EXAMINING DRIVERS OF SUSTAINABLE INNOVATION

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ABSTRACT

Various forces drive corporations to sustainable innovation, including: (a) external stimulus such as government regulation or social activism, (b) business opportunities from technological advance or customer demand for environmentally friendly products and (c) transition of business mission and orientation toward corporate social responsibility. Each of these drivers of sustainable innovation is based on a differing view of the relationship between economic growth and the environment. This paper explores the views and driving forces of sustainable innovation and proposes a future research program that examines the relative importance and interaction of the drivers of sustainable innovation.

KEYWORDS:
Sustainable Innovation, Sustainable Development, Corporate Social Responsibility

1. INTRODUCTION

Sustainable economic development is about creating: (a) sustainable economies that equitably meet human needs without extracting resource inputs or expelling wastes in excess of the environment's regenerative capacity, and (b) sustainable human institutions that assure both security and opportunity for social, intellectual, and spiritual growth (IMF, 2005). Rogers broadly defines innovation as “an idea, practice, or object that is perceived as new to an individual or another unit of adoption” (1995, p. 132). In regard to business processes and economic development, Luecke and Katz (2003) define innovation as “the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services.” Sustainable innovation can reasonably be defined as the development of new products, processes, services and technologies that contribute to the development and well-being of human needs and institutions while respecting the worlds’ natural resources and regenerative capacity.

This paper examines the theoretical foundations and impacts of key drivers of sustainable innovation, specifically (a) the trade-off view on economic growth and the environment, (b) the synergy view of economic growth and the environment and (c) the social responsibility view of corporate social responsibility.

2. VIEWS ON ECONOMIC GROWTH AND THE ENVIRONMENT

The Trade-Off View of economic growth and the environment is a pessimistic perspective focusing on the situation in which economic growth begets environmental problems due to increases of production and consumption (Hirschhorn, 2001). As economies and populations grow, natural resources are used in an increasingly indiscriminate manner, contributing to resource shortages and various forms of pollution. The trade-off view on the relationship between growth and the environment argues that other stakeholders such as consumers, communities and governments instead of the polluters bear these costs over both the short and long-term.

The Synergy View is based on the argument that economic growth is essential to enable a society to increase resources for environmental and social improvement. It points to a synergistic or mutually supportive relationship between economic growth and the environment in the process of industrialization. Economic growth increases the stock of economic, ecological and socio-cultural assets while providing a safety net to meet the basic needs of people. The *environmental Kuznet curve* explores the statistical association between environmental indicators and national income levels as being positively correlated until a certain level of income is reached, but once this focal point is reached, further increases in income level result in a decline of pollution levels (Lifset, 2002).

The Social Responsibility View argues that while there is no inevitable association between economic growth and the environment, business practices in a society can be directed toward sustainable innovations and models. This view points out the importance of business culture and its transition from a growth orientation toward sustainable innovation, e.g. an emerging business orientation toward corporate social responsibility. Hopwood et al. (2005) argue that a change of perception and action toward environmental protection can change the whole society. A key issue in this normative approach is how to transform the trade-off situation of the pessimistic view to the synergistic situation of the optimistic view. Korfiatis et al. (2004) report that such an effort and outcome toward sustainability varies from country to country, depending on the style of reform, experience with market structure, geographical coordinates as well as political attitudes and information flows. Corporate citizenship can be a business strategy for efficiency and an opportunity for growth rather than an obligation (Grayson, 2005).

3. DRIVERS OF SUSTAINABLE INNOVATION

Our review of the conceptual foundations for each of these alternative views on the relationship between economic growth and the environment examines six possible drivers of sustainable innovation (i.e. government regulation, social activism, customer demand, technology advance, social responsibility initiatives and supply chain partnerships).

3.1 Trade-off between Growth and the Environment

The trade-off view on the relationship between growth and the environment is based on the notion that economic growth is a necessary, but insufficient, condition for improving the overall environment for the benefit of the human race. Economic growth reflects the increase in value of the goods and services produced by an economy while environmentalism is a concern for the preservation, restoration or improvement of the natural environment. According to this view, as the economy grows, increased production and consumption expands demand for natural resources while also increasing pollution by-products (Suzuki, 2002).

There is a close association between the pattern of economic growth and the environmental problems experienced by a country. China is struggling with environmental issues as its economy has doubled every 7 years for the past two decades. India is experiencing similar problems from economic development at a rapid pace. According to the World Bank, more than 80 Chinese cities had sulfur dioxide and nitrous dioxide levels higher than World Health Organization limits. It estimates that more than 1 million people in China and India will die prematurely due to urban pollution from 2001-2020 (China Daily, 2005).

Globalization, in its efforts to leverage developing nation cost efficiencies and new consumer markets, contributes to the growing environmental problems faced by all nations. When companies move production facilities from industrialized nations with established environmental regulations and high consumer awareness to developing nations with less stringent or non-existent environmental and workplace regulations, they shift the environmental costs of business from one group of stakeholders to another. While this serves the company bottom-line, resource depletion and pollution may ultimately inhibit long-term economic growth both in the host and client countries.

Despite the apparent conflict between economic growth and the environment presented by the Trade-Off View, two drivers of sustainable innovation do emerge, government intervention and social activism. The trade-off view on the relationship between growth and the environment implies that, without external intervention, the environment will continue to deteriorate to a point where it will not sustain a quality of life for all citizens. This argument takes a position that, without the intervention of a vigilant civil society, the unregulated market neglects essential needs for public goods, externalizes a significant portion of real production costs and tends to move toward monopoly control over resource allocation (Daly, 2004). To achieve social justice and environmental sustainability, government needs to establish a social framework to assure that full costs are internalized, competition is maintained, benefits are justly distributed and necessary public goods are provided (Korten, 1996).

In an effort to balance between protecting the environment and promoting the competitiveness of the economy, governments have exercised both regulations and incentives (Simpson, Taylor and Barker, 2004). New regulations and public spending aiming to mitigate greenhouse gas emissions have created new opportunities for some sectors of the economy. Government incentives such as tax credits and grants help counter the expenses that may otherwise prevent investment in renewable energy, green products and abatement technology. Government policies may stimulate environmental R&D, technological innovation and diffusion to provide corporations with the correct incentives to avoid damaging the environment, while preserving competitiveness in the market (Carraro and Galeotti, 1997).

Social activism significantly influences government and industry responses to the trade-off between growth and the environment. Social activism is often effective in applying pressure on commercial enterprises to spend additional resources on environmental protection. Governments are influenced by social activism, resulting in the development of new regulations and funding priorities. Social activism has both raised awareness about and helped address international issues such as global climate change, water pollution, coastal degradation and greenhouse gases.

3.2 Synergy between Growth and the Environment

In contrast to the argument that environmental regulations and protection may slow or inhibit developing economic growth, the Synergy View suggests that the additional capital investment required of environmentally friendly industry can spur the creation of new industries fostering new economic growth. Environmental policies and laws that require firms to invest in pollution abatement equipment or cleaner technologies help create demand for new products, technologies and services (Schofer and Granados, 2006). A U.S. Environmental Protection Agency study found that air quality regulation actually increased Gross Domestic Product when both the negative and positive impacts of the regulations were accounted for (Whitehead et al., 2005). An analysis by the Institute for Southern Studies in 1994 found that 9 of the 12 states that were strongest in environmental protection also were strongest in economic growth, while 12 of the 14 states that were weakest in environmental protection also ranked among the lowest in economic growth (Graham, 1998), suggesting that countries or states with aggressive environmental protection policies had high economic growth and more job creation.

Generating synergy between growth and the environment requires transferring the fruits of economic growth to environmental issues and resource conservation. Desjardin (2006) discusses the concept of eco-efficiency, a principle of sustainable development which refers to increasing the efficiency with which industries use natural resources, in effect reducing waste, pollutants and overuse. As developing countries industrialize, their reliance on sulfur-based fossil fuels due to cost constraints and lack of environmental controls contributes to significant urban air pollution and inefficient use of the resource. In lower GDP countries, the society is often concerned with other priorities (e.g. inadequate water supplies, shelter, and food sources) rather than R&D for developing sustainable technologies (Stern, 2004). As per capita income rises however, more resources are available to purchase cleaner fuels, creating business opportunities for emerging technology companies such as Rentech Inc. (www.rentechinc.com), who are now using technology to convert the dirtier, sulfur-based fuels into cleaner, environmentally friendly diesel and jet fuels.

The Synergy view of economic growth and environmental protection suggests two primary drivers for promoting corporate sustainable innovation: (1) customer needs and demands for sustainable products and (2) advances in sustainable technologies and growth of environmental industry. Customer attitude and demand toward sustainable products and services is certainly helping to change the way that corporations produce goods and services. DesJardins (1998) argues that one aspect of economic growth, unrestricted consumer demand, is a primary cause of environmental and ecological deterioration. However as consumers become more aware of environmental issues and the importance of environmental protection and resource conservation, consumer demand can lead corporations to be more accountable for the impact of their business practices. Corporate commitment to sustainable innovation becomes profitable as increasing numbers of consumers are willing to pay more for green products. Increasing consumer awareness and demand helps drive company investment in environmental R&D and technological innovation, which leads us to a second driver of sustainable innovation, advances of environmental technology.

Technology has long been recognized as the key source of synergy between economic growth and the environment (Baucus, 1994). Technological innovation supports the more efficient use of natural resources, the ability to mitigate or eliminate various types of pollution and provides new investment and growth opportunities (Costanza et. al., 2000). Developing clean technologies is critical to solving some of this century's most pressing global environmental issues (e.g., global warming, scarcity of natural resources and rising energy costs). As environmental technologies come to market, companies that invest in these technologies also improve their image with the investors as many financial stakeholders react positively to clean or green technologies and corporate green initiatives. In North America, venture capital investment in the 4th quarter of 2005 in environmental technology accounted for 9.1%, ranking 5th in terms of absolute investing dollars, ahead of the semiconductor segment (Henderson, 2006).

3.3 Social Responsibility for the Environment

An emerging view of corporate social responsibility (CSR) is based on stakeholder theory, the premise that commercial enterprises are responsible to a wide range of constituents affected by the enterprise's policies, actions and business activities. These constituents include primary stakeholders (i.e., owners, employees, customers, suppliers) and secondary stakeholders (e.g., local community, competitors, environment, media) (DeGeorge,1986; DesJardins,1998; Weiss, 2006). This is a significant departure from the classical view of corporate responsibility which identifies a corporation's sole responsibility as generating profits for owners of the company (Friedman, 1962). Against this narrow view of corporate responsibility for profit maximization, the broader view of corporate social responsibility sees the modern corporation as a social institution that must consider the interests of all the groups upon which it has an impact (Shaw, 2007). This latter view of corporate social responsibility suggests the need for companies to engage in sustainable business practices. If the needs of stakeholders, both upstream and downstream of business activities, are properly considered, a socially responsible company must consider and address issues such as natural resource depletion, pollution, working conditions and their impact on local communities (Buchholz,1998; Amalric and Hauser, 2005).

There is growing evidence that companies practicing CSR based on the stakeholder model can contribute positively to both the environment and the company's bottom line (Korten, 1996; http://www.dieoff.org). As companies examine the impact of business practices on secondary stakeholders and the environments they populate, many companies develop a longer-term, sustainable business perspective. In its 2005 Global Citizenship Report, Hewlett Packard reports that in 2004 it received more than $6 billion in requests for quotations that required information on their commitment to social and environmental responsibility -- an increase of 95% compared to 2003 **(**Makower, 2006). Increasingly, consumers come to value companies that demonstrate a commitment to CSR. In 2006, approximately 10% ($2.3 trillion) of all funds under US investment management were invested in companies identified as socially responsible (Demos, 2006). Investors also come to recognize a company's creation of wealth in a more comprehensive way, accounting for not only the goods and services produced within the business, but also the value or detriment brought to bear by that business within society and upon the environment (DesJardins,1998).

Two critical drivers supporting corporate adoption of CSR include (1) corporate initiatives for sustainable innovation and (2) cooperative operation of sustainable supply chain partnerships.

Corporate initiatives for sustainable innovation are a mechanism for publicly demonstrating a firm's commitment to good, corporate citizenship in a manner that generates attention and contributes to the company's bottom line. This demonstration is meant for various stakeholders, including customers, employees, neighbors, stockholders and investors. The intent is to increase stakeholder commitment and loyalty to the firm, whether this be the customer, who may maintain or increase purchases from the company; the investor, who may increase investments and support for the board; or employees, who gain a deeper understanding of and commitment to the firm's sustainability initiatives.

As companies increase socially responsible production and marketing activities, they must also consider the actions of their suppliers and distributors. A commitment to sustainable innovation needs to ensure that their green initiatives are not undermined by the actions of their supply chain partners. The role of supply chain partners is important for successful implementation of a firm's sustainable marketing

program since the production, processing and transportation activities partners participate in for the firm can also be a source of pollution, waste and resource depletion. Supply chain partnerships help companies to work together as they balance the need for business growth and environmental and social performance (Jaber, Friend and Olsen, 2006).

4. A Strategic Framework

Table 1 summarizes the views, drivers, corporate responses and strategies toward sustainable innovation discussed in the preceding section. The tradeoff view supports two external stimulus drivers of sustainable innovation: government intervention and social activism. The synergy view explores two business opportunity-minded drivers: response to customer demand for environmental goods and advances of environmental technologies. The social responsibility view supports two business strategic drivers: initiation of comprehensive CSR programs and cooperation with supply chain partners.

TABLE 1. DRIVERS OF SUSTAINABLE INNOVATION: VIEWS, DRIVERS, RESPONSES AND STRATEGIES

Views on Growth and Environment	Drivers of Sustainable Innovation	Modes of Response	Types of Strategy
Trade-off	Government regulation	Compliance	Reactive
Trade-off	Social activism	Alliance	Cooperative
Synergy	Technology advance	Innovation	Synergistic
Synergy	Customer demand	Marketing	Adoptive
Social responsibility	Supply chain	Partnership	Relative
Social responsibility	CSR initiative	Leadership	Interactive

Companies may respond to these drivers differently, based upon their view of the relationship between growth and the environment along with the combination of drivers they confront. Each company's response, ranging from compliance to leadership, reflects varying levels of commitment, resources and understanding of the problem at hand. Clearly, companies confronted with drivers of sustainable innovation have several choices to make. Should they only react to the situation by committing the minimum resources required to address the drivers or should the company be proactive, considering how their response can be used to strategic advantage? We have endeavored to present a framework for examining the relationship between a company's views on economic growth and environmental responsibility, the drivers which force company response and the interaction between the company, the drivers and stakeholder groups. Further research is required to test this framework as it applies to various companies, industries and economic conditions. Future efforts will detail initial research efforts in applying this framework to existing companies in a global context.

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