

The Fourth Wave, Sustainability and Change

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The Fourth Wave

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“The future is already here; It’s just not very evenly distributed”
William Gibson

Over the past 50 years, the notion of corporate environmentalism (later corporate sustainability) was born, grew, and evolved. Though the history of concerns about the state of the natural environment can be traced back more than 300 years (Evelyn, 1661), the decade of the 1960s marks the dawn of the “modern” environmental movement. Initially focused on visible forms of air, water, solid and even thermal and aesthetic pollution, attention grew over the next 50 years to include toxic substances, stratospheric ozone, climate change, water scarcity, ecosystem destruction, and species extinction. An even more recent evolution, triggered by the publication of the Brundtland Commission report on sustainable development (World Commission on Environment and Development, 1987), has witnessed a growing concern for income inequality, living wages, fair representation, secure retirement, transparency, and safe working conditions to round out the “triple bottom line” of the sustainability agenda: environment, equity, and environment (Elkington, 1997).

Today, this expanded notion of sustainability has become commonly accepted within both the academy and the corporate sector. Within the academy, what began as a modest offshoot of management science in the early 1990s has grown into a maturing area of study, one that encompasses a wide range of related disciplines (Hoffman and Bansal, 2012). Within business practice, sustainability has entered most domains of corporate activity. Corporations print annual “Sustainability Reports,” insert the term into press releases and CEO speeches, create new positions such as the Chief Sustainability Officer, and gather for conferences on the “sustainability challenge.” A

survey by Price Waterhouse Coopers (2005) found that 87% of Fortune 1000 CEOs believe sustainability is important to a company's profits. But, in spite of the myriad of new programs under the rubric of sustainability, problems of social and environmental sustainability continue to worsen. Sustainability has been integrated into corporate practice without serious dislocations to core beliefs, such that the solutions as presently configured do not go far enough (Ehrenfeld, 2008; Ehrenfeld & Hoffman, 2013). It is important to examine the next iteration of corporate sustainability that is now emerging: what problems it seeks to address, what changes it entails, and what it means for the corporate organization and the market system as a whole. This next iteration is part of the ongoing progression that involves the redefinition of the role of the corporation within society.

This chapter will present the evolution of sustainability practice and thought as a process of punctuated equilibrium (Rondinelli & Tushman, 1994; Gersick, 1991; Kuhn, 1962) passing through three waves between 1960 and the present. The fourth wave is emergent and glimpses of its details can now be explored. As William Gibson observes, "the future is here; it's just not very evenly distributed" (Gibson, 1991). This is true for the experiencing the problems and defining solutions, and for both management practice and management research.

Sustainability and the Economy: The Initial Problem Statement

The past century has witnessed unprecedented economic growth and human prosperity. World population increased by a factor of four; the world economy increased by a factor of fourteen (Thomas, 2002); global per capita income tripled (World Business

Council on Sustainable Development, 1997); and average life expectancy increased by almost two-thirds (World Resources Institute, 1994). In the US alone, life expectancy rose from 47.3 to 77.3 between the years 1900 and 2002 (National Center for Health Statistics, 2004).

While these and other advances are notable, widening income disparities mean that more people do not share in the material and economic progress of the past century. According to the United Nations, the richest 20% of the world's population consume 86% of all goods and services while the poorest 20% consume just 1.3%; the richest three people in the world have assets exceeding the combined gross domestic product of the 48 least developed countries; of the 4.4 billion people in the developing world, almost 60% lack access to safe sewers, 33% do not have access to clean water, 25% lack adequate housing, and 30% have no modern health services (Crossette, 1998).

At the same time, the past century has witnessed unprecedented human impacts on the natural environment. The UN Millennium Ecosystem Assessment (2005: 1), a study involving more than 1,360 experts worldwide, concluded that humans have changed the Earth's ecosystems "more rapidly and extensively than in any comparable period of time in human history." Of the 24 global ecosystem services that were analyzed, 60% were already degraded or being used unsustainably through species extinction, over-exploitation and eco-system destruction.

In short, the exploitative relationship between the economy and the natural and social environment—one that took shape in the industrial revolution of the 19th century and has grown with globalization of industrial production in this century—cannot be sustained.

Sustainability as a Stakeholder Issue: The Present Solution Statement

To the corporation, the sustainability problem has been framed as a shift in stakeholder demands. Pressures from a wide range of institutional constituents (governments, consumers, investors, insurance companies, as shown in Figure 1) translate sustainability into logics (Thornton & Ocasio, 2008) that are familiar and for which ready repertoires are available (Hoffman, 2000). For example, as insurance companies apply pressures on the firm, responses become risk management issues. As competitors apply pressure, sustainability becomes an issue of strategic direction and market growth. With investors, it becomes an issue of capital acquisition, and so on.

Insert Figure 1 about Here

In effect, sustainability has become less and less an isolated business concern. The firm's business channels have been altered to bring environmental and social issues to managerial attention through avenues related to marketing, accounting, finance, product development, etc. For each case, firms have pre-existing models and language that enable it to understand the issue and formulate a response. As these responses have become routinized, ongoing sustainability issues are treated as ordinary strategic concerns, no longer dictated by external social interests, but rather by internal strategic norms. In the process, managers need not understand or recognize concern for the sustainability issues as something unique. This historic process of internalization and translation has not been a steady linear trend, but instead has been marked by sudden punctuated shifts that have passed through three distinct waves.

Punctuated equilibrium and the three waves of corporate sustainability

Thomas Kuhn (1962) describes the progression of science as a series of transitions from *normal* science to *revolutionary* science. Others have applied Kuhn's model to the progression of institutional thought, describing it as following periods of punctuated equilibrium (Romanelli & Tushman, 1994; Gersick, 1991). A phase of normal science begins when a new theory emerges as dominant to the other existing theories and becomes the "paradigm." It is the role of normal science to undertake the "mopping-up," as Kuhn calls it, of the hitherto unexplained facts by applying the paradigmatic theory. Established theories become overtaken when anomalies-variously referred to as shocks (Fligstein, 1991), jolts (Meyer, 1982), or discontinuities (Lorange, Scott-Morton, & Ghoshal, 1986)-emerge and challenge the dominant technological or economic institutional order (Hoffman & Jennings, 2011). Conflict over the nature, meaning, and response to these events ensues, and the shift ends when a new theory is successful in providing a socially adequate response to the anomaly and becomes the basis of the new paradigm.

Based on this orienting structure, the history of corporate sustainability can be explained as having evolved through three "waves" of revolutionary change, shown in Figure 2 (Hoffman and Bansal, 2012; Elkington, 2005; Hoffman, 2001). These waves are periods of dramatic change in values, beliefs, norms and practices regarding the nature of our sustainability challenges. Each begins with a series of anomalous events and concludes with a new conception of the role of the corporation in addressing sustainability issues.

Insert Figure 2 about Here

Wave 1 (1970): Corporate environmentalism as regulatory compliance. The first wave of corporate sustainability focuses strictly on environmental protection and occurred in the late 1960s and early 1970s (Hoffman, 2001). Its origins can be traced to the publication of *Silent Spring* (Carson, 1962), a book that challenged what Samuel Florman called the “golden age of engineering” (Florman, 1976) and helped bring about a growing awareness that chemicals were damaging the environment and ultimately ourselves. Other events that followed included: the initiation of the International Biological Program (1963); the formation of the Club of Rome (1968); the Santa Barbara oil spill (1969); the Cuyahoga River Fire (1969); and the first Earth Day (1970).

These events created growing public and political concern over the worsening state of the environment and resulted in new regulatory agencies (most notably the Environmental Protection Agency in 1970) to arbitrate environmental rules and norms, negotiating on the one side with industry, and on the other with environmental activists. Within the corporate structure, “Environmental Health and Safety” (EH&S) departments were established whose principal responsibility was maintaining relations with governmental agencies. Separated from the operating core of the company, these departments remained an ancillary role with low organizational power, and focused strictly on legal requirements (Hoffman, 2001).

Wave 2 (1990): Corporate environmentalism as strategic management. The second wave occurred in the late 1980s and early 1990s and was precipitated, in part, by the 1984 accidental release of methyl isocyanate gas from the Union Carbide (UC) pesticide plant in Bhopal, India that resulted in 3,500 deaths and 300,000 injuries. This

event was followed by others that included: the discovery of the Arctic ozone hole (1985); the Chernobyl nuclear disaster (1986); the Brundtland Commission report *Our Common Future* (1987); the Montreal Protocol (1987); the formation of the Intergovernmental Panel on Climate Change (1988); the *Exxon Valdez* oil spill (1990); and the UN Conference on Environment and Development (1992).

In the wake of these events, insurers began to restructure pollution coverage, investors began to consider environmental liabilities in their portfolio, and communities began to create “right-to-know” laws. Within the corporate structure, these pressures elevated the issue to one of strategic concern. The environmental department enjoyed new levels of organizational power, and environmental considerations began to be pushed into line operations. Objectives shifted from regulatory compliance at the end of the pipe to waste minimization in product and process design.

It is also during this second wave that attention to environmentalism (and sustainability) began to emerge within the field of management science. Shown in Figure 3, academic publications in the topics area of Business and the Natural Environment (B&NE) (Hoffman & Georg, 2013; Hoffman, 2011) emerged as a body of literature in the early 1990s, and has been growing at a steady rate ever since.¹ While many early articles appeared within specialized B&NE journals, the number published in mainstream academic (non-specialized) increased over the decade. Overall seventy-three percent of B&NE articles were published in mainstream journals as the issue became a legitimate

¹ This emergence is marked by the first gathering of management scholars on the topic in 1989 with the Greening of Industry Network. The Organizations and the Natural Environment special interest group of the Academy of Management was formed in 1994 and specialized academic journals dedicated to the interface between managerial action and environmental protection followed: *Industrial and Environmental Crisis Quarterly* (1987), *Business Strategy & the Environment* (1992), *Organization & Environment* (1997), and the *Journal of Industrial Ecology* (1997).

empirical domain for testing and applying existing theories in the management sciences: organizational theory (i.e. Jennings & Zandebergen, 1995), operations (i.e. Klassen & Whybark, 1999), strategy, (i.e. King & Lenox, 2000) marketing, (i.e. Luo & Bhattacharya, 2006) accounting (i.e. Gray & Bebbington, 2001), and finance (i.e. Neu, Warsame & Pedwell, 1998).

Insert Figure 3 about Here

Wave 3 (2010): Corporate environmentalism as sustainability. The third wave began in the first decade of the twenty-first century, propelled by a series of events that followed the creation of a global constituency for sustainable development created by the 1992 Summit of the UN Commission on Commerce and Development. No single issue drove the advent of the third wave more than climate change. The growing scientific consensus that humans have been altering the global climate through the release of greenhouse gas emissions since the Industrial Revolution has focused attention on the need to move the economy away from its foundations on fossil-fuel use and material consumption.

Public and political concern was elevated due to concerns that climate change might create dramatic threats in multiple domains. For example, a 2007 report by the US Military Advisory Board warned “projected climate change poses a serious threat to America’s national security . . . climate change acts as a threat multiplier for instability in some of the most volatile regions of the world” (CNA Corp, 2007). Others began calling for nations to maintain their economic competitiveness by developing the next generation of technologies for creating and conserving energy, food, and water (Friedman, 2007;

Chu, 2010). Still others warned that increased demand for increasingly scarce resources would affect previously “free” ecosystem services. The Millennium Ecosystem Assessment warned “higher operating costs or reduced operating flexibility should be expected due to diminished or degraded resources (such as fresh water) or increased regulation” (MEA, 2005).

As a result of these and other stakeholder pressures, the third wave signifies the mainstreaming of sustainability. Firms incorporate sustainability strategies into their core mission. University administrators promote sustainability as central to their curricula. Scholars pursue sustainability as a bona fide field of research inquiry. Consumers buy sustainable products, drive sustainable cars, and stay at sustainable hotels. Indeed, sustainability is reaching into all areas of business, politics, and society. Given this level of attention and action, the world should be on the road to a sustainable future. But it is not. Problems continue to get worse.

Contemporary Sustainability: The Problem Statement Revisited

We are today in the throes of a commons tragedy of global proportions. Global annual emissions of CO₂ rose approximately 80% from 1970 to 2004 and 2012 atmospheric concentrations of CO₂ far exceed the natural range of the previous 650,000 years. The first decade of the 21st century was the hottest decade on record. As a result, extreme weather events in the US have become both more frequent and more intense with a large decrease in the number of extreme cold waves and an increase in both extended heat waves and extreme rainfall events. The US, and the Eastern US in particular, has experienced a significant increase in extreme precipitation events, with the greatest

number of episodes taking place during the 2000s. During the 20th century, the Northeast saw sea levels rise on average 1.2 inches per decade. By the end of the century, heavy downpour events that occurred every 20 years were expected at a frequency of every four to 15 years depending on the region, with wetter areas (for example, the Northeast) expected to get even wetter, increasing the chance of severe flooding (Kunkel, 2013; Karl, Melillo & Peterson, 2009). “Very few environmental conditions affect our economy, natural resources, or citizens’ lives more than climate. Up to one-third of the US gross domestic product is directly influenced by weather and climate” (Lubchenco, 2011). Already, worldwide natural catastrophes are reaching historic highs (see figure 4). The year 2012 ranks as the second costliest for natural catastrophe insurance payouts since 1980, with a total of more than \$110 billion in damages (NOAA, 2013).² Already in China, pollution in some cities has reached levels that are 40 times the level that the World Health Organization deems safe, are estimated by the National Academy of Sciences to shorten life expectancy by five and a half years, and are estimated by the World Bank to reduce GDP by 9 percent (Economist, 2013).

Insert Figure 4 about Here

Beyond these environmental issues we are also facing tremendous social problems, most notably in income inequality. US Census data for 2010 show the widest income gap between rich and poor on record. In 1968, the top 20 percent of Americans had about 7 times the income of those living below the poverty line. By 2008, that disparity had grown to about 13. By 2010, it had grown to more than fourteen (Ehrenfeld

² The 2012 total damages rank only behind 2005, which incurred \$160 billion in damages due in part to four devastating land-falling hurricanes.

& Hoffman, 2013). This has led to public protests in the form of the Tea Party and the Occupy Wall Street Movement (and globally, the Arab Spring); all borne out of the concern that the institutions of society are no longer adequate or fair for managing society.

Overall, what these social and environmental data point to is the inescapable conclusion that the third wave has not been able to address the root issues of sustainability. The Kuhnian shifts that have occurred thus far are still insufficient to address the vision of a sustainable world. The problem with the solution statement of the third wave is that it is built upon the notion of eco-efficiency as the central tenet of the economic models used to devise public policy and business strategies. But while efficiency drives both competition and growth, it does not address sustainability. There simply is not an infinite supply of resources on Earth to allow for continuous growth in material terms; and certainly not if growth adds to, rather than reduces, inequality.

So what companies are doing when they promote sustainability in the third wave is incremental in scope. Their activities are focused on *reducing unsustainability*, which is fundamentally different *creating sustainability* (Ehrenfeld, 2008). Here is an analogous example. The U.S. fought a war in Iraq that eventually stopped. Now we're still there trying to create some kind of stable, lasting peace. Stopping the war and creating peace are different activities. These seemingly related concepts are based on different paradigms. So, while current activities are important for slowing the velocity at which we are approaching a system collapse, they are little more than a call to protect the status quo, that is, maintaining the fundamental paradigm of a liberal, free market economy that hides the externalities (the unseen, unintended consequences of the economy) tied up with the goods and services that are consumed. Therefore, they do not solve the problem.

This idealized model ignores the systemic effects arising from the production and marketing of goods and services. As such, they hold to the belief that the market as presently configured can work with minor adjustments, often by giving people perfect information through reporting initiatives and scoring systems or developing technological or technocratic solutions. But, without a correction that recognizes that the economy is embedded within complex environmental and social systems (Hawkins, 1993), present day sustainability “solutions” will be ineffective.

The Fourth Wave: The Market in the Anthropocene.

We are now living in the Anthropocene, a new geologic epoch in which human activities have a significant impact on the Earth’s ecosystems (Zalasiewicz et al., 2010; Crutzen & Stoermer, 2000). We, as a species, have grown to such numbers, and our technology has grown to such power, that we are altering the ecosystem on a planetary scale. This shift forces a change in societal views of both the ecosystem and the human place within it (Hoffman, 2012) leading to the fourth wave; a cultural shift akin to the Enlightenment of the 17th and 18th centuries (Kors, 2003). The Enlightenment marked a period in which knowledge was advanced through the scientific method rather than tradition, superstition, and religion. The Enlightenment, following the work of Adam Smith, created the concept of the market that has served as the fundamental organizing principle of the liberal economy and continues to be the foundational framework for business. Today, this framework is what brought us both the economic that was described at the beginning of this chapter but also created the problems that were similarly described. The fourth wave is a correction to that dominant model. The idea of the

market will survive, but the rules that govern the underlying social contract that legitimates the business sector will change.

Management Practice in the Fourth Wave

Climate change, droughts, increasing food prices, water scarcity, social unrest, income inequality; these are all the emergent cultural anomalies of the Anthropocene that are driving changes in the market, the primary linkage between humans and the environment. Signals of these changes can already be seen. In the next section, we will focus on only six: systems thinking, which leads to new forms of: partnerships, materials use and supply chains, domains of corporate activity, organizations, and the economic models and metrics that are used to measure them.

Systems thinking. Sustainability is a property of the system as a whole; not of just one firm. The impact and action of each firm is realized through its network connections to other nodes that include other firms, customers, regulators, banks, etc. No single firm, however large and powerful, can control the behavior of the system. It can neither prevent deterioration nor create solutions to social and environmental problems such as the reduction of greenhouse gases or the elimination of poverty and inequality.

Systems-thinking requires an emergent set of practices to manage a firm's actions in conjunction with others within a network (Wasserman & Faust, 1994) to create outcomes with a minimum of unwanted unintended consequences. Several components of such thinking include complexity, pragmatism, and participatory decision-making. Complexity recognizes that our emerging understanding of this system cannot be described by our existing sets of closed analytic expressions. Pragmatism helps

managers to understand and interact with these complex systems in ways that lie in opposition to the ideology of scientific reasoning and can be described simply as learning how something works by observing it in action, not in some isolated laboratory or computer modeling exercise. Such experiential learning presumes that there is no positively true answer to our questions about how the world works and, consequently, what is the right way to go. It legitimates non-expert local knowledge that can be discovered through participatory decision-making.

For example, the notion of a sustainable energy company in isolation from the system of which it is a part no longer makes empirical sense. One firm installing windmills is not sustainability. A more sustainable energy system incorporates renewable energy sources with distributed energy production, smart grid technologies, demand management, and energy efficiency for both grid and mobility energy consumption. The currently uneven energy demand curve, required to meet only 400 annual hours of peak demand, results in 25 percent of distribution and 10 percent of generation assets, costing hundreds of billions of dollars. Demand response resources can supplement generation capacity to flatten demand curves and fill existing demand valleys with renewable energy. By properly networking customers to time refrigerator defrost cycles and allow smart grid interfaces to initiate dryer or dishwasher start times, there is a potential of 300 GW of daily peak demand reduction (Catania, 2013). To create such a systems-wide approach, policy must be developed to synchronize and incentivize cross-sector coordination.

New forms of partnerships. Cross-sector coordination for systems-wide change requires new forms of competition and collaboration to recognize the interconnected and interdependent nature of industry. Co-opetition, as both a corporate and political strategy,

(Brandenburger & Nalebuff, 1996; Kellner, 1998) is not just a strategy of choice, but an essential framework for sustainability. A recent study by IBM found that 69% of CEOs see external partnering as being critical to the company's future success and 46% are using partnerships to enter new markets (IBM, 2012).

In capitalizing on systems-wide opportunities, partnerships will be of new and unusual forms, linking firms in multiple sectors. For example, Eaton, Whirlpool, SunPower and Ford have begun a new partnership called MyEnergi Lifestyle that is designed to help the average single family home reduce energy costs by as much as 60 percent by programming dishwashers and water heaters to do most of their high energy tasks at night. Another involves Ford's vehicle charging stations but uses a cloud database to schedule hybrid or electric vehicles recharging when utility rates are lowest or when integrated renewable energy sources are active (Buckley, 2013). Similarly, Chesapeake Energy is partnering with General Electric and Whirlpool to develop an appliance that will allow natural gas powered vehicles to be refueled at owner's homes (Lefebvre & Bennett, 2012).

New forms of partnerships will not just be between for-profit organizations. Non-profit organizations also play new, emergent, and influential roles in the global marketplace. They act as policy advisers to governments; strategy advisers to corporations; thought leaders for public opinion; and catalysts for action by bankers, investors, suppliers, customers, and even religious organizations. The Environmental Defense Fund (EDF), for example, participated in the 2007 leveraged buyout of the energy company TXU and hired Perella Weinberg Partners, a boutique investment bank, to advise it on using Wall Street tactics in negotiating mergers and acquisitions. The Bill

and Melinda Gates Foundation, the world's largest foundation with assets of \$30 billion, now rivals most governments in its annual disbursements of over \$3 billion to address global health challenges.

Enhanced supply chain management and materials management. These kinds of partnerships will direct more attention to longer and increasingly complex supply chains. The design and optimization of product life-cycle systems requires integrated information from a multitude of organizations. An entire new field, industrial ecology, has grown around the need to develop methodologies to measure life cycle impacts and to design minimally impactful systems (Ayres & Ayres, 2002). Using the closed-loop structure found in sustainable ecological systems as a model, industrial ecology argues for similar closed-loops in industrial systems from in-plant and household recycling to regional, even national, loop-closing systems (Ehrenfeld, 1997). The participatory decision-making schemes mentioned above are well fitted in these enhanced supply chains. The just-in-time supply chains of the Japanese automakers depend on close and cooperative relationships with parts suppliers (Liker, 2004).

New domains of corporate activity. Beyond the optimization of supply chains and their related environmental impacts, firms are adopting new kinds of activities that would have been previously considered outside the domain of traditional capitalism. For example, the Anglo-American Corporation engages in a comprehensive program that covers HIV/AIDS prevention and care for its employees and local communities in its African operations. Wal-Mart, the world's largest retailer, announced in 2008 that it would require suppliers to make major appliances that use 25 percent less energy within three years. Emblematic of the redefinition of the social role of the corporation (Post,

2002), CEO Lee Scott proclaimed, “We live in a time when people are losing confidence in the ability of government to solve problems... [But, Wal-Mart] does not wait for someone else to solve problems” (Barbaro, 2008).

At the local level, there is also movement to re-conceptualize corporate activity by re-localizing the economy. In Western Massachusetts, for example, a number of neighboring towns are using their own currency, Berkshares, for locally sourced goods and services. Time banking, an alternative monetary system that uses time instead of money as a form of reciprocal service exchange, is strong in England and northern Europe (Seyfang, 2009). People are building an economy within an economy. It’s still capitalism, still uses money in most cases, but uses barter in others, time banking in still others and focuses on reintroducing local relationships to market activities. This complements the primary economy and begins to rebuild connections and community, both of which are absolutely critical to the idea of sustainability.

New forms of organization. As corporate activity expands into new domains, with linkages to complex systems of actors through broader networks and supply chains, new forms of organization also emerge. Already, data show that the vertically integrated, shareholder-owned corporation is in rapid decline as a corporate model, with half as many public corporations in 2012 as there were in 1997 as they are superseded by alternative forms of organizing (Davis, 2013). Though not new, other forms, such as Cooperatives, or Employee-Owned Companies are part of a growing movement, particularly in Europe, that consider more than the shareholder in defining the actions of a corporation (Davis, 2013). One of the oldest examples of a Cooperative, for example, is Mondragon, a large Spanish firm with over 14 billion Euros annual revenue. Mondragon

is a federation of some 250 separate entities operating under an umbrella set of principles and management structure. Mondragon's four corporate values resonate with sustainability: co-operation between management and workers, participation in decisions through an elaborate committee structure, social responsibility reflected in a very flat salary structure, and innovation focused in all the many business areas (Whyte, 1991).

Going further, hybrid organizations are emerging at the intervening space between the for-profit and non-profit sectors and strive to merge the institutional logics of each domain (Battilana & Dorado, 2010; Powell, 1987). Alternatively described as Fourth Sector, Blended Value, For-Benefit, Values-Driven, Mission-Driven, or B-Corporations (Alter, 2004; Boyd et al., 2009), hybrid organizations present a bridge between two ends of a dichotomy previously seen as incommensurable; economic profit and social and environmental mission (Hoffman & Haigh, 2011). For example, Ten Thousand Villages is a volunteer-run 501(c)(3) non-profit organization that operates a for-profit retail operation to provide fair income to artisans from more than 30 countries by selling their fair-trade goods. Similarly, Stonyfield Farms is a for-profit agricultural company, but it also takes sustainability seriously in the development of its organic dairy products. As hybrids, these organizations are "both market-oriented and mission-centered" (Boyd et al., 2009: 1). Indicative of its increasing prevalence and importance, as of July 2013, nineteen States have passed laws creating a legal class of company, called "benefit corporations (B-corps)," and granted such hybrid organizations greater protection from shareholder lawsuits demanding management put profits above social and environmental missions (Gilbert, Houlihan & Kassoy, 2013). To qualify as a benefit corporation, a

company must define its nonfinancial goals in its charter and obtain approval of two-thirds of the shareholders.

New forms of economic models and metrics. All of these changes in corporate practice occur in tandem with alterations in the existing metrics and models by which firms measure organizational success, both individually and as a collective. These new metrics will reexamine traditional underlying values (Capra, 1982; Daly & Cobb, 1994; Daly, 1991; Gladwin, Kennelly & Krause, 1995).

Some have begun to question the time frames on which corporate activity is measured. Paul Pollman, CEO of Unilever, has said that the concept of shareholder value has passed its “sell-by date” and that his company will no longer provide quarterly profit updates to shareholders. Others have begun to question whether social discounting is inherently immoral, especially when applied to intergenerational issue like climate change (Rotman, 2013; Stern, 2009). With a simple discount rate of 5 percent, for example, anything beyond 20 years becomes worthless in present day calculations. Is it legitimate and moral to ignore the interests of the next generation because standard economic metrics of today do not recognize their worth? Similarly, the recognition of closed loop manufacturing principles described above challenge standard financial models of worth based on resource pricing.

Moving to the systems-scale, some have suggested alterations in traditional national accounting formulae. Rather than measuring only the quantity of economic activity, new measures may augment GDP to measure the quality of economic activity (Kubiszewski et al, 2013). French ex-president Nicolas Sarkozy, for example, created a commission, headed by two Nobelists, Joseph Stiglitz and Amartya Sen, that was

charged to come up with alternatives to GDP. The resultant report recommended a shift in economic emphasis from simply the production of goods to a broader measure of overall well-being, which would include measures for categories like health, education, and security. It also called for greater focus on the societal effects of income inequality, new ways to measure the economic impact of sustainability (climate change and the like), and recommended ways to include the value of wealth to be passed on to the next generation in today's economic conversations. Similarly, the King of Bhutan has developed another interesting example called Gross National Happiness, which is a composite of indicators that are much more directly related to human well-being than monetary measures.

Management Science in the Fourth Wave.

Recognition of the Anthropocene is a step change, one for which management research and teaching are ill-prepared. At a time when sustainability has gone mainstream in both the market and business school education/research, the fourth wave presents a period of “revolutionary science” (Kuhn, 1962) in which the norms of management science and practice are in flux. Today, with little sustained attention to critical sustainability issues like poverty, climate change, species extinction, social unrest, equity, and fairness in a rapidly globalized world (Khurana, 2007), some have begun to question whether business schools are falling out of step and irrelevant to the world of practice (Stewart, 2006; Economist, 2007; Jacobs, 2009; Podolny, 2009) and whether the modern business school must fundamentally alter its teaching and research in order to respond to the environmental and social challenges of the twenty-first century. Indeed,

some direct resentment towards MBA education for training graduates that played central roles in scandals such as Enron, Worldcom and the financial crisis (Podolny, 2009).

Rather than merely fitting within existing management theories and models, sustainability in the fourth wave challenges those theories to adapt to an emerging reality. For example, recognition of the Anthropocene forces theories of social organization to consider the role humans within the context of the natural environment, not separate or independent from it (Whiteman, Walker & Perego, 2012). Models of operations must consider closed-loop models that are bounded by the resource source and sink limitations of a finite environment (Caro, Corbett, Tan & Zuidwijk, 2013). Growing concerns for climate change challenge supply chain logistics and force consideration of more local options on material delivery (Davis, 2013) with implications for accounting and finance (Ascui & Lovell, 2011), organizational design (Valente, 2012) and strategy (Ansari, Wijen & Gray, 2013). Overall, the growing environmental and social ills that we presently face challenge the dominant organizing models of business education, such as agency theory and investor capitalism (Khurana, 2007; Ghoshal, 2005). In the end, sustainability presents a reexamination of the role of the corporation within society, and links corporate behavior to both the problems and solutions of the sustainability issue

Conclusion

The solutions to sustainability will, indeed they must, come from organizations within the market. The market is the most powerful organizing institution on earth, and corporations are the most powerful organizations. Without business, there will be no solutions. Business will design the next buildings we live and work in, the next

drivetrain under your car's hood, the next source of energy to propel it, the food we eat, the clothes we wear, and so on. But the solutions to the root problems that are inhibiting the emergence of sustainability go far beyond innovations in housing, automobiles, energy supply, food production, or clothing. Technical fixes arising from our existing knowledge base can only, at best, slow the advances of unsustainability. The root problems arise from outmoded beliefs deeply embedded in our political economy and most of our societal institutions. As our consciousness of the errors in our beliefs increases, the anomalies that signal the coming of a new paradigm will become more frequent and larger in scope. The challenges we face with the Anthropocene represent challenges for which our species has never before addressed. But as Stephen Jay Gould (1987) reminds us, "We have become, by the power of a glorious evolutionary accident called intelligence, the stewards of life's continuity on earth. We did not ask for this role, but we cannot abjure it. We may not be suited to it, but here we are."

FIGURE 1

Environmental Strategy as a Composite of Existing Business Interests (Hoffman, 2000)

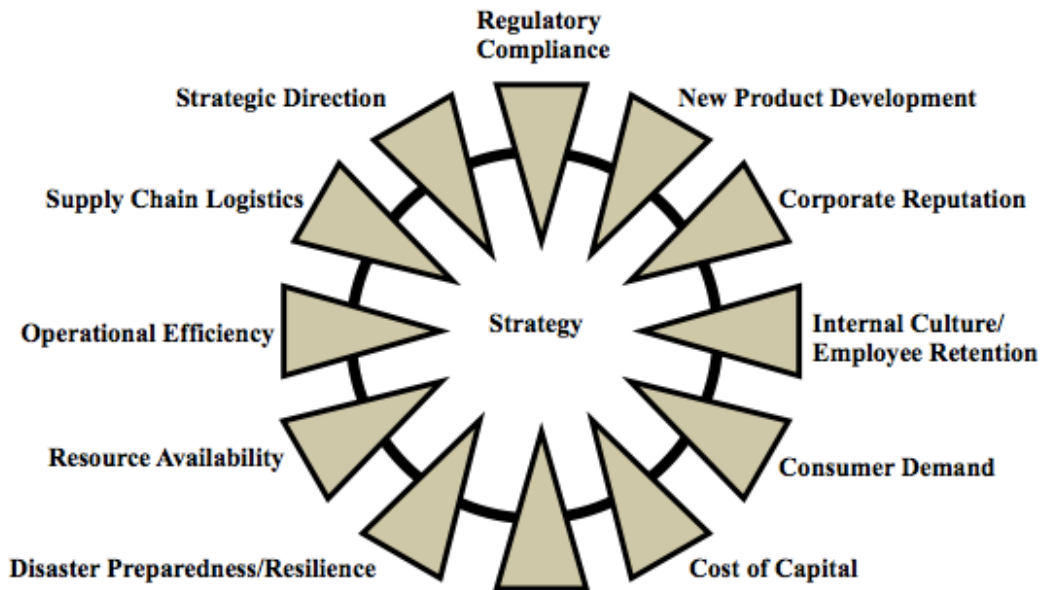


FIGURE 2

The Three “Waves” of Environmental Management (Hoffman & Bansal, 2012)



FIGURE 3

Articles per year on B&NE, 1975-2010 (Hoffman & Georg, 2013; Hoffman, 2011)

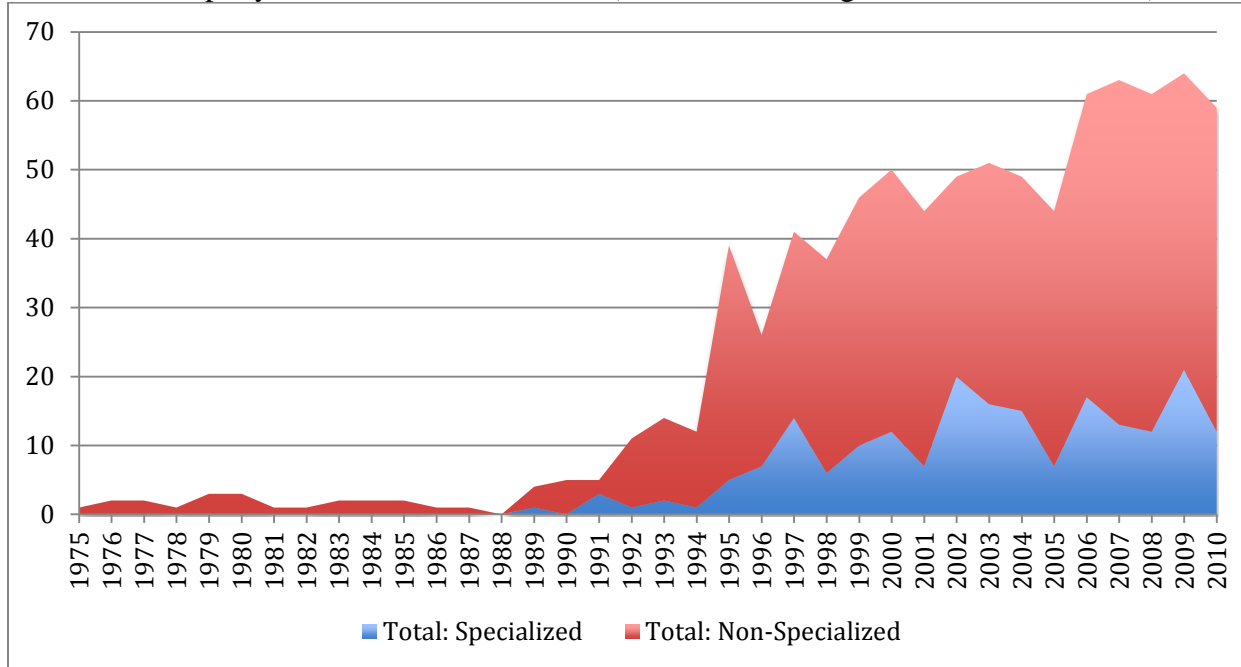
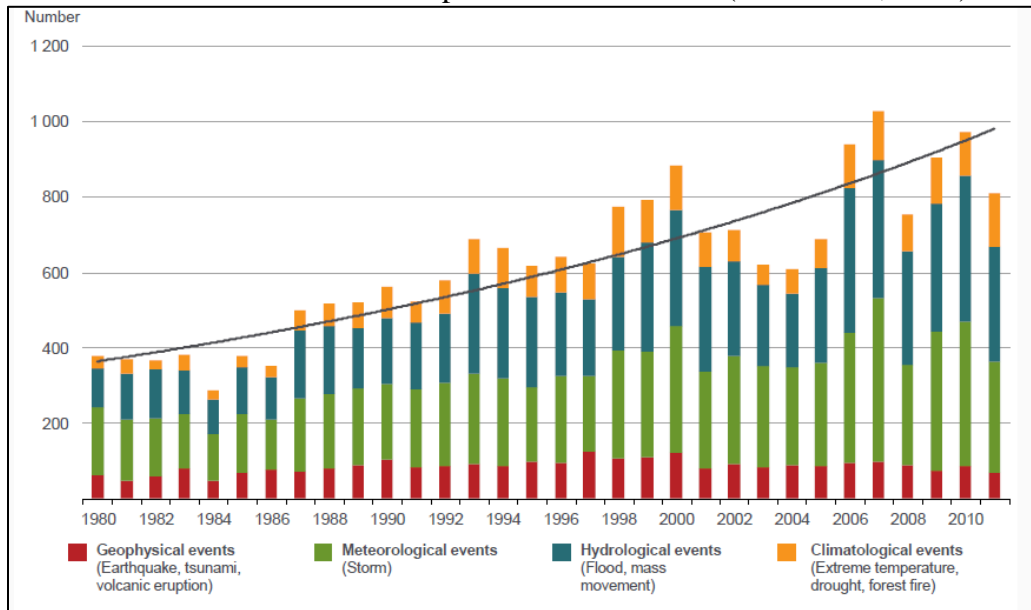


FIGURE 4

Worldwide Natural Catastrophes from 1980-2011 (Munich Re, 2011)



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