

Appendix C

Business Decisions and the Environment: Significance, Challenges, and Momentum of an Emerging Research Field

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INTRODUCTION

Over the past four decades, the concept of corporate environmentalism was born and redefined through multiple iterations. Driven by major environmental events such as Rachel Carson's *Silent Spring*, the Santa Barbara oil spill, the Cuyahoga River fire, Love Canal, Bhopal, the *Exxon Valdez* spill, the Brent Spar controversy, and many others, conceptions of corporate environmentalism as regulatory compliance in the 1970s gave way to newer management conceptions of "pollution prevention," "total quality environmental management," "industrial ecology," "life-cycle analysis," "sustainable development," "environmental strategy," "environmental justice," and others. The media focus of these conceptions expanded from air and water in the 1970s to hazardous waste, remediation, toxics, right to know, ozone, global warming, acid rain, solid waste, chlorine phase out, and environmental racism today. And with each conception came greater complexity for understanding the intersection of business activity and environmental protection. In particular, empirical data since the 1980s has raised questions about whether environmental protection and economic competitiveness can, at times, be complimentary (i.e., Sarokin, Muir, Miller, and Sperber, 1985).

Concurrent with this evolution in corporate practice has been the emergence of academic research focused on business decision making, firm behavior, and the protection of the natural environment. Among the academic sciences this is a relatively new field, coming into being only in the early 1980s with articles addressing the overlap between business strategy

and the environment (i.e., Royston, 1979, 1980) and, later, with the formation of research consortia such as the Greening of Industry Network (Fischer and Schott, 1993) and the Management Institute for Environment and Business (now part of the World Resources Institute). What began as a modest offshoot of management research has grown into a maturing area of study within the management sciences. It is now possible to step back and view the state of this field in terms of where it has been and where it is going. In this appendix I consider what is distinct about existing research in business decision making and the environment and consider future directions in which the field is going.

CORPORATE ENVIRONMENTALISM AS AN EMPIRICAL DOMAIN

The past century has witnessed unprecedented economic growth and human prosperity. Global per capita income has nearly tripled (World Business Council on Sustainable Development, 1997), average life expectancy has increased by almost two-thirds (World Resources Institute, 1994), and people are significantly more literate and educated than their predecessors. Many of these improvements in the quality of life have been driven by the accomplishments of industry. Advancing developments in medicine, materials, transportation, communication, and food production have all emerged from the industrial sector. But, since the 1960s, society has begun to question some of the assumptions around the treatment of the environment as (1) an endless source of resources and (2) a limitless sink for wastes. This has resulted in both an appreciation that corporate activity is the source of environmental problems, but also more recently that industry can also be the solution. This is the area in which research in managerial decision making has the most to offer.

Industry as a Problem

In 2000 private worldwide consumption expenditures reached more than \$20 trillion, an increase of more than fourfold since 1960 (in 1995 dollars) (Starke, 2004). To fuel this consumption, industry consumes vast amounts of material resources, and rates will increase. Between 1990 and 2000, sales of the largest 100 transnational corporations increased 50 percent to \$4.8 trillion (World Resources Institute, 2001). And 50-75 percent of the annual resource inputs to industrial economies overall become wastes within a year (World Resources Institute, 2000a). This industrial activity has had and will continue to have critical impacts on the natural environment. For example:

- The global rate of deforestation averaged 9 million hectares per

year in the 1990s (World Resources Institute, 2001). Global wood consumption has risen by 64 percent since 1961. During that time, half of that consumption was burned as fuel, and commercial logging has cleared more than one-fifth of the world's entire tropical forest cover. Demand for industrial wood fiber is projected to rise between 20 and 40 percent by 2010 (World Resources Institute, 1999).

- Soil degradation has become a major issue on as much as 65 percent of agricultural land worldwide, reducing the productivity of about 16 percent of that cropland, especially in Africa and Central America (World Resources Institute, 2000b).

- Consumption of fish and fishery products (such as fish meal and fish oils) has risen by 240 percent between 1960 and 2003 and more than fivefold since 1950 (World Resources Institute, 1999). In 1999 the global total fish catch was 4.8 times higher than in 1950. Since that time, industrial fleets have exhausted at least 90 percent of all large ocean predators (such as tuna, marlin, and swordfish) (Starke, 2004). Overall, nearly 25 percent of the world's most important marine fish stocks have been depleted, overharvested, or are just beginning to recover from overharvesting. Another 44 percent are being fished at their biological limit and are, therefore, vulnerable to depletion (World Resources Institute, 2000b). Demand for food fish is projected to increase by 34-50 percent by 2010, a level of consumption that cannot be met if current production trends continue unchanged (World Resources Institute, 1999).

- Global use of fossil fuels has increased 4.7 times between 1950 and 2002 (Starke, 2004), such that worldwide emissions of the greenhouse gas, carbon dioxide (CO₂), have increased to 23 billion metric tons in 1999, an 8.9 percent increase since 1990 (World Resources Institute, 2003). This rise is expected to yield changes in global weather patterns, increases in sea levels, and the migration of vectorborne diseases.

Industry as a Solution

The above examples illustrate how business activities impact the environment in significant ways. And as these types of environmental degradation continue to grow, companies will experience more and more pressure to find solutions. Although in truth it is industrial society as a whole that causes environmental problems, it is industry that will bear the burden of reducing their severity. Empirically, as the world becomes more globalized, and the impact of industrial and commercial activities become more extreme, no solution to the environmental problems society faces will be solved without the involvement of business. The reasoning for this assertion follows several lines.

First, business decisions about what inputs to use and how to manage

outputs ultimately determine environmental quality. Therefore, industry often bears the direct cause-and-effect link to environmental problems, such that it is the most vulnerable institution to social and political challenges for change. Second, firms are, in general, the sources of technological evolution within society. As such, in many cases firms best understand the technical trade-offs that innovation choices may involve. Although environmentalists and others may appreciate impacts of systemic change, firms understand the underlying technical and economic aspects of innovative activities. Third, governments no longer possess the full array of resources and knowledge necessary to dictate environmental solutions to business. Many within policy circles now agree that business must become a participant in the environmental regulatory process if sustainable and economically efficient solutions are to be found. And fourth, the power of business organizations to determine the structures of our social, economic, and political activity has grown to such enormous proportions that industry now possesses the most resources both individually and through markets to create more efficient coordinating mechanisms. And indeed, business has been developing solutions to emerging environmental problems with products and services such as alternative mobility systems such as gas-electric hybrid vehicles, fuel cell vehicles, or car sharing in urban centers; alternative energy sources such as wind energy, fuel cells, or microturbines; alternative materials such as biomaterials (to replace fossil-fuel-based fabrics such as nylon, polyester, and Lycra) or composite woods to replace large stock timber.

Such solutions can best be found when the industrial sector works in concert with other sectors of society (Dietz, Ostrom, and Stern, 2003). As a result, there is a great need for the study of business decision making as part of a social science research agenda. At the core of this agenda are some simple and straightforward questions: What is the relationship between environmental protection and corporate competitiveness? How does this relationship alter the basic elements of corporate management and objectives? How can we anticipate future ideas of the objectives, purposes, and practices of the corporate organization in light of emerging concerns for environmental protection? Scholars within business schools are now striving to understand the implications of these questions. And importantly, they bring a distinct set of capabilities, models, and theories toward answering them.

Business Challenges

As an empirical domain, corporate environmentalism comprises a blend of characteristics that make it distinct from other pressures with which the firm is familiar, necessitating a distinct research domain. It has many char-

acteristics similar to other social issues such as gender equity, affirmative action, or labor relations, although it is also distinct from these issues in several ways. On the other hand, it has technical and economic components that make it similar to other strategic issues such as consumer demand, material processing, or competitive strategy, but again it has differences that require special attention. For the corporate organization and the manager, it is the issue's ability to *merge the social and the technical* in its impact on corporate practice that makes environmentalism unique.

The Social Dimensions of Corporate Environmentalism

On its most fundamental level, environmentalism is a social movement much like gender equity, civil rights, and labor relations. It has constituent groups that lobby for social change on all levels of society. However, the makeup of this constituency is more troublesome for the corporation than that of other social movements. Membership in the environmental movement is indeterminate. In settling issues of labor relations, managers negotiate with workers and union officials. In settling issues of civil rights or gender equity, there are female, minority workers, and national organizations set up to represent them. However, with the environment there are few natural constituency or bearers (Buttel, 1992). A high-quality environment tends to be a public good, which when achieved cannot be denied to others, even to those who resist environmental reforms. For many environmental issues, those who act to protect the environment can expect to receive no personal material benefits (Buttel, 1992). So the firm is left to decide who is a legitimate representative for environmental concerns.

Often those representatives are organized environmental nonprofit groups. But the indeterminism of environmentalism also means that it attracts a wide range of supporters cutting across social, economic, and demographic lines. Those representing environmental interests to the firm or to society at large go beyond the nongovernmental organization community. Others, such as employee groups, labor unions, community groups, consumers, environmental activists, investors, insurers, the government, and industry competitors have become active environmental advocates. Even internal managers can become advocates for the environment (Morrison, 1991:18). Interacting with such a wide range of interests has necessitated new structures and internal conceptions of the firm's organization and purpose.

Furthermore, the social issue of environmentalism has a decidedly non-social component. More than just a constituency of social advocates, there is also the environment itself to contend with. The prominence and power of environmental change (and in the most extreme case, environmental catastrophes) act as another form of social pressure, placing demands on

our social, political, economic, and technical structures that are unique from any other demands the corporation faces. They focus attention without warning, imposing demands for action and change. While open to social interpretation and enactment (Hoffman and Ocasio, 2001), environmental events force corporations, government, and activists to devote resources and attention to the environmental issue.

The Technical Dimensions of Corporate Environmentalism

Where issues such as affirmative action and gender equity transcend industries and have little direct affect on production processes or product development, environmentalism has a distinct technical component, directly challenging how corporations handle material resources and produce goods and services. Over the past three decades, the technological demands for corporate environmental responsibility have shifted from removing only visible levels of contaminants from effluent streams to now removing concentrations in the parts per billion range and, at times, parts per trillion. Beyond process emissions, environmentalism also mandates changes in the content of product development. New laws mandating the public disclosure of emission levels and product contents as well as the potential health effects of those chemicals create daunting technological challenges for the firm (Hoffman and Ehrenfeld, 1998). The effects of these demands are not universal. Some industries, such as oil and chemicals, face greater challenges in both the measurement and the control of hazardous emissions. Even within industries, different companies face differential challenges in developing new products, processes, or raw materials in the face of environmental demands. The technical challenges of environmentalism add a new dimension to the strategic landscape, one that will often decide which firms will succeed and which will fail (Hannan and Freeman, 1977).

Often, firms are required to collect data, initiate change, and develop an understanding of their processes and products at levels that are not considered necessary for traditionally accepted strategic reasons. This is because strategy and technology are socially influenced by constituents outside the firm. Engineers can no longer focus simply on the end-based results of engineering calculations. They must now understand the social, political, economic, and cultural context of their task. Environmentalism signifies a redefinition of both technology and the corporation's role in developing it. New concepts such as waste minimization, pollution prevention, and product stewardship are finding their way into all aspects of operations, from process design to product development.

Beyond conceptions of technology, environmentalism challenges economic conceptions of the firm. Unlike other social issues that deal with equity and the fair distribution of opportunity and wealth, environmental-

ism increasingly affects basic business economics, effectively redefining the conceptions of production in industry. Issues such as gender equity or affirmative action will involve some gain or loss to specific individuals within the firm; however, the economic output of industrial activity should remain fundamentally unchanged (Hoffman and Ehrenfeld, 1998). Social issues bear more commonly on issues of sharing what we have, issues of social equity.

But environmentalism produces a different outcome. Environmentalism interferes with fundamental economic models of consumption and production, resulting in a net change in efficiency. For example, a recent debate has emerged over the economic impact of climate change controls. Some estimates predict a drain on the gross national product by as much as 3.5 percent if aggressive emission reduction targets are set. Others estimate that modest controls on greenhouse gas emissions would not damage the economy, that the world has significant opportunities to control emissions by making its energy systems and automobiles more efficient. This more efficient use of energy is estimated to increase the gross national product by 1 or 2 percent. Such a debate would not accompany new laws regarding racial or gender equity.

For the individual firm, the impact is no less direct. Environmental concerns can cause the elimination of entire product markets, such as those for chlorofluorocarbons, DDT, and dioxin. They can also cause the formation of new markets as they did for Freon substitutes, termed hydrochlorofluorocarbons, in the wake of the 1987 worldwide ban on chlorofluorocarbon production. Finally, environmental liability has risen to levels that have shaken the basic precepts of corporate risk management. Most notably, the \$5 billion in fines and penalties against the Exxon Corporation for the 1989 *Valdez* spill would have bankrupted many other "smaller" corporations. Regardless, the threat of such large fines has caused most firms to alter their oil transport strategies.

In essence, what has evolved is an alteration of the core objectives of the firm and the basic conceptions of production. Shareholder equity may remain the single most important criteria for corporate survival. Yet environmental responsibilities are infiltrating the taken-for-granted beliefs that have previously guided that pursuit. Today, most U.S. companies have a formal system in place for proactively identifying key environmental issues as part of their overall corporate strategy (Morrison, 1991). Environmental strategy incorporates a merger of these social considerations with the technical aspects of corporate operations.

CORPORATE ENVIRONMENTALISM AS A RESEARCH DOMAIN

The study of business and the natural environment lies at a unique

juncture of the physical and the social sciences, scientific disciplines that seek to understand the behavior of natural ecosystems either as separate entities or in their relation to social systems. The way we understand these systems as separate entities is through the physical sciences of chemistry, toxicology, biology, physics, entomology, and others. In fact, the study of the environment has been on the agenda of the modern physical sciences for long enough that boundary-spanning research specialties like ecology are now recognized areas of research and professional standing.

In contrast, attention to the natural environment within the social sciences is relatively preliminary both in research traditions and in professional infrastructure and has few established cross-disciplinary research fields (efforts in this regard are noted in the areas of urban planning, geography, and risk management). Subspecialties in many social science disciplines and associated professional fields such as law, economics, philosophy, theology, ethics, sociology, psychology, and political science do focus on environmentalism, each investigating the linkages between social and environmental systems in its own specialty idiom of characteristic research questions, designs and evidence, and implications. Each of these offers a different vantage point, allowing for a contribution to a complementary synthesis of ideas for explaining social and organizational behavior (Allison, 1971) as it relates to the natural environment. Below is a review of five disciplinary vantage points followed by a discussion in greater depth on how the environment is viewed from the field of business management. This review is not meant to be an exhaustive assessment of the breadth and depth of each discipline. Rather it is meant to highlight some of the influential and potentially productive areas of study as it relates to business activity. It is also an attempt to show the variety of research undertaken in these disciplines as background for the more specific research being conducted within the more focused management disciplines.

Perspectives from Economics

Scholars within the field of economics cover a variety of topics including the valuation of natural ecosystems and resources, analyses of social costs and benefits, the creation of market mechanisms to alter polluting activities, bounded rationality, the economics of innovation, agglomerated economies, and organizational behavior. Those addressing issues of corporate decision making tend to consider the nature of pollution and the environment with a long-standing set of policy approaches focusing on "market failures" (such as "externalities" and imperfect or asymmetric information about risks) and "public goods." In this domain, environmental damages that are imposed on downstream or downwind residents or the public at large are often omitted from market prices and thus treated as "free" to the

producers and consumers that cause them. Public goods—even essential environmental services for which no markets exist, such as clean air and other “common pool resources”—also are often destroyed because excessive or damaging uses cannot easily be excluded, and each user tends to undervalue them. And many natural assets such as petroleum and ancient forest stocks are priced only at their value in current markets, omitting their potentially greater value as sustainable capital assets. The harm caused by these outcomes is the “consequence of an absence of prices for certain scarce environmental resources (such as clean air and water)” (Cropper and Oates, 1992:675). Left unregulated, economists observe that private firms do not choose “socially efficient” levels of environmental protection (Tietenberg, 1992). They “externalize” these environmental costs and thus avoid paying the full social costs of the environmental damage they cause (Baumol and Blinder, 1985). To provide the needed signals for correcting the market and providing economic incentives for good environmental behavior, economists prescribe the introduction of surrogate prices such as unit taxes, effluent fees, or tradable credits (Hahn and Stavins, 1991).

Perspectives from Ethics

Scholars in the field of ethics focus on the nature and morality of human conduct. When addressing corporate activity as it relates to the environment, this field focuses on the role of the corporation within society and its responsibilities toward conserving, preserving, and utilizing natural resources. It mixes descriptions of what presently *is* with prescriptions of what *ought* to be. It is a normative discovery of human values derived from science, metaphysics, aesthetics, epistemology, philosophy, and judgments of intrinsic values (Hargrove, 1989). Where these fields have traditionally concerned themselves with an account of the goods of culture and of the right and wrong of interpersonal relations between man and man, environmental ethics takes traditional ethics one step forward, acknowledging that humans inhabit natural communities and expanding ethics to consider human responsibility for nature (Holmes, 1988). More specifically, it argues the thesis that human populations, nonhuman animals, and nonsentient nature are all morally considerable. They may not be counted by the same metric, but each counts in moral calculations because each has intrinsic value. Where traditional ethics places man at the center of the moral universe, environmental ethics expands the scope of that universe and man's place within it (Eliot and Gore, 1983). Of particular importance in this discussion is the place of the corporation—man's dominant instrument for utilizing natural resources—within the natural environment.

Perspectives from Law

When addressing concerns over corporate activity and the natural environment, scholars in the field of law focus on the equitable distribution of rights and liabilities. The legal system is devoted to avoiding or rectifying perceived wrongs that are the result of human or nonhuman action. It is the product of a society's collective and conflicting values, which are incorporated with scientific knowledge and are reflected in laws. The (American) legal system is built on the foundation of common-law decisions and principles, which is overlain with a later statutory system that attempts to correct the deficiencies of the earlier one. Decisions are the product of logical arguments based on legal precedent and supporting evidence. The focus of these decisions is on the property and personal rights of citizens. These rights include the rights to use the property we own in the manner that we chose; the right to enjoy our own property without unreasonable trouble from our neighbors; and finally, the right we have (or think we have) to a "decent environment" in which to live (Hoban and Brooks, 1996; Revesz, 1997). Over time, longstanding common-law precedents protecting individuals from upstream or upwind polluters were supplanted by judicial doctrines of "reasonable use" that favored industrial polluters; and as environmental damage subsequently increased, new environmental regulatory statutes provided limited substitutes for portions of these early precedents, but often in forms that prescribed costly and rigid (although easily enforceable) end-of-pipe technological controls rather than more efficient performance-based incentives.

Perspectives from Business History

Historical studies search for explanatory power in events, actions, and stories. Traditional business history studies focus on organizational, cultural, and strategic considerations within organizational decision-making processes, largely defined by the work of Chandler (John, 1997; Galambos, 1970). This work has provided evidence of variable concerns among managers and firms, publics and special constituencies, and governmental actors that dates from at least the mid-nineteenth century (Rosen, 1995, 1997). Standard emphasis among environmental historians has dealt with wilderness, the conservation movement, or the modern environmental movement. But more recently, these fields have begun to merge, identifying concerns at the intersection of business, markets, and environmental change (Cronon, 1991; Hays, 1998; McGurty, 1997; Andrews, 1999). "[F]rustrated with environmental history's longstanding focus on farms, forests, and wilderness and fortified by a dawning recognition of the much wider scope of the 'natural,' many environmental historians have begun to gravi-

tate away from the study of pristine environments toward those more thoroughly and unmistakably shaped by human hands" (Rosen and Sellers, 1999:582-583). This refocus on the environmental dimensions of industrial development is evident in recent studies, symposia, and review essays that chart new questions and new collaborations between business historians and environmental historians. This emerging tradition of research focuses on "physical processes by which the stuff of nature—'raw' materials—was carved or coaxed out of mountains, forests, and deserts, channeled into factories and squeezed and cajoled into commodities . . . varieties of 'waste' generated by business and customers; . . . to the effects of resource extraction and use" (Rosen and Sellers, 1999:577). This approach weaves business together with its material and symbolic environments in a seamless web, a basis to bring complex physical, cultural, managerial, technological, and economic connections between business and the environment into better focus and hence to explore business in relation to public policy.

Perspectives from Sociology

Organizational and sociological study of the interaction between the natural environment and social organization and behavior dates at least from the early 1970s, coinciding with the emergence of environmental activism and social movements in the United States, Europe, and elsewhere (Laclau and Mouffe, 1985). This is evident in activity in professional associations, intellectual organizing, and specialty journals. By the mid-1970s, the American Sociological Association, the Rural Sociological Association, and the Society for the Study of Social Problems had all established sections related to environmental sociology (Dunlap and Catton, 1979). To provide an outlet for this growing volume of research, special journal issues were devoted to environmental sociology: *Sociological Inquiry* (1983), *Annual Review of Sociology* (1979, 1987), *Journal of Social Issues* (1992), *Qualitative Sociology* (1993), *Social Problems* (1993), *Canadian Review of Sociology and Anthropology* (1994) (Hannigan, 1995). Schools increasingly posted position announcements in environmental sociology, and numerous research centers and institutes were established, including targeted funding for dissertations and some postdoctoral funding such as the National Science Foundation program initiatives in the early 1990s on global environmental change.

By the late 1980s, reviews of the field identified five areas of scholarship in environmental sociology (Buttel, 1987): (1) new ecological paradigm; (2) environmental attitudes, values, and behaviors; (3) the environ-

mental movement; (4) technological risk and risk assessment; and (5) the political economy of the environment and environmental politics. By the mid-1990s, a focusing of the research agenda included several streams of importance to business decision making. The new ecological paradigm (Catton and Dunlap, 1980)—the shift away from anthropocentric (human-centered) to ecocentric thinking (humans are one of many species inhabiting the earth)—has become an influential theoretical insight of environmental sociology, one that has been picked up by several management-oriented scholars such as Gladwin, Kennelly, and Krause (1995). Other researchers deal with concerns for the political and economic root causes of environmental disruption and the development of a systematic approach that shows how organizations, institutions, and individuals can push for environmental protection reforms (Schnaiberg and Gould, 1994) and competing conceptions of nature and analyses of how those conceptions have emerged (Cronon, 2003; Botkin, 2004). And still others attend to the rise of environmental consciousness and social movements (McAdam et al., 1996), addressing how change occurs within social systems and why. Central to this stream is a consideration of environmental risks as they relate to the macrosociology of social change (Beck, 1992). The field now appears to be centering on a social constructionist approach to addressing these key themes that focuses on the “social, political, and cultural processes” by which environmental issues, problems, and solutions are given attention and defined (Hannigan, 1995:30). This remaking of the focus of the subfield raises a perennial tension between the intellectual goal to foster research in the subfield and the professional project of defining a distinct stand-alone empirical field for research. At the root of this tension is the added value of creating distinct specialty fields versus remaining engaged with wider disciplinary approaches.

In sum, each of these disciplinary perspectives describes quite distinct characteristic concerns. In each, the study of environmentalism is described in the standard terms of the discipline. In each, there are scholars working at the edge of the discipline in order to take advantage of the distinct features of environmentalism as a theoretical and empirical pivot for further research. Each intellectual tradition approaches the issue from a different angle, using different terminology, asking different questions, and yielding different answers. Each also has a set of voices making links between the disciplinary standards, research, and policy and practice issues. The concerns and research infrastructure of environmentalism in organizations, strategy, and management look different.

CORPORATE ENVIRONMENTALISM AS A MANAGEMENT DISCIPLINE

Initiatives to Build a Research Community

Scholars in management schools have more recently entered this research domain as well. An international interest group of scholars, the Greening of Industry Network, was formed in 1989. This group produced one of the first collections of research in environmental management. Greening of Industry Network participants argued that "most regulation has not been based on a solid understanding of how industrial firms operated" and that future advances in environmental policy required an appreciation for the "intradynamic and interdynamic processes" of organizational learning that incorporate an awareness for how "various groups both inside and outside the firm conjointly shape its behavior and strategy" (Fischer and Schott, 1993:372).

This first initiative to build a research community among management scholars was followed by the formation of the Management Institute for Environment and Business in 1990 (now a division of the World Resources Institute) and establishment of the Organizations and the Natural Environment special interest group of the Academy of Management in 1994. To support this burgeoning research area, special issues on the natural environment and organizations have appeared in the *Academy of Management Review* (1995), *American Behavioral Scientist* (1999), and *Academy of Management Journal* (2000). Furthermore, academic journals dedicated to the interface between managerial action and environmental protection also emerged, including *Society and Natural Resources*, *Business Strategy and the Environment*, *Social Science Quarterly*, and *Organization & Environment*.

The corpus of research parallels developments in environmental sociology. For example, one common theme has been the shift from an anthropocentric to ecocentric perspective similar to the new ecological paradigm (Colby, 1991; Gladwin et al., 1995; Purser, Park, and Montuori, 1995). But a distinction in this research domain is its primary focus on the behavior of the firm, management research, and management education as a self-evident and unquestioned need. Furthermore, although addressing the fundamental question of why firms respond to ecological issues (Hart, 1995; Lawrence and Morell, 1995; Lober, 1996), much of this research has been normative in focus, focusing on understanding and predicting why and how corporations "can take steps forward toward [being] environmentally more sustainable" (Starik and Marcus, 2000:542). Some researchers have focused on the implications of the shift to an ecocentric perspective for organizations (and corporations in particular) (Starik and Rands, 1995;

Shrivastava, 1995). Others have considered how to merge existing concerns for economic competitiveness with environmental demands to gain market advantage (Schmidheiny, 1992; Smart, 1992; Porter and van der Linde, 1995; Stead and Stead, 1995; Roome, 1998; Sexton, Marcus, Easter, and Burkhardt, 1999). But an underlying tension in this domain parallels that within environmental sociology—the question of whether the goal of this group of researchers is to create a distinct specialty field of management inquiry. Some have argued that academic research in the “organizations and natural environment area” is based on a vision of practice and policy based on new values, attitudes, and behaviors (Starik and Marcus, 2000). Others consider this area to be an empirical domain into which existing theory can be applied. These are fruitful tensions about intellectual and professional strategies. Regardless of this debate, the field is in development and embarking on streams of research in multiple directions.

Emerging Directions in Environmental Management Research

Research within the management sciences on environmental issues falls generally into seven basic areas within the business school community, each with its set of concerns and research tracks.

Strategy

Some of the early research on environmental strategy attempted to show the link between positive environmental performance and positive competitive performance. Questions over whether it “pays to be green” emerged in a cadre of papers (King and Lenox, 2001). Yet a more recent examination has begun to ask, not if, but how and when firms can create competitive advantage through environmental protection (Howard-Grenville and Hoffman, 2003). This is an area of great empirical and theoretical importance and has tremendous linkages to work in the field of entrepreneurship. Toward this end, some research is being performed on the relationship among uncertainty, general environmental factors, resources, and proactive environmental strategies (Aragón-Correa and Sharma, 2003). Significant research demonstrates the relationship between resources and environmental strategies (Shrivastava, 1995; Hart, 1995, 1998). However, little is known about what impacts that relationship. How do organizational and managerial variables as well as stakeholder relationships impact that relationship? Similarly, little research exists on the measurement of critical resources as they impact environmental strategies. The resource-based view of strategy (Hart, 1995; Barney, 1991; Wernerfelt, 1989) is arguably one of the newest and fastest growing areas of strategic inquiry. The resource-based view argues that only resources that are rare,

valuable, inimitable, and nonsubstitutable will lead to a sustained competitive advantage. Yet, no adequate operationalization of these resources exists in the context of the environment (or in the minds of some, in all of strategy research).

Another research stream examines what factors—public policy, market and institutional forces, and others—would favor or retard environmentally beneficial innovation, in products as well as production processes, both within and across firms. Toward this end, significant research attention needs to be focused on interfirm collaboration and partnerships toward environmental protection. Oftentimes, the environmental impacts of corporate behavior come from networks of firms operating within a continuous value chain that brings raw materials to final consumption (and sometimes back again). The knowledge and technical expertise in this network does not lie within one single organization but within a constellation of actors that must work together to find solutions (Roome, 1998).

In coordinating this network activity, some have begun to study why firms adopt voluntary standards for environmental performance (Delmas and Terlaak, 2001; Andrews et al., 2001; Delmas, 2002). Others focus on the role of organizational clusters or fields (Jennings and Zandbergen, 1995; King and Lenox, 2000; Bansal and Roth, 2000), interorganizational relationships (Starik and Rands, 1995; Clarke and Roome, 1999), interorganizational alliances (London and Rondinelli, 2003; Rondinelli and London, 2003), and stakeholder relations (Berman, Wicks, Kotha, and Jones, 1999; Clarkson, 1995) as determinants of systemic corporate environmental behavior. Still others prefer to look more carefully at questions about how and why these networks form and what are the coordination mechanisms within them. And finally, these arenas of study can all be addressed at the international level as globalization continues to develop and broaden the impact and possible opportunity for business.

Operations Management

On the level of the individual firm, there is a great need for further research into dematerialization of production processes (Roome, 1998). This can involve optimization of the supply chain logistics for producing goods, developing more efficient manufacturing processes (or related objectives of factor four improvements—Weizacker, Lovins, and Lovins 1998), and utilizing green materials and processes. Or it can involve the shift from products to services in the marketplace (Lovins, Lovins, and Hawken, 1999) such as leased carpets (Interface) or car sharing (Mobility or Zip Car). Continuing this line of inquiry into networks of firms, a great deal of research has been conducted within the domain of industrial ecology since its earliest writings in the late 1980s (Frosch and Gallopoulos, 1989). Using

natural ecosystems as its model (Friedman, 2000), industrial ecology highlights transformational change in local, regional, and global material and energy flows, the components of which are products, processes, industrial sectors, and economies. It promotes efficient resource use by reducing environmental burdens throughout the total material cycle. This cycle exists in a continuous feedback loop with materials and energy flowing between natural and industrial systems in three stages: extraction of natural materials, converted into raw materials and mechanical energy; these then worked into usable and saleable products; and finally, these products are distributed, consumed or used, and disposed by consumers. Developed largely by engineers, the central unit of analysis in industrial ecology is that of industrial organizations within broad-scale systems of facilities, regions, industries, and economies and seeks to reduce the environmental burden of that system through broad-scale system-wide changes (U.S. Environmental Protection Agency, 2000). A great deal of research is necessary to understand the linkages among the technical “ecology” of the industrial enterprise and also to incorporate concerns for the “social ecology” into industrial ecology research (Hoffman, 2003).

Organizational Behavior

We now live in an age when environmental concerns originate from a system of pressures much broader than government, activist forces, or supply chains. Increasingly, environmental concerns are becoming infused into the relationships among firms and trade associations, insurance companies, shareholders, investment funds, financial institutions, environmental non-governmental organizations, the local community, individual citizens, the press, consultants, and employees. Through so complex a systemic web of constituents, environmentalism becomes transformed from something external to the market environment to something that is central to the core objectives of the firm. The definition of what constitutes a “green” company continues to expand as the external pressures for corporate environmental action become more diverse and demanding. More research is necessary for understanding the full dynamics by which this change is taking place; understanding when such change is genuine or a form of greenwashing; analyzing when there are ebbs and flows in this definition with respect to fads and fashions; and covering a range of levels of analysis, including intrafirm dynamics, sectoral dynamics, supply chain dynamics, service platformed on technology dynamics, and global economic systems. For example, research into the ways in which trade associations affect industry-wide change (Nash, 2002) is one avenue. Another is analysis of the ways that overall institutional environments are changing and how this impacts what is expected of firms today and tomorrow on environmental

issues (Hoffman, 2001). A related line of inquiry asks how individual firms can influence this change process, in effect playing the role of institutional or social entrepreneur (Lawrence, 1999; Fligstein, 1997).

As corporations respond to this increasing institutional change, they must trigger a more complex set of organizational and strategic responses than merely the management of these external pressures. Scholars approach this issue by analyzing both individual- and organization-level variables. Individual-level variables include concerns like reward systems, selection and socialization, management leadership styles (Egri and Herman, 2000), and individual interpretation and intention (Ramus and Stegner, 2000; Flannery and May, 2000). Organizational variables include concerns such as identity and environmental interpretation (Sharma, 2000), strategic benefits from reputational management (Fombrun and Shanley, 1990), organizational culture (Hunt and Auster, 1990; Roy, 1991), and corporate governance (Kassinis and Vafaes, 2002). Yet much work still needs to be done on understanding how this is done and with what implications for the firm, firm competitiveness, and the motivation of the individual employee. Finally, a great deal of work is necessary for understanding how international culture and corporate greening intersect. As firms become more global in their operations, how do they transfer environmental standards from one national context to another and how do they translate environmental imperatives from one regime to another? U.S. concerns, for example, over endangered species will not resonate with communities in developing countries where their primary concerns may be clean water or proper sewage.

Marketing

When considering the value chain, attention should be paid to the role of the end consumer in driving environmental considerations within the firm. If consumers begin to demand environmental attributes in products, firms will respond to environmental issues as a market opportunity. But pinning down the exact status of environmental consumerism is a difficult challenge. The power of this purchasing block is a much-debated issue. Beyond general attention to the issue, public opinion polls also show that people care about the environment and claim that they will allow that concern to affect their buying decisions (Krupp, 1990; *Times Mirror*, 1995). However, opinion polls and actual buying practices are not tightly linked. It is widely believed that, although they claim otherwise, consumers will not pay a price premium for environmental attributes (Mohr, Eroglu, and Ellen, 1998). Research is necessary to understand the linkages between opinion and behavior.

Research is also necessary for understanding the demographics of green consuming, what drives those consumer-buying decisions, and how to in-

fluence or appeal to that decision-making process. Conventional marketing wisdom suggests that the best marketers can expect is that when goods provide comparable value (and are comparably priced), environmental attributes can break the tie. But others are working on designing effective strategies for attracting the consumer to products with green attributes (among others) (Ottman, 1998). For instance, how do people perceive green claims or pressures for behavioral change such as recycling? In product development, how are green issues integrated, "silently" or overtly, into design and development as well as all aspects of marketing planning, especially marketing strategies? And when individual efforts at marketing "green" fail, how can collective efforts be more effective? Marketers are investing in green certification schemes such as the Green Seal, Sustainable Forestry Initiative, or others. More research is necessary for understanding the influence of such schemes on individual buying decisions and the overall value chain. And then the international aspects of green consuming warrant more attention. How do attitudes and willingness to pay on environmental issues differ among consumers in different countries, and what influence does this have for possibilities to integrate environmental aspects into marketing and customer relationships? And all of this leads toward questions regarding greenwashing. Further study is necessary in the understanding of symbolic adoption of green practices or facades in order to gain further market acceptance.

Some suggest that traditional segmentation variables (sociodemographics) and personality indicators are of limited use for characterizing the green consumer (Schlegelmilch, Bohlen, and Diamantopoulos, 1996). This leads some to look beyond demographics to understand how green purchases may be more driven by context and perceived trade-offs (Peattie, 1999). For example, do I drive further to buy the environmentally better products? Do I buy the local organic product, or the fairly traded imports from a poor country? How concerned consumers juggle the different issues in the sustainability agenda and manage the trade-offs between them is an interesting research frontier. Finally, the broadened area of social- (Andreason, 1995) or cause-related marketing (Bloom and Gundlach, 2001) is a vibrant and interesting line of inquiry that deserves further analysis.

Beyond consumers, there is also the area of business-to-business marketing or organizational marketing (as in for government and other public sector purchasing) that gets less attention, but is often where more change is going on in terms of purchase criteria (for example, through the passing of the International Organization for Standardization's ISO 14000 requirements back down a supply chain). So the influence of environmental criteria in industrial and organizational marketing is a key area for research.

Finally, there is research emerging that looks beyond these elements of

the green marketing agenda and looks toward more sustainable societies, economies, and companies that will require more significant changes to production and consumption within mass markets rather than market niches. This research agenda seeks to understand how to achieve this end. This research stream considers issues such as problems of marketing to consumers when levels of basic environmental literacy are low; product takeback and the need to engage consumers in the return of old cars and electronics into the supply chain; development of new market structures based around alternatives to purchase and product and service substitutions; design-for-environment products and the use of dematerialization and low-energy products to reduce environmental impacts at no additional cost to the consumer; and the role of marketers as an inhibitor or promoter of environmentally improved products in each of these cases. One critical element is the question of how to communicate means of production issues to consumers effectively.

Accounting

The traditional approach to teaching accounting has been to provide students with a rule-oriented taxonomy where problems fit neatly into specific topical cells. This approach is inadequate for the increasingly complex accounting problems posed by environmental issues (Sefcik, Soderstrom, and Stinson, 1997). Environmental issues challenge accountants to apply existing accounting systems to new settings and to critically analyze existing and proposed accounting systems. Research in this area encompasses economic analysis of incorporation of environmental "externalities" in accounting systems: emerging international standards concerning corporate environmental performance; overhead allocation as strong environmental strategy; reporting rules for environmental liabilities and expenditures; approaches to environmental measurement, cost accounting, and environmental audits; and the impact of information from these systems on decision making (Gentile, 2002). An example is research into full-cost accounting and life-cycle analysis. In essence, how does one incorporate the full environmental costs of a product or process into existing accounting measures and models? Then attention can be applied toward understanding how to link such environmental performance measures to the reward systems within the company in order to motivate environmental behavior.

A different and related line of analysis deals with environmental disclosure. This research has focused particularly on environmental (and now sustainability) annual reports and on the determinants and reasons for more versus less disclosure. The publication of this information is still increasing and taking place increasingly in separate reports, oriented not

only at shareholders but also at a range of stakeholders. This raises new questions about the objectives, quality and determinants (country, sector, size, degree of internationalization, multinationality, etc.), and specific drivers (legitimacy, stakeholder management, events) of these reports. Also, it raises challenging questions about the possible liabilities related to disclosing too much or too little information and the extent of accountability and transparency. And finally, new questions about the value and reliability of disclosure in light of recent scandals, (i.e., accusations of “managerial capture”) are gaining greater attention (Kolk, 2003; Kolk and van Tulder, 2004).

Finance

Shareholders and investors are powerful forces for change within the corporation. In the cause of the environment, they have been wielding that power since the late 1980s both through shareholder voting and directing capital investment. Beginning in 1989, shareholders began to file environmental proxy resolutions in annual board meetings. However, no one has yet been able to demonstrate conclusively that corporate social responsibility boosts shareholder value, and the evidence is at times conflicting (Margolis and Walsh, 2001). Thus, within the finance community, there is research under way to understand the connections between financial and environmental performance as well as the power and influence of the environmental investor. This power can be a single purchasing block, as through green investment funds, or through the market in general as it reacts to environmental events and issues. “Regular” investors have increasingly raised concerns over the financial risk of environmental issues such as climate change at shareholder meetings, exerting pressure on companies to take measures. In 2002 a shareholder resolution sought to reduce the duties of Lee Raymond, chairman and CEO of Exxon-Mobil, because of his position that climate change was not a problem for the company. The resolution got a surprising 20 percent supporting vote. And this is not the only such resolution. In the 2003 proxy season, there were as many as 19 resolutions filed regarding climate change issues, two-thirds of which received more than 20 percent supporting votes, including GE (22.6 percent), American Standard (29 percent), Eastman Chemical Co. (29 percent) and American Electric Power (27 percent), (Interfaith Center on Corporate Responsibility, 2003). Further study is necessary to understand the trajectory and influence of this activity on corporate actions vis-à-vis the environment. This study should address the assessment of environmental liabilities, the development of risk-return profiles, and then the extent to which a company should disclose such results to the investor community and the public at large. In addition, there has been growth of new market-based solutions

to reducing environmental impacts—for example, the U.S. sulfur dioxide emissions permit market (Tietenberg, 2002). A similar market is developing in the European Union. The dynamics and success of these markets provide new areas of interest for finance researchers.

• *Government Policy*

While legal standards have achieved impressive gains in environmental protection and wildlife conservation since the 1960s (Easterbrook, 1995), some argue that the methods they employ are out of date with contemporary environmental problems and that such standards are becoming increasingly inefficient in achieving emerging environmental goals. Existing standards and enforcement programs are perceived to be too rigid and restrictive to foster the type of private innovation (rather than mere compliance) that is required to identify and implement solutions that are both environmentally and economically sustainable (Schmitt, 1994). Believing that we are rapidly approaching the point of diminishing returns on command-and-control environmental regulation, many see the existing policy regime as possibly the greatest obstacle to continued environmental improvement. Some look to the roles of subsidies (often perverse) in inefficiently protecting existing industries against environmentally and economically preferable innovations and the roles of a wide range of other policies in encouraging or retarding competitive evolution of businesses toward more environmentally sustainable performance levels (not to mention the improvement of environmental performance of public sector business units themselves). These phenomena become topically acute as industries are restructured through changes such as deregulation (i.e., the utility industry).

On another level, new governance models are under investigation that will help mobilize private investment and innovation in environmental initiatives. Some are looking at the more recent phenomena of self-regulation (such as the Global Reporting Initiative or the Forest Stewardship Council) (Prakash, 2002). While maintaining a solid foundation of government regulation upon which to build new forms of innovative policies, others are looking to alternative regulatory programs that employ a negotiated form of compliance tailored to the needs and potentialities of individual organizations and environmental contexts. This new approach is “characterized by a new kind of legal self-restraint . . . [which] restricts itself to the installation, correction, and redefinition of democratic self-regulatory mechanisms” (Teubner, 1983:239). Cooperative environmental policy fundamentally reconfigures the role and objectives of both oversight agencies and the regulated community. Instead of mandating environmental policy, regulators seek out the input and participation of other parties with site-specific

knowledge about the nature of environmental problems they encounter. Through the strategic steering of networks (DeBruijn and Heuvelhof, 2000), potentially innovative solutions are developed to resolve environmental problems. These may include regulated private sector organizations, non-profit organizations, scientific communities, local and state governments, community organizations, and others. Through negotiation among these interested parties, corporations gain the flexibility to define which emission sources to control through site-specific compliance strategies that achieve broadly defined objectives (Schmitt, 1994). Cooperative environmental policy strives to reward proactive companies for seeking competitive advantage through environmental innovation beyond regulatory standards (Fiorino, 1999). In that direction, the U.S. government has introduced a host of voluntary programs that are designed to foster collaboration between government agencies and regulated entities on the development of innovative, beyond-compliance environmental management solutions. The objective of such programs is compelling: to uncover ways for regulated entities to save money and achieve higher environmental protection standards than are guaranteed by existing regulations. Unfortunately, adoption of these programs has been slow. More research is necessary for understanding this new form of regulatory activity.

CONCLUSION

In today's business environment, annual costs for pollution control in the United States have risen nearly 600 percent since 1972, reaching levels equal to roughly 2 percent of the gross domestic product. As a result, companies are working on ways to devote resources toward environmental initiatives in a way that satisfies their economic objectives. They need a way to translate environmental issues into a form that they can understand and manage. Environmental protection, as an issue of corporate concern, has become much more complex and requires a more sophisticated view to be managed effectively. To treat environmental and business issues as separate and distinct leaves the business manager at a strategic disadvantage, unable to efficiently recognize the reality of a changing society—one that will demand ever greater corporate responsibility for protecting the environment. And this is an area where academic research can offer a contribution. But even more so, research into managerial decision making and the environment has implications for activists who now recognize that, to improve environmental conditions in today's world, they need to understand how to change the behavior of business; it also has implications for policy makers who need to understand how to incorporate business thinking into policy development so as to foster the most effective and efficient response from business.

And, in closing, it must be noted that research into corporate environmental behavior is now transitioning into new areas regarding sustainable development. The shift represents an expansion and augmentation rather than a change in focus within the research agenda. But although the concept of sustainable development has clearly entered the lexicon of corporate dialogue, the integration into business practice and research has far to go. Much research is needed in understanding how this concept will emerge, what it means, and where it is going. The existing and emerging research agenda on environmental issues has much to offer in shedding light on the triple bottom line of sustainable development: economic prosperity, environmental quality, and social equity (Elkington, 1998).

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