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# THE ROLE OF CORPORATIONS IN ACHIEVING ECOLOGICAL SUSTAINABILITY

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**Ecological problems rooted in organizational activities have increased significantly, yet the role corporations play in achieving ecological sustainability is poorly understood. This article examines the implications of ecologically sustainable development for corporations. It articulates corporate ecological sustainability through the concepts of (a) total quality environmental management, (b) ecologically sustainable competitive strategies, (c) technology transfer through technology-for nature-swaps, and (d) reducing the impact of populations on ecosystems. It examines the implications that these concepts have for organizational research.**

Industrial development of the past 200 years has brought immeasurable wealth and prosperity. However, it has also caused unintended ecological degradation. As a result, the earth faces many environmental problems, including global warming, ozone depletion, deforestation and desertification, declining biodiversity, acid rain, industrial accidents, and toxic wastes (Brown & the staff of the Worldwatch Institute, 1991, 1992, 1993; Pryde, 1991; Smil, 1994). The objective of this article is to provide a framework for organizational research and practices in dealing with environmental problems. It articulates ways in which corporations can contribute to ecologically sustainable development.

The ecological sustainability of current industrial and organizational practices becomes more questionable as one considers the next 40 years. By the year 2030, world population will double from 5.5 billion to 11 billion (Ehrlich & Ehrlich, 1991). To provide basic amenities to all people, it is estimated that the production of goods and energy will need to increase 5 to 35 times today's levels. With current technologies, social organization, and production practices, this level of production will generate commensurate increase in environmental degradation (Commoner, 1990; Frosch & Gallopoulos, 1989; Meadows, Meadows, Randers, & Behrens, 1972).

Some analysts think that these dire assessments of ecological problems are exaggerations. They point to the high degree of scientific uncertainty about the pervasiveness, severity, and human consequences of

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environmental problems. Some argue that new technologies and laissez faire capitalism can prevent massive ecological disruptions and permit reasonable rates of growth (Anderson & Leal, 1991; Beckerman, 1974; Bernstam, 1991; Taylor, 1994). Still, these sanguine assessments do not contest the desirability of creating a worldwide ecological-economic equilibrium. They accept the need for caution in expanding worldwide production and consumption (Cole, Freeman, Jahoda, & Pavitt, 1973; Lecomber, 1975).

In 1987, the Brundtland Commission Report popularized "ecologically sustainable development" (ESD) as a means for simultaneously dealing with economic and ecological problems (World Commission on Environment and Development, 1987). The July 1992 Earth Summit in Rio de Janeiro further cemented international commitment to ecologically sustainable development through treaties for dealing with ozone depletion, global warming, and declining biodiversity (Stern, Young, & Druckman, 1992).

Government policies and programs have selectively mitigated many environmental problems. However, because much economic activity occurs within corporations, these government efforts need to be supplemented with new voluntary efforts by corporations in order to address the industrially induced ecological problems (Commoner, 1990; Landy, Roberts, & Thomas, 1990; Lee, 1993).

Researchers need to better understand the role that corporations can play in dealing with ecological problems. Corporations too stand to benefit by moving toward ecological sustainability. They could benefit by reducing costs through ecological efficiencies, capturing emerging "green" markets, gaining first-mover advantage in their industries, ensuring long-term profitability, establishing better community relations, and improving their image.

In this paper I focus on corporations and the role they play in ESD, as the unit of analysis for the following three reasons. First, corporations are the primary engines of economic development. Second, they have financial resources, technological knowledge, and institutional capacity to implement ecological solutions (Schmidheiny, 1992; Welford & Gouldson, 1993). Third, the examination of ecological sustainability at this organizational level of analysis is both appropriate for this audience and weak in the management literature (Stead & Stead, 1992).

However, I acknowledge that corporations are only one of the many wheels of sustainability. Consumers and governments form the other wheels (Gallup International Institute, 1992). Consumers must be willing to consume fewer products and use these more wisely, while governments must establish ecologically sustainable economic policies (Zimmerman, 1990). Although analysis of the contributions and roles of governments and consumers is also necessary, it is outside the limited scope of this article.

One boundary condition that circumscribes this discussion of ecological sustainability involves a 40-year time horizon—the period during

which the global population will double. Thus, the global economy will need to make a transition to an ecologically sustainable state. The second boundary condition is the assumption that there is a heightened ecological awareness in society—an awareness that rejects "throw-away consumerism," unrestrained technological expansion, and inequitable distribution of natural resources (Daly & Cobb, 1989; Throop, Starik, & Rands, 1993).

I begin by discussing ESD—an approach to economic development that reconceptualizes society-nature relations and identifies corporate implications. In the next section I suggest four ways that corporations can contribute to ecological sustainability through (a) *total quality environmental management (TQEM),* (b) *ecologically sustainable competitive strategies,* (c) *technology-for-nature swaps, and* (d) *the reduction of the impact that populations have on ecosystems.* In the concluding section, incentives for corporations to become ecologically sustainable and implications for management research are discussed.

## ECOLOGICALLY SUSTAINABLE DEVELOPMENT

ESD refers to people behind economic development who are conscious of limits of the natural environment to support growth. It is "development that allows the present generation to meet our current needs, without compromising the ability of future generations to meet their needs." It acknowledges that mass poverty is endemic worldwide and must be eliminated. ESD aims "to meet the basic needs of all and extending to all the opportunity to fulfill their aspirations for a better life." It seeks to moderate the use of natural resources and renew the earth's depleting finite natural resources (World Commission on Environment and Development, 1987: 8).

Global ESD requires that those who are more affluent adopt lifestyles that are within the planet's ecological means. At the same time, it requires limiting total world population, and it involves managing the earth as it is transformed by human actions (Turner et al., 1991). It seeks an alternative form of ecologically sustainable economic growth, using energy conservation, resource regeneration, environmental preservation, and minimization of wastes (Costanza, 1992).

ESD is a comprehensive strategy for global development. The Brundtland Report conceptualizes it in terms of four interrelated strategies: (a) managing the impacts of populations on ecosystems, (b) ensuring worldwide food security, (c) managing ecosystem resources, and (d) creating sustainable economies. In this case, sustainable economies imply sustainable energy use, sustainable industrialization, and sustainable urbanization (World Commission on Environment and Development, 1987).

### Managing the Impacts of Populations on Ecosystems

The total world population and the rate of population growth in many countries are simply too high. Many developing countries cannot support

their populations with existing ecological resources available to them (Sadik, 1990). Mass poverty and shortage of food, water, shelter, and hygienic living conditions are endemic in poor developing countries. Sustainable development in these countries requires control over the population explosion (Brown, Flavin, & Kanes, 1992).

In industrialized countries, the impact of populations on ecosystems depends not only on the size of populations but also (and more important) on how these populations consume natural resources. As Ehrlich and Ehrlich (1991) showed, ecological impacts are a function of (population × affluence × technology). People in rich industrial countries consume 30 to 80 times the energy and resources per capita as do people in developing countries. This high rate of consumption is the bigger burden on the earth's resources, and it must be controlled (World Bank, 1986b).

For corporations this burden implies that they cannot continue to actively foster the creation of consumer societies. They cannot continue to encourage expanding consumption and consumerism through aggressive promotion and advertising campaigns (Hirschman & Holbrook, 1992). Corporations must learn to live with ecologically responsible consumption and urge people to use appropriate products and appropriate production, distribution, and promotion strategies (Rehak, 1992). In developing countries corporations must help regarding the control of populations—a task left largely to governments in the past.

**Ensuring Worldwide Food Security**

Due to increasing population and maldistribution of food resources, a very large number of people live without adequate food each year (Food and Agriculture Organization, 1984). Industrialized countries subsidize food production (agriculture) and protect it from foreign competition. They have high agricultural productivity because they use chemical fertilizers, pesticides, and hybrid seeds. However, the heavy use of agricultural chemicals also weakens the soil and causes water pollution (Garcia-Barrios & Garcia-Barrios, 1990).

The shortage of food in developing countries is a complex problem that is affected by agricultural, climatic, economic, political, and cultural factors (Food & Agriculture Organization, 1984). There is a vast literature on this topic that identifies lack of land reforms, erratic weather conditions, inefficient means of production, lack of agricultural finance, and outmoded agricultural practices as contributing to insufficient food production (Horowitz & Nyerges, 1988). Additionally, a significant quantity of food that is produced is lost to pests and through inefficient distribution (Brown et al., 1992; World Bank, 1986a).

ESD requires that people deal with the existing imbalance in food distribution. Developing countries must provide economic incentives, technical assistance, land reforms, and protection to small farmers and pastoralist rural families in developing countries to make them economically viable. Industrialized countries also must transfer surplus food

stocks, at least during a short-term transition period to prevent mass hunger (Food and Agriculture Organization, 1984; World Commission on Environment and Development, 1987).

Agribusinesses can play a vital role in reducing the insecurity of food production. By adopting environmentally benign technologies and sustainable agricultural practices, they can reduce environmental degradation (Edwards, Lal, Madden, Miller, & House, 1990). Corporations control many parts of the food-distribution chain and can directly affect food prices and inventories (George, 1979). By adopting humane food-marketing policies and sustainable pricing strategies, these "giants" can help reduce global food insecurity.

**Managing Ecosystem Resources**

The third strategy of ESD involves managing ecosystem resources to maintain their long-term viability. These resources are under tremendous stress, and land erosion, weather changes, deforestation, desertification, and land and water pollution have caused tremendous degradation of many ecosystems. Species are becoming extinct at the unprecedented rate of 10,000 per year, contributing to declining biodiversity (Ehrlich & Wilson, 1991; Mann, 1991; Wilson, 1989).

ESD implies protecting the diversity and richness of natural resources. It implies conserving nonrenewable natural resources (e.g., fossil fuels) and maintaining the integrity of sensitive ecosystems such as rain forests, deserts, and marine life. Economic-development activities that consume natural resources must be paced at such a rate that allows these ecosystems to naturally regenerate themselves. The people behind these activities must make provisions for the renewal of the resources they consume. Preserving ecosystems also requires special protection of species that are at the verge of extinction (Frankel & Soule, 1983).

Corporations are the intermediaries that convert natural resources into usable products. They are well situated to implement ecosystem resource-preservation strategies. The energy industry and natural-resource-based industries can play a very constructive role in preserving ecosystems through conservation and resource-renewal strategies (President's Council on Environmental Quality, 1992; Starik & Carroll, 1991; Stead & Stead, 1992).

**Creating Sustainable Economies**

The fourth strategy of ESD is creating ecologically sustainable economies. This involves development of regulations and public policies for ecology-sensitive industrialization and urbanization. Daly and Cobb (1989) argued that to create sustainable economies, managers need better measures of economic welfare that systematically incorporate ecological costs. Without such measures, increasing economic production also inadvertently increases pollution and ecological degradation.

A key ingredient of sustainable economies is reducing both the

worldwide rate of energy consumption and the dependence on fossil fuels (World Bank, 1989). By some estimates, if the current rate of oil consumption continues there will be less than 40 years of known oil reserves left (British Petroleum, 1986; International Institute of Applied Systems Analysis, 1981).

Sustainable industrial production means minimizing the negative impact that production systems have on the environment by using cleaner production technologies. It means reducing pollution and minimizing toxic and solid wastes. These changes require increasing production efficiency, reducing technological hazards, and recycling and reusing materials (Frosch & Gallopoulos, 1989; Shrivastava, 1995a).

### A Critique of Sustainable Development

The idea of ESD is not without its shortcomings. It has been criticized for being Western-centric, because it is based on Western definitions of development and progress. It seeks management of global ecological resources and systems, even though researchers and managers do not understand completely how they function (Redclift, 1989). It superficially deals with indigenous peoples' rights to decide their own resource usage. By tying the needs of developing nations to ecological problems created mainly by industrialized nations, it limits their development options. It increases the dependency of developing countries on industrialized countries (De La Court, 1990). Finally, ESD may be internally contradictory because it seeks to conserve nature, without meaningfully curtailing consumption or eschewing technological and economic expansion (Lele, 1991; O'Connor, 1991).

Despite these limitations, proponents of ESD are more mindful of energy use, ecological preservation, and waste minimization than are users of conventional growth strategies. It may not be the ultimate answer to all ecological problems, but it is a move in the right direction. Corporations, because they are a key instrument of economic production, are operationally important for achieving ESD. Next, I turn to examining what it means to create ecologically *sustainable corporations*.

## ECOLOGICALLY SUSTAINABLE CORPORATIONS

If goals of sustainability are to be achieved, corporations must be reformed, redesigned, and restructured to minimize their negative ecological impacts (Gladwin, 1992). Organizational and management theorists have paid little attention to how this can be done.

Moreover, there are many barriers to creating sustainable corporations. First, existing economic systems make many polluting and wasteful goods seem alluringly inexpensive because they do not incorporate the full ecological costs of their production or use. These costs are passed on to future generations, transferred to nonusers of products as taxes, or exported to less environmentally regulated countries. Second, consumers

in the industrialized world have become accustomed to unsustainable levels and types of consumption. It is not in the interest of corporations to change these consumption patterns, and they do not have the capabilities to do so. Third, vested interests, financial realities, and organizational inertia prevent radical restructuring of corporations toward sustainability. Normally, corporations change incrementally, often reacting to external cues, although in recent years the reengineering movement is eliciting radical changes that may provide an opportunity for them to move toward ESD.

In order to understand the corporate implications of ecological sustainability, it is useful to view companies as groups of individuals trying to achieve their *visions*, through *systems of inputs, throughputs, and outputs*. It should be acknowledged that visions of organizational members vary, but there is some level of agreement that allows them to work collectively as an organization. All these key elements of corporations have direct consequences for the natural environment. Corporate visions define the relationship of the company to its natural and human environments. The input system uses natural resources and energy, depleting them progressively, particularly the nonrenewable ones.

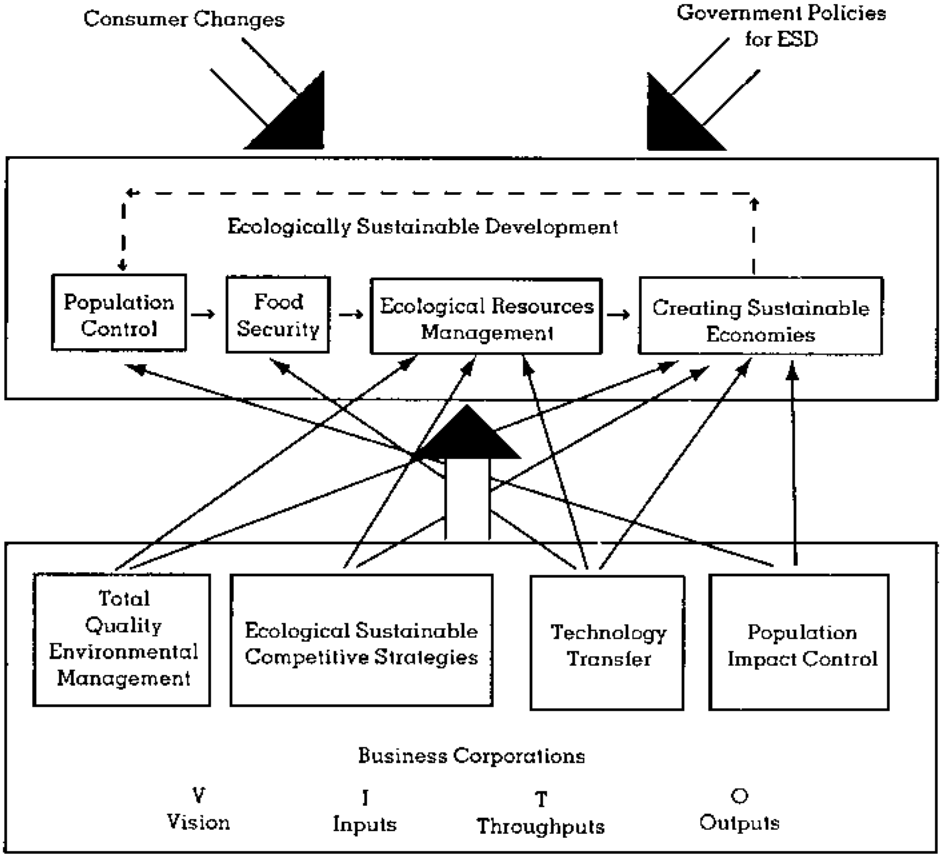
The throughput system (or system of production) impinges on the natural environment through its level of (in)efficiency in converting inputs to outputs, emissions, wastes, and hazards. Outputs include products and wastes. Products can have unintended negative environmental and health effects. Industrial wastes cause air, water, and soil pollution. Most important, toxic and nuclear wastes cause adverse health effects (Bates, 1994; Bucholz, 1993; Smith, 1991).

These inputs, throughputs, and outputs have systemic interconnections among themselves and with environmental, economic, social, and organizational variables. Corporations can become sustainable only by simultaneously directing these variables and interconnections toward ecological performance (Fischer & Schot, 1993; Roome, 1992). Additionally, corporations must expand their scope of activities into new social areas that are relevant to ecological sustainability, such as population impacts, food security, and ecosystem management.

The four mechanisms through which companies can contribute to ecological sustainability (i.e., total quality environmental management [TQEM], ecologically sustainable competitive strategies, technology-for-nature swaps [transfers], and corporate population impact control) are discussed in the following sections. These four mechanisms have been selected because they are practically feasible and collectively they address the four interrelated strategies of ecologically sustainable development, as depicted in Figure 1.

TQEM and ecologically sustainable competitive strategies address the ESD strategy of managing ecosystems resources (ESD Strategy No. 3). There is also a direct correspondence between corporate management of population impacts and the ESD strategy of managing population

**FIGURE 1**
**Corporate Actions for Ecologically Sustainable Development**




impacts (ESD Strategy No. 1). The technology-transfer mechanism can contribute to the ESD strategy of ensuring worldwide food security (ESD Strategy No. 2). Finally, the four corporate mechanisms of sustainability contribute to the creation of ecologically sustainable economies (ESD Strategy No. 4).

These corporate mechanisms have been placed in an order of how practical they would be to implement. I believe TQEM and ecologically sustainable competitive strategies are easier to implement because their elements are under corporate control. Technology transfers require some involvement of governments, and corporate actions on controlling population impacts are less well understood and perhaps more difficult to implement.

The correspondence between the corporate mechanisms and ESD strategies is somewhat limited because corporations are not equally well

equipped to handle all of the ESD strategies. Corporations can make the most immediate and significant contributions through total quality environmental management and sustainable competitive strategies, whereas technology swaps/transfer and population impact control would be a stretch for any firm. I present these measures here as simply starting points for organizations to use to move toward ecological sustainability.

**Total Quality Environmental Management**

TQEM involves dealing with environmental problems from a total systems perspective. Just as "total quality management" demands improvements in each stage of the design and production process, a TQEM perspective seeks to optimize the ecological performance of the entire corporate system (Imai, 1986; Shrivastava, 1995a).

TQEM uses life-cycle analysis (LCA) as a holistic approach to understanding the linkages between an organization and its natural environment. It identifies and deals with ecological costs of inputs, throughputs, and outputs throughout the life cycle of products. This understanding prevents the shifting of ecological costs both from one medium to another (e.g., from air to solid waste) and from one stage in a product's or services's life to another stage. This prevention is handled by extending the system boundaries to include all aspects of product development, production, use, and retirement (Hopfenbeck, 1993).

On the input side, TQEM encourages energy and natural resource conservation and renewal by (a) reducing use of energy and virgin materials through product redesign (e.g., the Swedish company Tetrapak innovated packaging technologies to use recycled and recyclable materials and energy-conserving production); (b) making greater use of renewable materials (e.g., Herman Miller substituted older forest timber for sustainably harvested timber in its furniture lines); (c) off-setting energy/resource consumption with replenishment (e.g., The Body Shop produces wind energy in Scotland to replace the fossil energy it uses in its production); and (d) developing ecologically sensitive purchasing policies and inventory-management systems (e.g., the largest Canadian grocery chain, Loblaw International Merchants, has established vendor management programs that encourage "green" products, lower transportation costs, energy-efficient warehousing, and recycling of packaging) (Post, 1991; Shrivastava, 1995a; Shrivastava & Hart, 1994).

Guided by TQEM principles, Tokyo Electric Power Company has developed closed-loop energy production and recycling systems. The company's average pollution output per unit of energy produced is 25% less than the averages of utilities in the US, England, France, and Germany. In its new headquarters, the National Audubon Society cut its use of energy by 40% through solar architectural design, energy-efficient lighting fixtures, conservation-oriented maintenance, and energy use programs. Ecover, a Belgian detergent maker, established an "ecological

factory" made of low-energy recycled and recyclable materials, closed-loop materials systems, and high-energy efficiency systems (Develter, 1993).

TQEM in the throughput system focuses on improving the efficiency of production, minimizing wastes, and reducing costs. It seeks to *eliminate emissions, effluents, and accidents.* Just as the "zero-defects" goal in quality control demands preventative action and continuous improvement at every step of the production process, a "zero-discharge" goal and a "zero-risk" goal can serve to focus a company's efforts toward the virtual elimination of waste. For example, Dow Chemical's new ethylene plant in Fort Saskatchewan has been designed to minimize the discharge of waste materials. It will release only 10 gallons of waste water per minute, compared to 360 gallons per minute for traditional plants.

Corporations have been saving costs and even generating new revenues through their environmental programs. Examples include the 3M company's Pollution Prevention Pays (3P) program and Dow Chemical's Waste Reduction Always Pays (WRAP) program. The 3M company saved nearly $500 million and prevented 500,000 tons of pollution from 1975 to 1989 through its 3P program—a program that is based on pollution reduction at the source through product reformulation, process modification, equipment redesign, and recycling and reuse of materials.

TQEM also focuses on product choice and design. Products that lack durability and are difficult to repair and recycle place a greater demand on the natural resource base and create unnecessary waste and disposal costs. Thus, TQEM seeks to *minimize the life-cycle costs and improve the quality* of products and services. Life-cycle costing attaches a monetary figure to every ecological impact of a product—disposal costs, legal fees, liability for product harm, loss of environmental quality, and so on. Product-development decisions are then based not only upon projected cash flows but also projected future costs associated with each product design. Improved quality using product design and packaging is a basis for competitive advantage (i.e., unique features of superiority over competitors).

Toshiba and Hitachi have been gaining a competitive advantage in the worldwide battery industry through the design of acid-free and renewable batteries. These batteries are more expensive than conventional acid batteries; however, when the costs of renewal and disposal are factored in, they are more economical, less harmful for the environment, and in compliance with increasingly strict disposal regulations. BMW has initiated a "design-for-disassembly" process, which they hope will result in a unique fully recyclable car. Mazda Motors has been developing a "clean" engine, using hydrogen rotary technology, in response to the growing pressure around the world for air-pollution control and the reduction of carbon emissions (Shrivastava & Hart, 1994).

**Integrated industrial ecosystems.** In addition to integrating ecological efforts inside companies, TQEM also encourages creating integrated

*"industrial ecosystems"* within bioregions.[1] These industrial ecosystems seek to create interdependent industrial networks modeled on biological ecosystems. Within biological ecosystems, several organisms are connected together through resource interdependencies. Production facilities within a system can take waste products, heat, water, and other resources from each other to minimize overall resource consumption and waste of the entire network (Allenby & Richards, 1994; Tibbs, 1992).

A network of companies in Kalundborg, Denmark serves as a good example. It consists of the Asnaes power plant, Novo Nordisk enzyme plant, Statoil refinery, Gyproc wall-board plant, a fishery, a chemical plant, and local farms. They use one another's wastes and by-products as raw materials. They attempt to close the loop of output and input processes within the network, and they try to collectively minimize wastes and conserve energy, raw materials, and water, which is pumped from Lake Tisso, seven miles away.

The coal-fired power plant sells its used steam to the city, the fishery, the enzyme plant, and the refinery, instead of discarding it. It sells its fly ash to the cement company and its limestone sludge to the wall-board plant. Statoil refinery supplies the power plant with treated waste water for cooling and desulphurized gas for fuel, saving 30,000 tons of coal a year. The plant ships its high-sulfur gas emissions to the chemical plant for making sulfuric acid. Local farms use waste from the fishery and from Novo's enzyme plant as fertilizer. This network arrangement reduces the total environmental burden by saving fuel, mined gypsum, and sulfur and reducing wastes that need treatment. However, this system depends on its external environment for the majority of the initial inputs and final outputs. In that sense, it is not independently sustainable.

The next mechanism by which corporations can contribute to ecological sustainability is creating ecologically sustainable competitive strategies for their businesses.

### Ecologically Sustainable Competitive Strategies

Competitive strategies are means by which companies gain marketplace advantages over their rivals. These strategies are also used to guide firms' entries into new markets. The market for environmentally friendly products has grown to over $200 billion per year (EPA, 1990) and green investment funds have mushroomed from a $40 billion industry in 1984 to one that is currently estimated at close to $500 billion (Council on

[1] Another example of this effort is the EPA "bubble policy," which seeks to limit pollution to bubbles of industrial facilities through emissions-trading programs (or rights to pollute). The total pollution in a group (bubble) of facilities is limited and distributed to member firms. The firms can trade these rights in the marketplace. These rights are progressively retired and become more expensive with time. This approach seeks to control overall pollution while encouraging companies to invest in cleaner technologies.

Economic Priorities, 1991). Companies can strategically position themselves to take advantage of these market trends.

Three generic strategies commonly used by corporations are the least-cost strategy, the differentiation strategy, and the niche strategy (Porter, 1980). I have used Porter's generic strategies because they are widely known in the organizational literature and because they deal with the *competitiveness of firms*—a critical element of organizational success. To be really comprehensive researchers also should consider corporate-level strategies (of domain choice) and functional-area policies. However, space limitations prevent me from extending the discussion here. Moreover, the previous TQEM section covered corporate domain choice and functional policy issues in the discussion of environmentally friendly product and packaging choices and cleaner manufacturing systems.

The *least-cost strategy* involves becoming the lowest cost operator in the industry. It requires mass production of standardized products needed by a broad group of customers. It exploits economies of scale in production and distribution. Least-cost firms can use their price flexibility to gain market share. This strategy works best where there is a large demand for standard products.

The *differentiation strategy* involves producing a range of well-differentiated products that meet the specific needs of customer segments. These products have unique features and are hard to imitate. By offering uniqueness, manufacturers can lock in clients that want specific product features, and they can charge higher prices for these unique products.

The *niche strategy* focuses on a narrowly defined segment of the market and fulfills the needs of special customers in that niche. Usually, this means producing highly specialized products and marketing them through limited-focused delivery systems. The total demand for the product may be low, but it is constant. Niche firms possess specialized knowledge about customers, distribution systems, product features, and production systems, which give them long-term competitive advantage (Porter, 1980).

These and other generic competitive strategies can be made ecologically sustainable by adhering to the principles suggested by the Business Charter for Sustainable Development and other similar guidance codes.[2] The charter is listed in Table 1. These principles affect the follow-

[2] Besides the Business Charter for Sustainable Development listed here, there are similar guidelines provided by Keidanren Environment Charter, CERES Valdez Principles, Global Environmental Management Initiative, the Business Council for Sustainable Development, and the European Green Table. Many environmentally oriented nongovernmental organizations, including the German BAUM and the British Business in the Community target group also provide codes for environmentally sound business practices. Government efforts in this area include the EC Eco Audit and the British Standard 7750, which is being adopted by European and Scandinavian companies.

**TABLE 1**
**Business Charter for Sustainable Development**

**1. Corporate Priority:** To recognize environmental management as among the highest corporate priorities and as a key determinant to sustainable development; to establish policies, programs, and practices for conducting operations in an environmentally sustainable manner.
**2. Integrated Management:** To integrate these policies, programs, and practices fully into each business as an essential element of management in all its functions.
**3. Process of Improvement:** To continue to improve corporate policies, programs, and environmental performance, taking into account technological developments, scientific understanding, consumer needs, and community expectations, with legal regulations as a starting point; and to apply the same environmental criteria internationally.
**4. Employee Education:** To educate, train, and motivate employees to conduct their activities in an environmentally responsible manner.
**5. Prior Assessment:** To assess environmental impacts before starting a new activity or project and before decommissioning a facility or leaving a site.
**6. Products and Services:** To develop and provide products or services that have no undue environmental impacts and are safe in their intended use, that are efficient in their consumption of energy and natural resources, and can be recycled, reused, or disposed of safely.
**7. Customer Advice:** To advise, and where relevant, to educate customers, distributors, and the public in the safe use, transportation, storage, and disposal of products provided; and to apply similar considerations to the provision of services.
**8. Facilities and Operations:** To develop, design, and operate facilities and conduct activities, taking into consideration the efficient use of energy and materials, the sustainable use of renewable resources, the minimization of adverse environmental impact and waste generation, and the safe and responsible disposal of residual waste.
**9. Research:** To conduct or support research on the environmental impacts of raw materials, products, processes, emissions, and wastes associated with the enterprise and on the means of minimizing such adverse impacts.
**10. Precautionary Approach:** To modify the manufacture, marketing, or use of products or services or the conduct of activities, consistent with scientific and technical understanding, to prevent serious and irreversible environmental degradation.
**11. Contractors and Suppliers:** To promote the adoption of these principles by contractors acting on behalf of the enterprise, encouraging and, where appropriate, requiring improvements in their practices to make them consistent with those of the enterprise; and to encourage wider adoption of these principles by suppliers.
**12. Emergency Preparedness:** To develop and maintain, where significant hazards exist, emergency preparedness plans in conjunction with the emergency services, relevant authorities, and the local community, recognizing potential boundary impacts.
**13. Transfer of Technology:** To contribute to the transfer of environmentally sound technology and management methods throughout the industrial and public sectors.
**14. Contributing to the Common Effort:** To contribute to the development of public policy and to business, government, and intergovernmental programs and educational initiatives that will enhance environmental awareness and protection.
**15. Openness to Concerns:** To foster openness and dialogue with employees and the public, anticipating and responding to their concerns about the potential hazards and impacts of operations, products, wastes, or services, including those of transboundary or global significance.
**16. Compliance and Reporting:** To measure environmental performance; to conduct regular environmental audits and assessments of compliance with company requirements, legal requirements, and these principles; and periodically to provide appropriate information to the board of directors, the shareholders, the employees, the authorities, and the public.

ing six elements of management: management of product/service design, operations management, precautionary management, employee/customer education, contractor/supplier management, and technology transfer (Hopfenbeck, 1993; Kolluru, 1994).

These management elements intersect with generic strategies

described earlier. The generic strategies represent unique combinations of product choices, operating systems, customer and supplier relations, and technologies. By applying these sustainability principles, *ecologically sustainable generic strategies* may be conceptualized as depicted in Table 2. The ecological orientations described in this table are gross generalizations meant to reflect directions; they are not specific recipes for all companies.

Thus, creating an *ecologically sustainable least-cost strategy* involves standardizing environmentally friendly product designs. Production systems are designed as closed-loop systems; they emphasize energy and resource conservation and use of clean technologies. Because of the large production volume, even small per-unit reduction of resources and energy can result in significant overall savings. With ecologically friendly standardized product designs, it is sufficient to provide employees with only basic training on safety, health, and environmental issues and customers with accurate product labels. Given the large-scale systems common in this type of strategy, environmental-impact assessment and emergency planning are critical. To squeeze ecological efficiencies, it is essential to build partnerships with both subcontractors and suppliers and to encourage them to reduce packaging, waste, and costs. Standardized mass-production technologies can be transferred inexpensively and with limited competitive risks through licensing.

*Ecologically sustainable differentiation strategies* use environmental orientation of product features and packaging to create differentiation. Ecologically friendly packaging is a source of competitive advantage, particularly for products that need large amounts of packaging. Manufacturing plants are of moderate size; hence, operational improvements aimed at compliance with environmental and safety regulations may suffice to make manufacturing ecologically sound. The differentiated nature of products in this strategy increases the need for special training of employees and customers on safety, health, and environmental issues and specialized emergency plans. It is common to have many and diverse vendors when this strategy is used. Thus, management of vendors on a sustainable basis becomes particularly important. Through creative partnerships with vendors, it is possible to reduce packaging, wastes, transportation costs, and the duplication of materials. Although the technology transfer of environmentally sound technologies is desirable, it is expensive and competitively risky when this strategy is being used.

The *ecologically sustainable niche strategy* seeks ecologically friendly product niches. Customers who use this strategy are often very knowledgeable. They can be a source of safety, health, and environmental information and operational improvements. The right choice of niche minimizes the scope of precautionary measures. However, there is a need to protect safety, health, and environmental programs from cost-cutting pressures. If a company selectively works with key vendors, it can improve the environmental performance of products. Specialized

**TABLE 2**
**Sustainable Competitive Strategies**

| Sustainability Variables | Least Cost | Differentiation | Niche |
|---|---|---|---|
| Products/services | **Standardize** ecological designs | **Variable** design<br>Ecological packaging | Choose **ecologically safe** products |
| Operational improvements | Use **clean** technologies<br>Resource **conservation** | Regulation **compliance**<br>Very expensive | Limited scope<br>Protect SHE from cost pressure |
| Employee/customer education | **Basic** SHE training<br>Product labeling | **Specialized** SHE training | Learn from customers |
| Prior precautions | Impact assessment<br>Emergency plans **critical** | **Differentiated** emergency plans | Embedded in **product** choice |
| Contractor/supplier relationships | Critical for cost<br>Build **partnerships** | **Streamline** management of multiple vendors | **Selective** focus on key vendors |
| Technology transfer | Inexpensive, low risk | Expensive, risky | Very expensive, highly risky |

SHE = Safety, health, and environmental programs

technologies are a key competitive resource and often pose special environmental and health hazards. Transferring such technologies is very expensive and risky.

These ecologically oriented strategies allow companies to gain first-mover advantages into environmentally sensitive market segments and inimitable production advantages. However, in order to gain these benefits, companies must establish compatible organizational structures, systems, and operating size. Organizational structures must allow free flows of ecologically relevant information within organizations and between organizations and their vendors and their customers, which facilitates cooperation. Organizational systems must be designed to accept, process, and integrate ecological signals from the external environment. The size of the operation must be determined in correlation to their ecological impacts. Very large-scale operations may irreversibly overwhelm bioregional ecosystems. This problem may call for designing operations in smaller decentralized modules (Sale, 1986).

**Technology Transfer: Technology-for-Nature Swaps**

A major hurdle in reaching global environmental sustainability lies in the grossly lopsided distribution of resources between developing and industrialized countries. Developing countries need new technologies to provide basic amenities to their teeming populations. They need ecologically benign technologies to minimize pollution and stop environmental degradation. Such technologies are available in industrialized countries, but at exorbitant prices.

Developing countries, in perennial debt crisis, do not have the financial capital to acquire new ecologically friendly technologies (Sachs & Huizinga, 1987). In some cases, they do not have the human resources or industrial infrastructures to make these technologies work effectively (Shrivastava, 1995b). The mounting Third World debt makes industrial countries weary of lending, whereas developing countries are eager to borrow. Past borrowings have only indebted these countries excessively, and this has not brought about the expected developmental benefits (Susman, 1989).

In contrast, developing countries possess immense natural resources that industrialized countries want. These include plants for making pharmaceuticals, metal and mineral ores, land, marine and wildlife. Many of these resources and ecosystems are becoming extinct because of the inability of local governments to manage them sustainably. Developing countries are facing a dramatic decline in ecodiversity as a result of deforestation, desertification, and coastal development (Wilson, 1989).

One integrated solution to Third World debt, technological needs, and ecological preservation is to arrange technology-for-nature swaps. Part of the national debt can be reduced by exchanging debt forgiveness and ecologically benign technologies for nature-preservation rights. These could be modeled along the lines for debt-for-nature swaps used to

preserve the rain forests in South America. Because these swaps are in their infancy, the practical possibilities for conducting them is limited at this stage. However, the principle of swaps is a valuable one, and it deserves serious attention by corporations (Kimball, 1992).

Chlorofluorocarbon (CFCs) substitute technology is one example of how technology-nature swaps may work. CFCs destroy stratospheric ozone. The Montreal Protocol and its subsequent reformulations ensure that industrialized countries will stop producing CFCs by the year 2000. These countries will switch to CFC substitutes that are currently being developed by DuPont and other chemical companies. It is expected that 75% of CFC production will shift to developing countries. Some of these countries are not signatories to the Montreal Protocol, because they feel it would hamper their industrial-development efforts. They also cannot afford to buy the CFC substitute technologies.

In a swap, these countries could allow multinational companies that possess CFC substitute technologies (DuPont, ICI, etc.) to establish programs for sustainable cultivation and harvesting of genetic resources from their forests. In exchange, companies could buy off debt and transfer CFC substitute technologies to developing countries. Such swaps assign market prices to the many natural resources that are currently being destroyed as free goods. Because of the page restriction of this article, I am able to discuss only the principle of such exchanges. Detailed mechanisms for the swap requires further conceptual and institutional development (Hansen, 1989).

The next mechanism by which corporations can contribute to sustainability involves dealing with environmental impacts of populations. The population problem has historically been in the government domain. However, there are many opportunities for corporations to participate in dealing with this problem.

**Corporate Population Impact Control**

The population explosion in developing countries is a function of many complex social, economic, and cultural factors. Births are simultaneously a source of wealth and poverty, of high and low social status, and inheritance. Family size and constitution are linked in complex ways to work life, social relations, and political power. In a brief discussion such as this one, it is not possible to explicate all these complex relationships (Hollist & Tullis, 1987). However, one fact about population explosion remains clear. Extreme poverty and the unavailability of birth control information and devices significantly contribute to population growth. Dealing with population growth requires *socioeconomic improvement of rural populations.* It requires *public education* and *mass distribution* of birth control information and aids. Corporations have some leverage in such areas: They can have an influence on both the problems of population control in developing countries and the reduction of the environmental impact of affluent populations in industrialized countries.

In developing societies, corporations can encourage rural economic development by building production facilities in rural areas. Historically, corporations have acquiesced in local government policies of urban-biased industrialization to take advantage of urban infrastructures (Lipton, 1975). They have not participated in rural development programs. Now urban areas are becoming overcrowded, polluted, and unlivable, and their infrastructures are collapsing. By investing in rural areas, companies can stem urbanization and improve the utilization of rural land and labor. This change would facilitate wealth distribution to rural populations.

Clearly, moving companies to rural locations will require additional investment into creating infrastructure. Historically, the government has provided the infrastructure of developed land, electric supply, water, transportation, and communications services. However, the quality of government-provided infrastructure in most developing countries is poor, and it is progressively deteriorating. The dependence on such an infrastructure increases the company's risks of breakdowns and accidents. Thus, many companies are now creating their own backup infrastructure services. They make investments such as small power generators to deal with brownouts. They dig their own wells for water to supplement the municipal water supply. They establish transportation, education, entertainment, and financial services for their employees and neighboring communities (United Nations Center for Transnational Corporation, 1985).

Corporations also can help through educating the public about family-planning options via their advertising campaigns. Ads and product packages are useful media for getting family-planning messages to the masses. These messages can be specifically targeted to children, young adults, women, married couples, and parents through ads and products that are appropriate to those groups. Corporations can facilitate the distribution of family-planning information and aids through the use of their distribution networks and logistical capacities.

In many countries, corporations possess distribution systems that penetrate deep into remote villages. These distribution channels can be used to systematically bring birth-control devices to rural households. Because of the sensitivity of birth-control issues, these efforts are best undertaken in cooperation with local institutions. For example, subsidiaries of multinational companies, such as Unilever and Union Carbide, are participating in local, government-sponsored programs to distribute family-planning materials to people in remote rural villages in India. Similar collaboration is possible with charitable and nongovernmental voluntary organizations.

In industrialized countries, corporations have leverage through consumers. Advertising is a tool that can be used for creating consumer demand and for educating consumers about products. In the United States alone, consumers receive over $90 billion a year worth of advertising messages. These messages have been aimed more at increasing

consumption rather than promoting responsible consumption. For corporations, the creation of a throw-away consumer society has meant *demand* for their products (Hirschman & Holbrook, 1992). To achieve ecological sustainability this mass-consumption approach to products needs to be moderated.

By reorienting advertising to its educational mission and by promoting responsible consumption, corporations can play a constructive role in reducing excessive consumption and minimizing waste.[3] Companies can also minimize ecological impacts by reorienting their products and packaging toward reuse, recycling and recovery of wastes (Hoffman, Fredrick, & Petry, 1990).

## IMPLICATIONS AND CONCLUSIONS

In the past, corporations have been forced through government regulations to become environmentally responsive. This action has had limited success. It has moved corporations incrementally toward environmental management, but even the best ones are still far short of ecological sustainability.

To unleash the vast potential of corporations to resolve ecological problems, researchers and managers must reconceptualize their roles in society. Corporate activities must be linked to the fundamental problems of sustainability (i.e., the ecological impacts of population, food security, ecosystem preservation, energy use, and technological change). Environmental sustainability must be integrated into the logic of corporations and sustainability should become an integral aspect of any corporation's effectiveness. This article has articulated several ways in which companies can contribute to ecological sustainability. Corporations have the knowledge, resources, and power to bring about enormous positive changes in the earth's ecosystems.

Although my focus in this article has been mainly on corporate actions for ecological sustainability, I want to reiterate the need for people to support corporations through appropriate changes in government policies and consumer behaviors. There are mutual reciprocal interactions and influences among corporate actions, government policies, and consumer choices. Hence, the three must be moved in tandem if true ecological sustainability will be achieved.

What incentives can companies use as they undertake the expanded role that is implied in ecologically sustainable development? This is a complex question. At this point, I simply want to acknowledge that even

[3] "Responsible consumption" connotes overall reduction in demand for products and, consequently, reduction in sales revenues. One way companies can mitigate this reduced demand is to encourage consumption of higher quality goods (i.e., goods that would cost more per unit but last longer and be more ecologically efficient).

though there are many initial costs and barriers, there also are several benefits to ecological sustainability.

1. First, there is the opportunity to drive down operating costs by exploiting ecological efficiencies. By reducing waste, conserving energy, reusing materials, and addressing life-cycle costs, companies can save costs.

2. Ecological sustainability provides a basis for creating competitive advantage. There is a large and growing segment of consumers who want ecologically friendly products, packaging, and management practices. These "green" consumers are drawn to companies that genuinely use sustainable practices.

3. At this early stage of corporate environmentalism, companies have the potential to create unique and inimitable environmental strategies, thus both distinguishing themselves and becoming environmental leaders within their industries.

4. Ecological sustainability is also good for a company's public relations and corporate image. It can help companies both to establish a social presence in markets and to gain social legitimacy.

5. Ecological sustainability offers the potential for reducing long-term risks associated with resource depletion, fluctuations in energy costs, product liabilities, and pollution and waste management. By systematically addressing these long-term issues *early*, companies can become aware of and manage these risks.

6. Improved ecological performance of companies benefits the ecosystem and the environment of communities in which companies operate. It can help to reduce health expenses in a community that are the result of industrial pollution.

7. Ecologically sustainable practices allow companies to get ahead of the regulatory curve. These strategies give companies a firmer legal footing and may allow industries to preempt some regulations.

In order to actualize these potential benefits, companies will have to incur some new costs. The cost of "setting up" for or transitioning to ecological sustainability will vary from industry to industry and will eventually be significant. But two factors can mitigate these costs (barriers). First, some of the above-mentioned benefits can be achieved through relatively small investments. Such investments can pass routine investment hurdles in companies. For example, companies as varied as 3M, Dow Chemical, and the Tokyo Electric Power Company routinely make ecological investments as part of their capital-investment programs (Shrivastava, 1995a). By making ecological investments in stages, companies can distribute the costs over time.

Second, these benefits become persuasive when company members believe they are pursuing broadly substantive, rational goals rather than narrowly economic, rational goals. Such a commitment means they are willing to incorporate the goals and values of ecological sustainability with their more traditional economic goals and values. This willingness

is a function of nonorganizational factors such as (a) personal attitudes and values of consumers, (b) regulatory policies, and (c) physical and social infrastructures for ecologically sustainable development. Thus, the move toward ecologically sustainable development will require an overall value reorientation of both society and corporations, from the current economic rationality to a broader ecological rationality that is focused on the long-term survival of the earth.

Organizational sustainability also will require the creation of new organizational processes and systems. This organizational capacity would be geared toward creating (a) inimitable, green production systems; (b) first-mover market strategies to capture emerging green markets; (c) ecologically efficient cost structures for long-term profits; (d) a better legal system regarding environmental and product liabilities; and (e) environmental programs for better public relations and community image.

These changes cannot occur simultaneously. The easy changes, which involve adopting cleaner production systems and TQEM, should be attempted in the first stage. Once these are widely implemented, companies can deal with the more difficult challenges of limiting the ecological impacts of population and the transfer of technologies and resources.

**Implications for Future Research**

The challenge facing organizational scholars is to flesh out organizational pathways to ecological sustainability. This article only begins this task. After it, come the next steps of refining theory and building practical tools for corporate sustainability. Four important implications for management theory can be identified.

First, the concept of ecological sustainability has been debated largely at the macroeconomic level. This article shows that different types of organizational actions, some of which are beyond the purview of corporations as they are currently constituted, are needed. Therefore, further theorizing about "sustainability" at the organizational level of analysis which addresses organizational forms that can be sustainable is needed. In the future, researchers should address what it means to be ecologically sustainable in different organizational settings, in different industries and competitive environments, in different countries, in different economic systems, and in different time periods of a company's life cycle. More precise definitions of the *internal* and *external* conditions of organizational sustainability are needed.

The second implication is methodological. The conceptual fuzziness of this area is compounded by the lack of good measures of organizational sustainability. Organizational scholars must develop meaningful measures of organizational sustainability. What type of data should they collect? How should researchers modify current accounting principles and systems to get this data? How and to whom should the data be reported? What internal and external monitoring systems are needed to

urge corporations to move toward sustainability? These are some of the methodological issues that must be addressed in coming years.

The third implication of sustainability deals with rethinking the basic concepts of organizations, objectives, strategies, structures, performance, and environments in order to accommodate the needs of ecological sustainability. The current organizational concepts were developed when there were no severe ecological impacts of organizations. For example, organizations were conceptualized as "systems of production," which ignores that they also are "systems of destruction" (of ecological values). Objectives and strategies were conceptualized in terms of growth, profits, and wealth, which ignores the concomitant risks and ecological degradation produced by such objectives. Organizational performance was conceptualized as economic and human (productivity) which ignores ecological performance. Systematic incorporation of sustainability criteria into basic organizational concepts can expand researchers' organizational theory agenda by shifting the central problem for the field. The question of central concern then becomes—what makes organizations ecologically sustainable, not simply what makes them grow or more profitable?

A fourth implication of sustainability deals with organizational values. Historically, according to an anthropocentric view, organizational members and organizational researchers have considered that the unrestricted exploitation of nature as a resource for human and social consumption is acceptable and legitimate. The idea of ecological sustainability challenges the feasibility and legitimacy of such an ethic. Thus, the value base of organizational practices must be expanded to include nature as an important stakeholder. Nature must be valued for its own sake, as managers and theorists alike seek a new equilibrium in human (and organizational)-nature relations.

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