do not have to separate and recycle these products – they are part of the "normal" stream of trash, but they "recycle themselves." Other examples include BioBag International's compostable and biodegradable products;⁹² Leafware™ disposable biodegradable dinnerware made of palm leaves;⁹³ and International Paper's ecotainer® line of cups, lids and containers made of compostable plant-based polymer.⁹⁴

4.2 Avoiding The Innovator's Dilemma

While green products may sell to a relatively small consumer market, leading companies are faced with what Harvard's Clayton Christensen termed *The Innovator's Dilemma*.⁹⁵ Successful companies have a difficult time investing in new products that may disrupt their existing ones. The reasons are that such products typically do not perform as well as traditional ones when they first come out ("version 1.0"). Examples include the small market share of cold-water detergents and dry shampoos. Furthermore, the new products may not appeal to the

companies' existing customer base; they may cannibalize sales of existing profitable products; and ultimately compete for resources that management may prefer to allocate to known profitable lines of business. While the market for sustainable products may be small, and some products may be perceived as inferior and costly, this can all change quickly due to technological breakthrough (making green products better and cheaper), a change in consumer sentiment, a regulatory edict, or a court decision. For example phosphates-free detergents have been perfected overtime by Seventh Generation and other natural cleaning companies. Starting in 2006, when Washington State Governor Christine Gregory signed into law the first ban on phosphate dishwashing detergents,⁹⁶ followed by similar laws in 17 states the dish detergent industry was forced to reformulate its products en-masse instead of producing separate detergents for states with and without phosphate bans.⁹⁷

The examples mentioned at the end of the last section, of products made sustainably or made to decompose and biodegrade, point to a strategy to mitigate the risks embedded in the innovator's dilemma. These companies create and fund experimentation that helps nurture environmental-centric innovations, even if they are not initially as profitable as their traditional offerings. As these innovations develop, they establish connections with networks of equally minded environmentally driven suppliers and other stakeholders. These stakeholders, in turn, may infuse further new ideas into the green product lines and the teams working on them, creating a virtuous innovation cycle.

A way to ensure that the teams developing green products are not going to be starved for resources -- as they compete internally with established, profitable products -- is to create or keep independent business units devoted to sustainable products. This also allows the main business to learn and adopt sustainability principles without risking the main business at the same time.

In 2007 Clorox bought Burt's Bees, a company focusing on organic personal care products. A year later it launched Green Works⁹⁸, a brand that competes with Clorox's main line of cleaning products. Clorox kept Burt's Bees as a separate business unit in order to learn from its environmental-friendly processes and apply them to the Green Works business unit.⁹⁹ A similar approach was taken by Unilever when it bought Ben & Jerry's, allowing the company to keep its corporate social and environmental missions. In fact, Unilever supported Ben & Jerry's B Corp certification.¹⁰⁰ And when the French food group Danone bought Stonyfield Farm it not only kept the New Hampshire company as a separate business unit, but adopted some of its ways. For example, Danone France's "Nature" program, launched in 2008, is modeled after Stonyfield's business principles.¹⁰¹

5 Eco-Growth

In 2011 Patagonia started promoting the sales of its used garments on eBay's and its own web site.¹⁰² Despite its push to sell used, instead of new apparel (and the fact that it did not get any benefit from eBay's sale), the initiative did not stunt its growth. On the contrary, Patagonia grew by 27% by 2013, reaching \$575 million. In fact, the initiative was so successful that an advertisement industry trade

publication questioned if it was just a marketing ploy.¹⁰³ Being a private company, committed to environmental causes, Patagonia even shares its sustainable technology, such as the Yulex, bio-rubber wetsuits material, with competitors because it is committed to increasing the environmental sustainability of the entire industry.¹⁰⁴ Of course, such a move is likely to lead to scale economies in the manufacture of the new material, reducing its costs, and fueling further growth for Patagonia. Other companies, such as Seventh Generation also allow suppliers to share some of their intellectual property for the same purpose.¹⁰⁵

The basic aim of eco-growth is to decouple profitable growth from constrained earth resources. While this may work for private, committed companies – they are not the only ones committed to growing sustainably.

5.1 Nike

Nike is an example of a company growing sustainably by putting it all together – eco-efficiency, eco-alignment, and eco-innovation, to achieve eco-growth. The company drives waste reductions throughout its supply chain by employing the NIKE material sustainability index. It measures the environmental impact and waste efficiency of any design under consideration, leading designers to prefer sustainable materials and designs. For example, the Flyknit Lunar 1+ running shoe, introduced in 2013, reduces footwear waste by 80% when compared to typical NIKE running footwear.¹⁰⁶ The Flyknit shoe is an extremely innovative feather-light shoe, created from knit threading rather than layers of fabrics. It required a total re-engineering of the manufacturing process, leading to an exciting product, lower waste, and, in the long term, low production costs.

Nike involves many stakeholders in its eco-alignment strategy. It shared its sustainability index methodology with the Sustainability Apparel Coalition; a group of over 130 retailers, brand owners, manufacturers, industry organizations, NGOs, and government agencies, aspiring to foster “an apparel and footwear industry that produces no unnecessary environmental harm and has a positive impact on the people and communities associated with its activities.”¹⁰⁷ In 2013 Nike hosted the LAUNCH summit. It convened 150 material scientists from business, academia and NGOs together with NASA, the US Agency for International Development, and the US Department of State to catalyze actions around material and process sustainability.¹⁰⁸ The LAUNCH initiative goes beyond getting feedback from stakeholders – it is a wide engagement that aims at working together to find new solutions.

These efforts bore significant financial fruits. From 2005 to 2014, Nike’s revenues more than doubled to \$27.8 Billion and its stock price almost tripled.

5.2 Natura

When Brazil-based Natura Cosmetics went public in May 2004, its annual sales were close to \$500 million.¹⁰⁹ As of 2014, Natura’s sales have reached \$3 billion,¹¹⁰ a market value of \$6.5 billion and it is ranked by Forbes as one of the top ten most innovative companies in the world¹¹¹. Natura combines product eco-innovation with deliberate eco-alignment across its entire supply chain, to achieve impressive eco-

growth, embracing the culture of sustainability advocated by its founder, Antonio Luiz da Cunha Seabra, in 1969.¹¹²

The company's consumer alignment, inspired by the *Avon Lady* distribution model, is built around "consultants" that sell directly to consumers through their social network. The 1.6 million Natura consultants¹¹³ are often Natura's first consumers, driving sales through personal relationships, and disseminating Natura's social and environmental values.¹¹⁴ "There is a real pride in representing Natura's ethical standards, our high quality products, and our support of broader social causes," said Luciana Hashiba, Manager of Partnerships and Technological Innovation at Natura.¹¹⁵ This intimate connection with the consultants, allows Natura to communicate complex sustainability elements of their products and supply chain to consumers.

Even though Natura sells its innovative and aspirational brands to low and middle-income consumers, it is able to charge a premium compared to lower cost brands in the region, including Avon. Natura aligns all of its supply chain partners through its "open value chain concept"¹¹⁶ where all players of the supply chain obtain economic value and are transparent about profit margins throughout product development and contract negotiations. This vision of offering the "right price" extends to consumers. In 2001, for example, when Argentina suffered currency devaluation, many cosmetic companies started to increase prices to protect margins. Natura decided to go in the opposite direction. "We looked for ways to reduce costs and put ads in the major magazines stating that we would keep our prices steady for the time being and would change them if and when local salaries were adjusted. The idea was to create a kind of social pact involving suppliers, employees, and customers, showing to the Argentinean market that we were there for good and we expected profits in the long run," said Alessandro Carlucci Sales Director of Argentina at the time.¹¹⁷ In the following three years, Natura's revenues increased six-fold in Argentina.¹¹⁸

Natura is also aligning itself with shareholders and the investment community by reporting its environmental performance quarterly, alongside its financial and social performance. The environmental reports are as detailed, commented, and explained – both achievement and failure to meet goals -- as the financial reports.

Over 90% of the company's dry raw materials come from natural resources harvested in the Amazon jungle. Like Unilever and Dr. Bronner's, Natura bypasses major intermediaries of raw materials and procures from the source in cooperation with Amazonian communities to guarantee that all natural ingredients can be harvested within the environment's capacity.¹¹⁹

Natura has embedded Life Cycle Assessment (LCA) into its product design process. In 2013, for example, it launched SOU ("I am") a new line of products combining low environmental impact, low cost, and customer alignment – asking consumers to use every last drop of the product.¹²⁰

"From the start, we have been intent on building a fundamentally different kind of company," said Hashiba, Natura's Manager for partnerships and technological Innovation, "one that succeeds in the marketplace ... by integrating the interests and consideration of our people, our customers, our communities, and the

natural environment. Our mantra of *'bem estar bem'*—*'Well-being/Being well'*—reflects Seabra's original vision and is infused throughout the culture and operations of the company today."¹²¹

6 The Path to Eco-Growth

The examples in the last section demonstrate that companies can grow while committed to environmental sustainability. It will be naïve, however, to ignore the inherent tension between financial pressures and environmental initiatives. In fact, businesses that lose money cannot be sustainable – financially or environmentally -- in the long term. The question is the balance – should a business be dedicated to maximizing shareholders' value, or does it have further social and environmental commitments to other stakeholders and the earth.

Figure 2 depicts these two dimensions: environmental stewardship and market capitalization. Each of the dots in the figure represents a company in terms of these two dimensions. Owing to technology, legal frameworks, and economic forces, companies cannot operate in the greyed area in the figure. The best they can do is - develop a combination of environmental and financial strategies that will bring them to operate on the "efficient frontier."

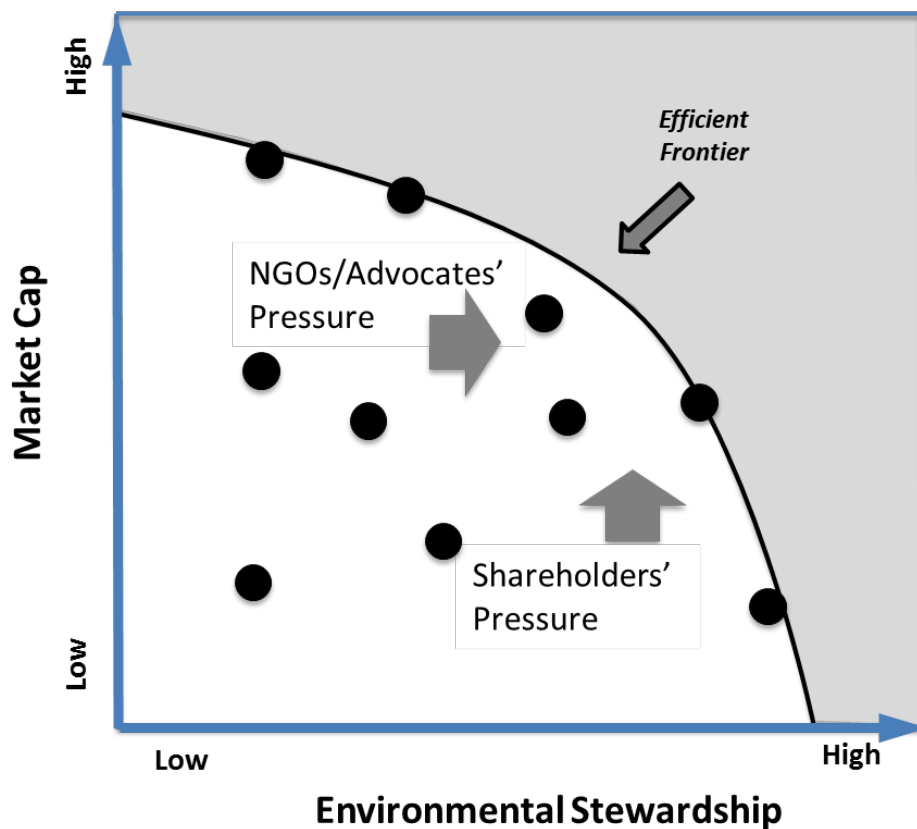


Figure 2 - The Efficient Frontier

Shareholders and financial markets would like companies to operate as high as possible along the vertical axis – in other words to maximize shareholders’ value. Environmental activists would like companies to operate on the far right of Figure 2 – maximizing environmental stewardship.

Each company also needs to have a “minimum profit” to cover expenses, attract capital, and invest in its future. Companies also have to have some minimum environmental stewardship in order to comply with prevailing laws and to fend off NGOs and media. These two constraints are depicted in Figure 3.

Mission-driven companies like Patagonia, Seventh-Generation and Dr. Bronner’s aim to operate at maximum levels of environmental stewardship while building their business for the long term. Many other companies do the minimum required to stay within the law and ‘out of trouble’ while maximizing shareholders value. This is the case with many B-2-B enterprises which, because they operate “behind the scenes,” are less susceptible to NGO attacks which can degrade consumer brands. Many of these companies will comply with the law and do what their customers require, but no more.

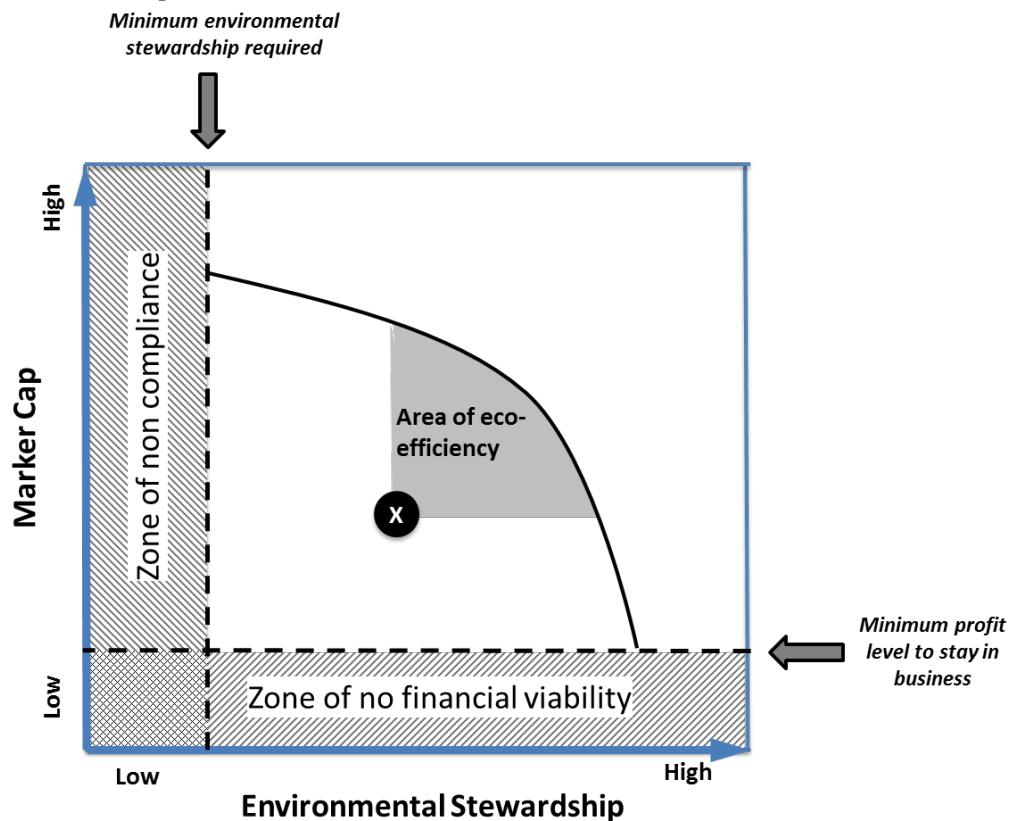


Figure 3 – The potential for Eco-Efficiency Initiatives

Most companies are not operating at the efficient frontier of the trade-off between financial performance and environmental stewardship. Instead, they operate “inside” the efficiency frontier at, for example, Point X in Figure 3. Such companies can move towards the efficient frontier, improving both their financial

performance and their environmental stewardship. This is the zone of eco-efficiency represented by the grayed area in Figure 3. As mentioned earlier, eco-efficiency initiatives include energy savings, waste reduction, recycling, optimized operations and other corporate actions that reduce environmental impact while also reducing costs, improving service and mitigating risks. At some point, however, companies may reach the efficient frontier. By then most of the “low hanging fruits” have been harvested and they will have to start trading off environmental vs. financial investments. Benefit Corporation regulations have created a formal legal framework that enables companies who choose to do so, to move “to the right” along the efficiency frontier – increasing environmental stewardship at the expense of financial performance.

The efficient frontier, however, is not an absolute limit. Companies can achieve both greater financial performance and greater environmental stewardship by deeper eco-alignment – bringing their suppliers to the fold through dialogue, training and rewards; their customers, through incentives; and their entire industry through consortia and sharing of best practices. Such supply-chain and industry wide practices move the efficiency frontier “out” enabling companies to have further financial and environmental achievements. Such a new efficiency frontier is depicted in Figure 4. For example, Starbucks has lowered its environmental footprint after rolling-out its CAFE practices with small farmers, while also reporting yield and quality improvements. Unilever achieved similar results in its work with tea farmers.¹²²

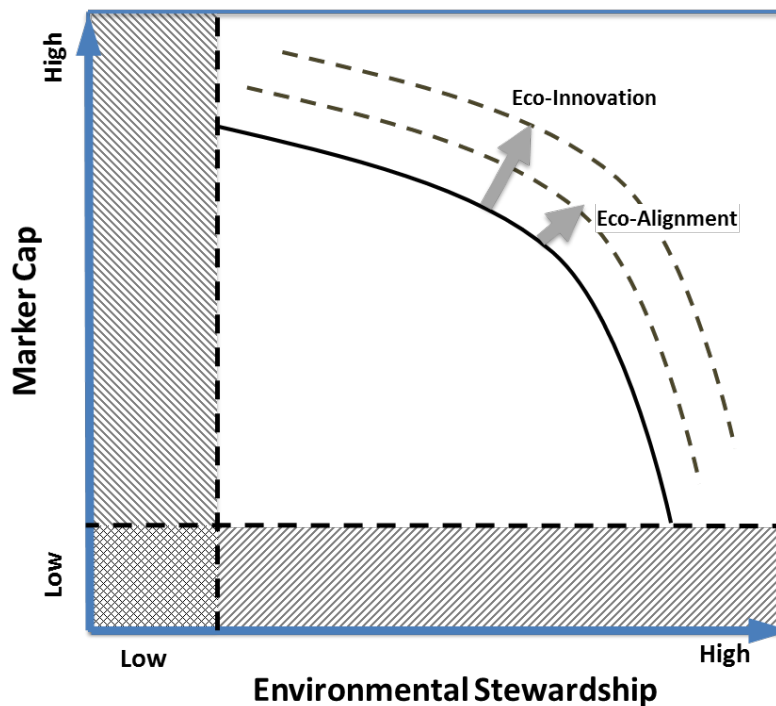


Figure 4 – Pushing the Efficient Frontier

The efficient frontier can be pushed even further “out” through innovation. Innovation always allows companies to leapfrog existing constraints, beliefs, and competitors, and eco-innovation is no exception. The previous section mentioned examples such as Patagonia’s Yulex wet suit, Nike’s Flyknit shoe, or Natura SOU line.¹²³ Innovation allows companies to enter new markets, such as renewable energy; sell to new, eco-conscious, consumer segments; and, in the process, improve their brand image, reduce costs, and grow.

7 The Road Ahead

Increasing a company’s environmental stewardship is similar to many other corporate goals beyond short term profits. It requires the involvement of the entire organization (in addition to top management support). After Toyota manufacturing System demonstrated that quality is synonym with better financial performance, many companies have instituted a “Quality Czar,” responsible for increasing product quality. It took some time to realize that quality is not an isolated department’s function but part of every job within the organization. Environmental stewardship is no different. In fact, the prevailing corporate culture entails the involvement of every employee in committed companies like Patagonia, Dr. Bronner’s, Seventh Generation, and Ben & Jerry. It is also prevalent in larger companies such as Natura, Nike, and Unilever.

An important step in the road to eco-growth is a holistic view of the entire value chain. Many companies rely on comprehensive LCA to identify “hotspots” of high environmental impact along the supply chain. In many cases, such hotspots involve inefficient processes: excess energy use, high waste, low yields, etc. For example, one of Toyota’s principles is to eliminate “muda” (the Japanese term for waste). This ties directly to the company’s lean manufacturing and continuous improvements principles. Toyota works continuously to identify instances of muda, such as over-production, unnecessary transportation, too much inventory, and defects that require re-work – all of which offer cost reduction opportunities. Such instances also offer opportunities to reduce wasted production resources, eliminate extra inventory, avoid unnecessary transportation, and eliminate re-work – all leading to more sustainable operations. Such reductions are the first step in the Reduce-Reuse-Recycle-Remanufacture thought process used by Toyota.

A comprehensive LCA should include the use phase in the analysis and adoption of the “circular supply chain” -- thinking about the flow of products from “cradle to cradle” instead of the linear “cradle to grave” process of “Take-Make-Dispose.” Such thinking leads companies to adopt what EMC calls “design for disassembly.” EMC accepts returns of all their branded products. Some are reconditioned for internal deployment or donations, while other are harvested for remanufacturing. The company sends less than 1% of the recycled products and materials to landfills. In the process it saves money, improves community relationships, and reduces its environmental impact.¹²⁴

Involving all trading partners in reducing the environmental footprint, using comprehensive LCA, and thinking “circular,” all mean that supply chain professionals have a leading role to play in environmental sustainability. Procurement professionals are typically involved with suppliers and responsible for developing beneficial relationships with them; Manufacturing is responsible for the most resource-intensive part of most industries; and Distribution has to interface with customers. Naturally other functions, notably Engineering, Sales, and R&D are also part of the solution, but a significant part of the challenge is up to supply chain professionals to find the best sustainability/financials balance – and to ‘push the envelope’ (in terms of the efficient frontier) -- throughout the supply chain.

But the most significant factor in moving to an environmentally sustainable economy is the consumer’s mindset. Companies exist in order to satisfy consumers and as of 2014 most consumers around the world are not willing to pay more for sustainable products and are not clamoring for companies to provide them. Yet, things may be changing. In the 2014 Gallop poll about American attitudes regarding the balance between environmental sustainability and economic growth 60% of young Americans (18-29 years old) preferred environmental protection, even at the expense of economic growth, while only 39% of those 65 and older did.¹²⁵ The conclusions may be that millennials care more about the environment, and as they move into peak consumption years they will continue to have this attitude.¹²⁶ To this end, companies may think about disrupting their industry with green products – at least as a side product line that the company can learn from – in a way similar to Nike’s Considered line, Clorox Green Works, or Puma’s InCycle.

Furthermore, consumers in the developed world – especially young ones - are requiring less material goods. According to Jill Hennesy of Northwestern University, who researched millennials attitudes, “nearly any possession you can think of stopped being an ‘of course’ and became a ‘hmmmm’ for millennials.”¹²⁷ This is especially noticeable in the attitude toward car ownership¹²⁸ (in the U.S., the proportion of 17-year-olds with drivers’ licenses fell to 45 per cent in 2010, down from more than two-thirds in 1978¹²⁹) but it is not limited to automobiles. Millennials are investing in “experiences” rather than “things,” which is why social networking, music sites, and the sharing economy thrive. Thus, companies follow consumers and are creating experiences, be it sharing on Facebook or Walmart movie nights, and in the process are moving from the industrial economy to the service economy.

The move to services is also important at the other spectrum of age groups. As the population in developed (and many developing countries, such as China and Russia) ages, product delivery process may evolve to incorporate more services. These may include installation, training, maintenance, consumables, support, and removal – or just temporary ‘full service’ rental.

The changes on both sides of the age spectrum offer business opportunities to companies who move their focus from manufacturing to services. Such shifts are likely to reduce the environmental impact of industrial operations – simply because there will be less products. Yet, this is not the picture everywhere else in the world. Developing countries are still in the process of industrialization, and consumers in China, India, Brazil, Mexico and elsewhere are increasing their purchasing power.

These consumers strive for a “Western” living standard that, in many ways, is measured by consumption.

The challenge of bringing billions of people into Western world living standards in an environmentally sustainable fashion is one of the important challenges of the 21st century. It requires companies and government working together; it requires innovations and commitment. The essence of the challenge is to convince consumers in the developing world not to repeat the environmental missteps of the developed world and skip a level or stage of economic development. This is happening in some areas of technology. African countries are building cellphone networks and skipping the landline phase with coper lines everywhere; they are using mobile payments without bank branches everywhere; and they are in the process of skipping the PC revolution in favor of smartphones.¹³⁰

As the developed world is moving (ever so slowly) to a more sustainable ecosystem, the challenge is for the developing world to get there without going through the conspicuous consumption stage of unbridled consumerism followed by costly clean-up efforts. Clearly, the key to such transformation is changing people’s attitudes -- redefining the “middle class standard” as having access to consumer goods without overtaxing the natural environment.

While government intervention, NGO pressure, and media exposure will play an important role, companies can ease this transition by committing to eco-growth throughout their supply chains. Clearly, large companies who cater to mainstream consumers have to balance environmental stewardship with shareholder value creation. Yet -- by providing green products, increasing transparency of supply chain operations, rewarding managers for eco-innovation, embedding life-cycle thinking in their organization and aligning with trading partners (as well as competitors, customers, NGOs, and research organizations) – companies can accelerate the shift both in consumer attitudes and in government regulations.

8 References

- ¹ The Telegraph (2013). Procter & Gamble brings back former CEO AG Lafley to revive growth. Retrieved from <http://www.telegraph.co.uk/finance/newsbysector/retailandconsumer/10078775/Procter-and-Gamble-brings-back-former-CEO-AG-Lafley-to-revive-growth.html>
- ² P&G (2013). A.G. Lafley Rejoins Procter & Gamble as Chairman, President and Chief Executive Officer. Retrieved from <http://news.pg.com/press-release/pg-corporate-announcements/ag-lafley-rejoins-procter-gamble-chairman-president-and-chi>
- ³ Amy Joyce Rush, Armstrong CEO's mandate: Growth, Innovation, Branding, Floor Covering Weekly, February 20th, 2014. Retrieved from <http://www.floorcoveringweekly.com/Main/Articles/Armstrong-CEOs-mandate-Growth-innovation-branding-4446.aspx>
- ⁴ Bain & Company. Fundamentals of Growth. Retrieved from <http://www.bain.com/consulting-services/strategy/fundamentals-of-growth.aspx>
- ⁵ See also, for example, Myron Gordon and Jeffrey Rosenthal, Capitalism's Growth Imperative, Cambridge Journal of Economics, Vol. 27(1), pp. 25-48
- ⁶ Nike (2014). Nike Sustainability Performance Summary. Retrieved from http://www.nikeresponsibility.com/report/uploads/files/FY12-13_NIKE_Inc_CR_Report.pdf
- ⁷ Apple (2014). Retrieved from <http://www.apple.com/environment/climate-change/>
- ⁸ Unilever (2014). Unilever Sustainable Living Plan. Retrieved from <http://www.unilever.com/sustainable-living-2014/our-approach-to-sustainability/unilever-sustainable-living-plan-summary/index.aspx>
- ⁹ Nike (2014). Nike Sustainability Performance Summary. Accessed July 2014. http://www.nikeresponsibility.com/report/uploads/files/FY12-13_NIKE_Inc_CR_Report.pdf
- ¹⁰ University Alliance (2014). Three Companies With Best Practices in Environmental Sustainability. Retrieved from <http://www.usanfranonline.com/resources/supply-chain-management/three-companies-with-best-practices-in-environmental-sustainability/#.U9ZQtLGZhUA>
- ¹¹ The Guardian (2012). Retrieved from <http://www.theguardian.com/environment/2012/jan/30/tesco-drops-carbon-labelling>
- ¹² Walmart (2014). Retrieved from <http://corporate.walmart.com/global-responsibility/environment-sustainability/sustainability-index>
- ¹³ Reuters (2009). Wal-Mart needs industry support for green labels. Retrieved from <http://www.reuters.com/article/2009/07/17/us-walmart-index-analysis-idUSTRE56G48N20090717>
- ¹⁴ See The Sustainability Consortium at <http://www.sustainabilityconsortium.org/>
- ¹⁵ Unilever (2014). Retrieved from <http://www.unilever.com/mediacentre/pressreleases/2014/Over75ofUnileversfactoriesachievezeroonhazardouswastetolandfill.aspx>
- ¹⁶ Motor Trend (2011). A Tour of Subaru of Indiana Automotive Inc. – green and Gregarious: How Subaru Took “Zero Landfill” to a Whole Other Level. Retrieved from http://www.motortrend.com/features/travel/1107_a_tour_of_subaru_of_indiana_automotive_inc/vi-ewall.html
- ¹⁷ M&S (2014). Retrieved from <http://corporate.marksandspencer.com/plan-a/about-plan-a/carbon-neutral/cutting-carbon>
- ¹⁸ Walmart (2014). 2014 Global Responsibility Report. Retrieved from <http://cdn.corporate.walmart.com/db/e1/b551a9db42fd99ea24141f76065f/2014-global-responsibility-report.pdf>

-
- ¹⁹ Packaging World (2013). Staples deploys on-demand, custom case making. Retrieved from <http://www.packworld.com/machinery/converting-machinery/staples-deploys-demand-custom-case-making>
- ²⁰ Walmart (2014). 2014 Global Responsibility Report. Retrieved from <http://cdn.corporate.walmart.com/db/e1/b551a9db42fd99ea24141f76065f/2014-global-responsibility-report.pdf>
- ²¹ Professor John Sterman from MIT, refers to these two dimensions as technical complexity and organization scope, which inspired this classification. See Sterman, J. (forthcoming). *Stumbling Towards Sustainability*. In Henderson, R., M. Tushman, & R. Gulati (eds.), *Organizational & Strategic Change and the Challenge of Sustainability*. Oxford University.
- ²² IWAY Standard: Minimum Requirements for Environment and Social & Working Conditions when Purchasing Products, Materials, and Services. Ikea Supply AG, Ikea, 2012.
- ²³ Patagonia (2014). Retrieved from <http://www.patagonia.com/us/footprint/>
- ²⁴ *Changing Course*; World Business Council for Sustainable Development: Geneva, Switzerland, 1992.
- ²⁵ Energy.gov (2014). Retrieved from <http://energy.gov/science-innovation/energy-efficiency>
- ²⁶ Business Week (2011). "Subaru of Indiana, America's Scippiest Carmaker" Retrieved from http://www.businessweek.com/magazine/content/11_24/b4232068147070.htm
- ²⁷ Unilever (2013). "Unilever reduces waste by one million household bins while growing business" Retrieved from <http://www.unilever.com/mediacentre/pressreleases/2013/Unileverreduceswastebyonemillionhouseholdbins.aspx>
- ²⁸ P&G (2014). "Zero Waste Manufacturing Waste to landfill". Retrieved from https://www.pg.com/en_US/downloads/sustainability/reports/ZeroManufacturingWaste.pdf
- ²⁹ P&G (2014). "Making Zero Waste a Reality". Retrieved from http://www.pg.com/en_US/sustainability/environmental_sustainability/worth_from_waste.shtml
- ³⁰ UNEP (2012). P&G Case Study. Retrieved from http://www.unep.org/resourceefficiency/Portals/24147/scp/business/dialogue/2012/pdf/Case_Studies/ProcterAndGamble.pdf
- ³¹ P&G (2014). "Making Zero Waste a Reality". Retrieved from http://www.pg.com/en_US/sustainability/environmental_sustainability/worth_from_waste.shtml
- ³² Packsize(2014). Staples and Packsize Win First Place Award for Sustainability from the World Packaging Organisation. Retrieved from <http://www.packsize.com/files/Release/file35.pdf>
- ³³ Amazon (n.d.). About Amazon Certified Frustration-Free Packaging. Retrieved from <http://www.amazon.com/gp/help/customer/display.html?ie=UTF8&nodeId=200285450>
- ³⁴ Environmental News Network (2013). Amazon Promotes "Frustration-Free Packaging Initiative." Retrieved from <http://www.enn.com/business/article/46770>
- ³⁵ Amazon (2013). Amazon Frustration-Free Packaging Letter to Customers. Retrieved from http://www.amazon.com/gp/feature.html/ref=amb_link_84595831_1?ie=UTF8&docId=1001920911&pf_rd_m=ATVPDKIKX0DER&pf_rd_s=merchandised-search-5&pf_rd_r=0MGZCPE0HQ4B2MPYNDW&pf_rd_t=101&pf_rd_p=1721461822&pf_rd_i=5521637011
- ³⁶ New York Times (2010). Packaging is All the Rage, and Not in a Good Way. Retrieved from http://www.nytimes.com/2010/09/08/technology/08packaging.html?_r=0
- ³⁷ Walmart news Archive (2006). Retrieved from <http://news.walmart.com/news-archive/2006/11/01/wal-mart-unveils-packaging-scorecard-to-suppliers>.
- ³⁸ Walmart 2014 Sustainability Report. Retrieved from http://www.corporatereport.com/walmart/2014/grr/environment_packing_materials.html
- ³⁹ Ralph Lauren 2013 Citizenship Report. Retrieved from <http://investor.ralphlauren.com/phoenix.zhtml?c=65933&p=irol-newsArticle&ID=151051>
- ⁴⁰ Fiji (2009). Retrieved from <http://fijiwater.sg/giving-back/environment/sustainable-practices/packaging/>
- ⁴¹ Andrieu, N. & L. Weiss (2008). *Transport Mode and Network Architecture: Carbon Footprint as a New Decision Metric*. MIT Supply Chain Management Masters Thesis.
- ⁴² Andrieu, N. & L. Weiss (2008). *Transport Mode and Network Architecture: Carbon Footprint as a New Decision Metric*. MIT Supply Chain Management Masters Thesis.

-
- ⁴³ National Environmental Education Foundation (February 2010). The Business Case for Environmental and Sustainability Employee Education. Retrieved from https://microedge.com/~media/Files/PDF/WhitePapers/The_Business_Case_for_Sustainability_Employee_Engagement.ashx
- ⁴⁴ Modney M. (2010). Retrieved on January 2015 from <http://greeneconomypost.com/sustainability-creating-employee-engagement-incentives-11178.htm>
- ⁴⁵ Weinreb E. (2012). Retrieved on January 2015 from <http://www.greenbiz.com/blog/2012/01/11/pros-cons-linking-sustainability-successes-bonuses?page=0%2C0>
- ⁴⁶ GE Sustainability (2014). Retrieved from <http://www.gesustainability.com/how-ge-works/our-people/learning-and-development/>
- ⁴⁷ Unilever (2015). Our Governance. Retrieved from <http://www.unilever.com/sustainable-living-2014/our-approach-to-sustainability/our-governance/>
- ⁴⁸ PepsiCo (2014). Global Supplier Code of Conduct. Retrieved from <http://www.pepsico.com/Purpose/Environmental-Sustainability/Responsible-Sourcing>
- ⁴⁹ EICC (2012). Validated Audit Process. Retrieved from <http://www.eicc.info/validatedauditprocess.shtml>
- ⁵⁰ Locke, Richard (2014). The Promise and Limits of Private Power. Cambridge University Press.
- ⁵¹ Porteous, A. & S. Rammohan (2013). Integration, Incentives, and Innovation: Nike's Strategy to Improve Social and Environmental Conditions in its Global Supply Chains. Stanford Initiative for the Study of Supply Chain Responsibility, White Paper.
- ⁵² Porteous, A. & S. Rammohan (2013). Integration, Incentives, and Innovation: Nike's Strategy to Improve Social and Environmental Conditions in its Global Supply Chains. Stanford Initiative for the Study of Supply Chain Responsibility, White Paper: 2
- ⁵³ Nike (2013). Sustainable Business Performance Summary. Retrieved from http://www.nikeresponsibility.com/report/uploads/files/FY12-13_NIKE_Inc_CR_Report.pdf
- ⁵⁴ Dr, Bronner's Magic Soaps (2013). Press release. Retrieved from <https://www.drbronner.com/media-center/united-states/press-releases/dr-bronners-demonstrates-that-palm-oil-can-be-produced-sustainably-under-fair-trade-and-organic-certification/>
- ⁵⁵ Unilever (2010). Unilever's Europe-wide palm oil covered sustainably. Retrieved from <http://www.unilever.com/mediacentre/pressreleases/2010/UnileversEuropewidepalmoilcoveredsustainably.aspx>
- ⁵⁶ RSPO (2013). Vision and Mission. Retrieved from: http://www.rspo.org/en/vision_and_mission.
- ⁵⁷ Cargill (2010). "Cargill supports Unilever's drive to use sustainable palm oil", Retrieved from <http://www.cargill.com/news/releases/2010/NA3031888.jsp>
- ⁵⁸ Unilever (2013). New Processing Plant Enables Traceability of Palm Oil. Retrieved from <http://www.unilever.com/sustainable-living-2014/news-and-resources/sustainable-living-news/New-processing-plant-enables-traceability-of-sustainable-palm-oil.aspx>
- ⁵⁹ Aurora Organic Dairy (2012). 2012 Corporate Citizenship Report. Aurora Organic Dairy Online Publication.
- ⁶⁰ Aurora Organic Dairy (2014). GHG & Energy Report. Retrieved from http://www.auroraorganic.com/pdfs/12_AOD_CCR_Energy-GHG.pdf
- ⁶¹ Aurora Organic Dairy (2012). 2012 Corporate Citizenship Report. Aurora Organic Dairy Online Publication.
- ⁶² The Guardian (2012). Unilever's Paul Polman: challenging the corporate status quo. Retrieved from <http://www.theguardian.com/sustainable-business/paul-polman-unilever-sustainable-living-plan>
- ⁶³ Google Finance (2014). Unilever, P&G and S&P500 stock price between November 2010 and November 2012. Retrieved from https://www.google.com/finance?chdnp=1&chdd=1&chds=1&chdv=1&chvs=maximized&chdeh=0&chfdeh=0&chdet=1353704400000&chddm=515&chls=IntervalBasedLine&cmpto=INDEXSP:.INX;EP A:PGP&cmptdms=0;1&q=NYSE:UL&ntsp=0&ei=wWjSU5DuH4e28wb_0YGADA
- ⁶⁴ Businessweek (2010). "Maryland Passes 'Benefit Corp.' Law for Social Entrepreneurs", Retrieved from

http://www.businessweek.com/smallbiz/running_small_business/archives/2010/04/benefit_corp_bi.html

⁶⁵ Benefit Corp Information Center (204). Find a Benefit Corp. Retrieved from

<http://www.benefitcorp.net/find-a-benefit-corp>

⁶⁶ A “credence” attribute is a product characteristic that cannot be evaluated by the average consumer, even after buying and using a product. See Darby, M. and Karni, E. (1973). “Free Competition and the Optimal Amount of Fraud”. *Journal of Law and Economics*, Vol. 16, No. 1. pp. 67-88.

⁶⁷ B-Lab (2014). “How to Become a B Corp”. Retrieved from <http://www.bcorporation.net/become-a-b-corp/how-to-become-a-b-corp>

⁶⁸ B-Lab (2014). “How to Become a B Corp”. Retrieved from <http://www.bcorporation.net/become-a-b-corp/how-to-become-a-b-corp>

⁶⁹ Patagonia (2014). B-Lab. Retrieved from

<http://www.patagonia.com/us/patagonia.go?assetid=68413>

⁷⁰ Aall, Carlo, and Idun A. Husabø. “Is eco-efficiency a sufficient strategy for achieving a sustainable development? The Norwegian Case.” *Sustainability* 2.12 (2010): 3623-3638.

⁷¹ Unilever Product Analyzer, 2014. Retrieved from

<http://www.unilever.com/flash/ProductAnalyser/ProductAnalyser.aspx>

⁷² Koerner, M. et al. (2011). The Life Cycle Assessment of Clothes Washing Options for City West Water’s Residential Customers. Retrieved from

<http://www.conference.alcas.asn.au/2011/Koerner.pdf>

⁷³ *ibid*

⁷⁴ Daily Mail (2014). Should real denim wearers ever wash their jeans?. Retrieved from

<http://www.dailymail.co.uk/femail/article-2635085/I-know-sounds-totally-disgusting-Levis-CEO-admits-washed-jeans-YEAR.html>

⁷⁵ Target (2014). Sustainable Living. Retrieved from <https://corporate.target.com/corporate-responsibility/environment/sustainable-living>

⁷⁶ Home Depot (2014). Eco Options: Toilets. Retrieved January 2015 from

<http://www.ecooptions.homedepot.com/water-conservation/toilets/>

⁷⁷ Hotel Energy Solutions. Retrieved on January 2015 from

<http://dtxqtq4w60xqpw.cloudfront.net/sites/all/files/docpdf/eefactsheetn11keycardsystemstoswitchoffelectricityinguestrooms.pdf>

⁷⁸ GE (2005). GE Launches Ecoimagination to Develop Environmental Technologies. Retrieved from <http://www.businesswire.com/news/home/20050509005663/en/GE-Launches-Ecomagination-Develop-Environmental-Technologies-Company-Wide#.U8UcCFa7Awc>

⁷⁹ GE (2014). GE Renews Ecoimagination Commitments. Retrieved from:

<http://www.genewscenter.com/Press-Releases/GE-Renews-Ecomagination-Commitments-454d.aspx>

⁸⁰ Dell (2014). FY14 Corporate Sustainability Report. Retrieved from

<http://www.dell.com/spredir.ashx/corp-comm/cr-report-overview>

⁸¹ Vogtländer, Joost, Pablo Van der Lugt, and Han Brezet. “The sustainability of bamboo products for local and Western European applications. LCAs and land-use.” *Journal of Cleaner Production* 18.13 (2010): 1260-1269.

⁸² Joint Nature Conservation Committee, DEFRA, U.K. (2014). Mushroom wrap up plastic packaging. Retrieved from <http://jncc.defra.gov.uk/page-5784>

⁸³ Dell (2014). Green Packaging & Shipping: Mushroom Packaging. Retrieved from

<http://www.dell.com/learn/us/en/uscorp1/corp-comm/mushroom-packaging>

⁸⁴ Purex (2015). Purex Coldwater. Retrieved January 2015 from

<http://www.purexlaundry.ca/products/detergents/coldwater>

⁸⁵ Dana Oliver, The Huffington Post, Dry Shampoo: The Dos and Don’ts of Skipping the Sud, Huffington Post, April 6th, 2014. http://www.huffingtonpost.com/2012/04/06/dry-shampoo_n_1395302.html

-
- ⁸⁶ Unilever Sustainable Living (2014). Reducing GHG in Consumer Use. Retrieved from <http://www.unilever.com/sustainable-living-2014/reducing-environmental-impact/greenhouse-gases/reducing-ghg-in-consumer-use/>
- ⁸⁷ New York Times (2011). Cold-Water Detergents Get a Cold Shoulder . Retrieved from <http://www.nytimes.com/2011/09/17/business/cold-water-detergents-get-a-chilly-reception.html?pagewanted=all&r=0>
- ⁸⁸ Mintel (2013). Dry Shampoos Accounted For 3% Of Global Shampoo Launch Activity In 2012. Retrieved from <http://www.mintel.com/press-centre/beauty-and-personal-care/dry-shampoos-accounted-for-3-of-global-shampoo-launch-activity-in-2012>
- ⁸⁹ Transworld Business (2012). Patagonia's New Plant-Based Wetsuits And Goal To End Neoprene's Use Across Surf. Retrieved from <http://business.transworld.net/116138/features/jason-mccaffrey-on-patagonias-new-ecological-wetsuit-material/>
- ⁹⁰ Nike (2008). Steve Nash and Nike Turn Garbage into "Trash Talk". Retrieved from <http://nikeinc.com/considered-design/news/steve-nash-and-nike-turn-garbage-into-trash-talk>
- ⁹¹ Waste Management World (2013). Puma Launches Recyclable And Compostable Clothing & Footwear. Retrieved from <http://www.waste-management-world.com/articles/2013/02/puma-launches-recyclable-and-compostable-clothing-and-footwear.html>
- ⁹² Business Week (2015). Company Overview BioBag International. Retrieved January 2015 from <http://investing.businessweek.com/research/stocks/private/snapshot.asp?privcapId=49652936>
- ⁹³ See LeafWare at <http://leafware.com/>
- ⁹⁴ International Paper (2015). Making a Difference One Cup at a Time®. Retrieved January 2015 from <http://www.internationalpaper.com/US/EN/Products/ecotainer/ecotainerPackaging.html>
- ⁹⁵ Clayton Christensen, *The innovator's Dilemma: When New technologies Cause great Firms to Fail*, Harvard Business review Press (reprint edition) 2013.
- ⁹⁶ Sierra Club (2006). Washing state phosphate ban first in nation: Eliminating phosphates from dishwashing detergents "cleans dishes while saving fishes" Retrieved from http://www.waterplanet.ws/phosphates/Site/Media/Entries/2006/3/27_Washington_state_phosphate_ban_first_in_nation.html
- ⁹⁷ The New York Times (2010)> Cleaner for the Environment, Not for the Dishes. Retrieved from http://www.nytimes.com/2010/09/19/science/earth/19clean.html?_r=0
- ⁹⁸ The New York Times (2013). In an Overhaul, Clorox Aims to Get Green Works Out of Its Niche. Retrieved from http://www.nytimes.com/2013/04/22/business/media/cloroxs-green-works-aims-to-get-out-of-the-niche.html?_r=0
- ⁹⁹ Oliver Laasch and Roger Conaway, *Principles of Responsible management, Global Sustainability, Responsibility and Ethics*, Cengage Learning, January 2014 (P. 170). Preview retrieved on January 2015 from <http://books.google.com/books?id=0uLKAgAAQBAJ&pg=PT190&lpg=PT190&dq=clorox+business+units&source=bl&ots=9kXt81YSGP&sig=igHPRUCy6coHIV-UrNvx-SV5S2o&hl=en&sa=X&ei=HN7fU4KEM4risAS-iIDICw&ved=0CCcQ6AEwADgK#v=onepage&q=clorox%20business%20units&f=false>
- ¹⁰⁰ Ben & Jerry's (2015). B Corp. Retrieved January 2015 from <http://www.benjerry.com/about-us/b-corp>
- ¹⁰¹ Pascual L. (2012). Danone's Recipe for Sustainable Innovation. Retrieved from <http://added-value.com/danones-recipe-for-sustainable-innovation/>
- ¹⁰² eBay (2011). Inside the partnership: Patagonia + eBay. Retrieved from <http://green.ebay.com/greenteam/blog/Inside-the-Partnership-Patagonia-eBay/7797>
- ¹⁰³ AdWeek (2013). Patagonia Is Taking On a Provocative 'Anti-Growth' Position Is it all just a marketing ploy?. Retrieved from <http://www.adweek.com/news/advertising-branding/patagonia-taking-provocative-anti-growth-position-152782>
- ¹⁰⁴ Transworld Business (2012). Patagonia's New Plant-Based Wetsuits And Goal To End Neoprene's Use Across Surf. Retrieved from <http://business.transworld.net/116138/features/jason-mccaffrey-on-patagonias-new-ecological-wetsuit-material/>
- ¹⁰⁵ Nurturing Nature (2012). Sustainability Report. Retrieved from <http://2013.7genreport.com/popup.php?page=nurturing-nature>

-
- ¹⁰⁶ Nike (2015). Waste. Retrieved January 2015 from <http://www.nikeresponsibility.com/report/content/chapter/waste>
- ¹⁰⁷ Sustainable Apparel Coalition (2015). About Us. Retrieved January 2015 from <http://www.apparelcoalition.org/overview/>
- ¹⁰⁸ Nike (2015). Our Sustainability Strategy. Retrieved January 2015 from <http://www.nikeresponsibility.com/report/content/chapter/our-sustainability-strategy>
- ¹⁰⁹ Cosmetic Design (2004). Euromonitor publishes Brazil market report as Natura prepares for IPO. Retrieved from <http://www.cosmeticsdesign.com/Market-Trends/Euromonitor-publishes-Brazil-market-report-as-Natura-prepares-for-IPO>. The reported sales prior to the IP were of \$1 Billion Reais. An exchange rate of 0.44 Reals per USD was used to quote this number.
- ¹¹⁰ Natura (2014). Financial Statements in International Standards Released July 2014. Retrieved from: <http://natura.infoinvest.com.br/enu/4803/DFeCDingles.pdf>
- ¹¹¹ Forbes (2014). Natura Cosmetics. <http://www.forbes.com/companies/natura-cosmetics/>
- ¹¹² Jones, G. and Reisen de Pinho, R., "Natura: Global Beauty Made in Brazil", Harvard Business School, Case Study 9-807-029.
- ¹¹³ Natura (2014). Deutsche Bank Access Global Consumer Conference. Retrieved from http://natura.infoinvest.com.br/enu/4781/Natura_DB_2014VFinal.pdf
- ¹¹⁴ Responsible Supply Chain. Presentation by João Paulo Ferreira, Supply Chain Vice President, Natura.
- ¹¹⁵ Hashiba L. (2013). Innovation in Well-Being – The Creation of Sustainable Value at Natura. Retrieved from <http://www.managementexchange.com/story/innovation-in-well-being>
- ¹¹⁶ Boechat, C., and P. R. Mokrejs (2007). Natura's ekos: perfume essences produce sustainable development in brazil. *GIM UNDP Case Study Database, New York*.
- ¹¹⁷ Geoffrey Jones Ricardo Reisen De Pinho. HBS Case Study 807-029, Natura: Global Beauty Made in Brazil. October 2012.
- ¹¹⁸ Geoffrey Jones Ricardo Reisen De Pinho. HBS Case Study 807-029, Natura: Global Beauty Made in Brazil. October 2012.
- ¹¹⁹ GCI Magazine (2010). "A Lesson in Sustainability: Natura's Marcos Vaz". Retrieved from <http://www.gcimagazine.com/business/management/sustainability/101888568.html>
- ¹²⁰ Sustainable Brands (2014). Natura Asks: Why Do You Need What You Don't Need?. Retrieved from http://www.sustainablebrands.com/news_and_views/design_innovation/packaging/mathieu-jahnich/natura-asks-why-do-you-need-what-you-dont
- ¹²¹ Hashiba L. (2013). Innovation in Well-Being – The Creation of Sustainable Value at Natura. Retrieved from <http://www.managementexchange.com/story/innovation-in-well-being>
- ¹²² Henderson, R. & F. Nellesmann (2011). Sustainable Tea at Unilever. Harvard Business Case study.
- ¹²³ Sustainable Brands (2014). Natura Asks: Why Do You Need What You Don't Need?. Retrieved from http://www.sustainablebrands.com/news_and_views/design_innovation/packaging/mathieu-jahnich/natura-asks-why-do-you-need-what-you-dont
- ¹²⁴ EMC2(2015). Material & Resource Use. Retrieved January 2015 from <http://www.emc.com/corporate/sustainability/sustaining-ecosystems/eol.htm>
- ¹²⁵ Gallup (2014). Americans Again Pick Environment Over Economic Growth. Retrieved from http://www.gallup.com/poll/168017/americans-again-pick-environment-economic-growth.aspx?utm_source=WWW&utm_medium=csm&utm_campaign=syndication
- ¹²⁶ Of course, this is only one possible conclusion. It is just as likely that as people age their attitudes change and they care more about economic issues.
- ¹²⁷ NPR(2013). Why Millennials Are Ditching Cars And Redefining Ownership. Retrieved from <http://www.npr.org/2013/08/21/209579037/why-millennials-are-ditching-cars-and-redefining-ownership>
- ¹²⁸ USA Today (2014). Little car love among urban Millennials. Retrieved from <http://americasmarkets.usatoday.com/2014/04/23/little-car-love-among-urban-millennials/>
- ¹²⁹ Huff Post (2013). Generation Y And Consumerism: Waning Interest In Car Ownership A Sign Of A Deeper Shift. Retrieved from http://www.huffingtonpost.ca/2013/01/18/generation-y-consumerism-ownership_n_2500697.html

¹³⁰ Worstall T. (2011). Africa Might Just Skip the Entire PC Revolution. Retrieved January 2015 from <http://www.forbes.com/sites/timworstall/2011/08/17/africa-might-just-skip-the-entire-pc-revolution/>