

**Environmental Regulation with Supply Chains: Comparing Private and
Public Regulation**

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Introduction

Only a few decades ago, discussions of environmental regulation and the broader concept of environmental governance would have focused almost entirely on government. Through such laws as the Clean Air Act and Toxic Substances Control Act, government forced accountability on private firms in pursuit of the social goals of protecting the environment and health. In the last few decades, however, the institutional landscape has changed. Public regulation still dominates but is complemented by practices illustrating the concept of “government without governance.”

This paper explores the slightly more limited concept of *regulation* without government. It examines one aspect of a broader phenomenon of what is often termed a greening of industry—that of supply chain management by private firms for environmental purposes. Although supply chain environmental management has drawn attention in the business field, it has been studied to a lesser degree in the public policy literature. In contrast, other forms of private sector regulation discussed below have drawn attention in the policy literature. Among these are environmental management systems, industry codes, product or building certification programs, and reporting or disclosure programs. Supply chain management, however, exhibits a form of private sector regulation that differs in significant respects from these other versions. Adopting the definition of regulation that is used in this paper, as the process of imposing constraints on behavior in the pursuit of social goals (Mitnick, 1983), supply chain management is more clearly a “regulatory” activity than many of the others. The difference, of course, is that when firms manage suppliers’ environmental performance they are doing it less for social than for their own business goals. There is a spillover effect, however, to the extent that managing the supply chain provides broader benefits (i.e., positive externalities) to society and not just the firm. Large firms

with market leverage have become influential regulators, akin in many respects to agencies like the Environmental Protection Agency, and yet their regulatory process is largely unexamined.

The goal of this paper is to present an analysis and propose a framework for examining supply chain management by firms with substantial market leverage as a form of private sector regulation. The more specific objectives are to: (1) describe the impetus for and characteristics of the growing practice of supply chain environmental management in the context of the broader greening of industry; (2) analyze the similarities and contrasts between public and private sector regulation in supply chain management; (3) set out conclusions and a framework for thinking about such issues; and (4) propose a research agenda linking the policy and business literatures.

Supply Chain Management in the Context of the Greening of Industry

The policy and business literature have examined many aspects of industry greening (e.g., Press and Mazmanian, 2009; Esty and Winston 2006). This has been defined generally as efforts by firms to adopt practices or achieve environmental results that go beyond the rules issued by government. That firms would adopt such practices and incur costs is in itself an anomaly in terms of conventional regulatory theory. The assumption for many years was that firms would act to limit their adverse environment effects when government compelled them to do so. That the firms voluntarily reduce environmental and resource impacts without government coercion has led to a rethinking of the relationships among business strategy and environmental issues (Porter and van der Linde, 1995).

For a variety of reasons that by now are well documented in the literature on business and the environment, firms adopt policies and behaviors not specifically required by government. For example, Forrest Reinhardt (2000) proposes five reasons for viewing environment as a core

business function akin to finance or marketing and thus a source of opportunity: differentiating products, managing competitors, reducing operating costs, redefining markets, and managing risk and uncertainty. Managing the supply chain for environmental reasons serves nearly all of these ends. It may differentiate products by adding credibility to processes or product designs. It may reduce operating costs by encouraging process efficiencies among suppliers, eliminating waste disposal and treatment, reducing liabilities from materials contained in suppliers' products, and other measures. Regulating the supply chain provide a strategy for managing competitors by forcing the competition to adopt similar policies. A major reason firms regulate supply chains is to reduce risk and uncertainty. They are less likely to lose critical suppliers due to violations of environmental laws or exposure from negative publicity. They may create reputation capital with consumers, communities, and agencies, and reduce defects or environmental hazards in products.

Before moving on to a discussion of supply chain regulation, it is helpful to consider other forms of private sector regulation. One is *green clubs*. In public choice terms, green clubs offer non-rival but excludable benefits to their members (Potoski and Prakash, 2009). Ideally, these clubs generate benefits to society by promoting standards of behavior beyond government requirements. These come in the forms of higher levels of environmental performance, adoption of management practices, greater transparency, and more engagement with external stakeholders. In exchange, members receive such benefits as recognition, access to information and networks, and better relationships with regulators and communities. The public credibility of green clubs varies based on their design. Potoski and Prakash (2006) argue that the more credible ones require adopt reporting, third-party verification, and sanctions for non-performance as means of avoiding shirking and free riding by members.

Three types of green clubs have been studied in the literature, based on the sponsors and participants. Some are sponsored by government agencies like the EPA and its state counterparts. Examples from the EPA are the 33/50 program of the 1990s, Climate Leaders, and Waste Wise. Others, however, were formed and are managed without government sponsorship. Examples are the chemical industry's Responsible Care and the Sustainable Forestry Initiative, both of which are sponsored by trade associations on behalf of their members. A third form involves industry-NGO partnerships, such as the Forest Stewardship Council and the Marine Stewardship Council.

Another form of private sector regulation is product and building certification programs. The number of such certifications has proliferated in recent years. Although similar to green clubs, they differ in recognizing products or other objects, such as buildings, rather than firms. Among the more significant certification programs are Energy Star (sponsored by the EPA and Department of Energy), the Electronic Product Assessment Tool (EPEAT), and Leadership in Energy and Environmental Design (LEED). Only the first is sponsored directly by government; however, the federal government has endorsed both EPEAT and LEED for various purposes, such as compliance by agencies with requirements of sustainability purchasing through the executive orders in 2009 (Fiorino, 2011). Indeed, EPEAT and LEED illustrate private sector regulation which government has decided to accept as binding, even though there is no legal obligation to conform to them.

Supply chain environmental management should be viewed in the context of greening. It shares with these other programs the core characteristic of pushing business to perform beyond government standards. Similarly, although firms manage supply chains for business reasons, there are spillover effects in terms of positive externalities for society. Although supply chain policies often began as single-firm initiatives, they have become the subject of collective action

by groups of firms, as the discussion of *The Sustainability Consortium* below illustrates. The paper first briefly considers a question that is addressed in the business literature: Why do private firms look beyond their own four walls and assume responsibility for regulating their suppliers?

What Do We Know About Environmental Supply Chain Management?

Existing research in the field of private sector environmental management has found several common drivers that influence a firm's decision to adopt "beyond compliance" environmental practices. One such practice is a movement towards creating a "greener" supply chain and integrating downstream and upstream suppliers through environmental standard setting. This section briefly considers the research on supply chain environmental management before moving to a comparison of private (i.e., supply chain) and public sector environmental regulation.

Many scholars recognize cost cutting as one of the major drivers for firms adopting environmental supply chain initiatives (Srivastava, 2007; Walker et al., 2008). According to Srivastava (2007), the cost reductions that may be obtained by pushing suppliers to adopt bottom line environmental practices lead to lower costs for the firm. Pressure from investors and the goals of managing economic risk are also major reasons that firms green their supply chains (Green et al. 1996). Gaining a competitive and strategic advantage is also another driver for environmental supply chain management (Hart, 1995; Markley, 2007; Porter and van der Linde, 1995; Rao and Holt, 2005). This view is also reflected in the Lee and Kim (2011) study of greening of supply chain in the semiconductor industry in Korea. They find that integrating suppliers in the internal and external value chains can be a great source of competitiveness for firms in the semiconductor industry. Further, responding to opportunities for product innovation (Green et al. 1996), technological integration and advancement (Green et al., 1996; Lee and Kim,

2011), product consistency and quality (Porter and van der Linde, 1995), new ideas (Haufler, 2001), and technological innovations (Hart, 1995) are strategies that can gain a competitive and first-mover advantage. These strategies can open new markets and yield “top line” advantages in the form of increased market share and revenue (Allen, 2012). According to Vachon and Klassen (2008), environmental collaboration across supply chain enables firms to pool resources and offers advantages such as increased organizational capability and improved cost or quality.

Compliance with regulatory requirements is one of the most universally documented drivers in the literature of green supply chain management (Green et al. 1996; Srivastava 2007; Zhu and Sarkis, 2006; Gunningham et al., 2003). Porter van der Linde (1995) argue in their classic analysis that stringent environmental regulations are a major driver toward supply chain management and other initiatives, which push firms to be more innovative and efficient. They describe Hitachi’s response the Japanese Recycling Law of 1991 by redesigning washing machines and vacuum cleaners for better recyclability, which also saved disassembly time for the company. Increasingly, scholars in the field of business and environment argue that it is no longer sufficient for firms simply to react reactive to regulations, but to preempt future regulations in order to reduce risks (Handfield et al., 2005, Haufler, 2001). Haufler (2001) states that the objective of reducing political risk (i.e., more stringent government regulation) is a reason why firms (individually or collectivity) adopt environmental codes.

Another driver is managing public perception of the firm and scrutiny from customers, media, and environmental groups According to Roberts (2003) environmental supply chain management helps protect corporate reputation, which is a source of intangible value. Liability issues and accountability issues can also be managed better by adopting environmental supply

chain practices. Hall (2001) cites pressure from environmental advocacy groups, including community groups and shareholders, as one of the biggest drivers towards green supply chains.

Managing risk is increasingly an important issue for firms concerned about the threat of climate change (Cousins et al. 2004; Haufler 2001). Cousins et al. (2004) identify four types of risks faced by firms: technological exposure, strategic exposure, environmental exposure, and institutional exposure. In their view, major sources of business risk are the exposures arising from a firm's interaction with the natural environment. Srivastava (2007) argues that the attention to supply chain management flows from concerns about environmental deterioration, including diminishing raw materials (such as water or topsoil) and the effects of increasing levels of pollution (such as unhealthy employees).

Akin to the concept of a “policy entrepreneur” in public policy (Kingdon, 1984), Walker et al. (2008) identify another perhaps underappreciated driver—the existence of a value champion, generally at a mid-level management position within a firm, who may push it to move towards higher environmental standards, often through environmentally managing the supply chain. Reference to such type of leadership is rarely mentioned in the early business literature, especially in the context of environmental supply chain management. Friedman (1992) has studied the role of environmental managers, and he concludes that, especially after 1970s, when regulation became financially significant, environmental management was upgraded to become a central focus within firms. Drumwright (1994) has stressed the role of policy entrepreneurs in explaining socially responsible purchasing policies. Similarly, Pujari et al. (2003) outline an “eco-entrepreneurship” paradigm, in which firms are recognizing links between social well-being and business success.

In sum, a range of general and more specific drivers are moving firms in the direction of environmental supply chain management, which may be viewed as private sector regulation. It is the comparisons and contrasts between this and public regulation that are the focus of this paper.

Two Brief Cases: The Sustainability Consortium and the Semiconductor Industry

The significance of supply chain management as a private sector regulatory tool may be illustrated here by two examples. The Sustainability Consortium illustrates the incentives for groups of private firms to organize as a supply chain management collective rather than individual regulator. The semiconductor industry illustrates the issues that arise within the context of one industry's supply chain, especially when it is a global industry that sells products in many jurisdictions and, as a result, is subject to multiple regulatory and supply chain regimes.

The Sustainability Consortium (TSC) is an independent global organization that creates science-based sustainability standards for consumer products. The TSC is a multi-stakeholder collaboration, jointly administered by Arizona State University and University of Arkansas. It consists of more than 90 stakeholder organizations, among them leading global retailers, manufacturers, and consumer goods firms. Non-governmental and government organizations like the World Business Council for Sustainable Development (WBCSD), World Resources Institute (WRI), the Environmental Defense Fund (EDF) and the US Environmental Protection Agency (EPA) are involved and, in some cases, are actively engaged with the Consortium and its work.

In an interview, the research and academic director at the Sustainability Consortium describes reasons why companies “look beyond their four walls” to create green supply chains. Why had the TSC and its members adopted environmental supply chain practices? As the literature review above suggests, cost reductions are a major driver. Supply chain regulation

reduces the energy used by suppliers to make products, which in term leads reduced product costs. Avoiding future regulatory risks is another important driver.

Firms see value organizing and acting collectively than only on an individual basis. Leaders in sustainability have pushed as much as they can internally. They now are looking for opportunities where they can achieve economies of scale, and this often involves working across sectors and industries and sometimes even with competitors. Some of the tangible benefits of such forms of collaboration are realized as economic benefits through greater economies of scale, resource sharing, and broadening their sphere of influence on their primary customers, i.e., retailers or brand manufacturers who operate in diverse markets. From a regulatory perspective, the advantages are: anticipating regulation, sharing of best practices to avoid future regulatory risk and compliance costs, and having a greater common voice and influence on environmental regulations. This collective action also takes the form of pre-competitive collaboration, in which firms that are competitors can work together on areas in which they are not competing directly. For example, companies from two different sectors may have common process activities, such as transportation and distribution, which do not require unique infrastructure for each industry. This enables them to work together on a common transportation system. This can maximize trucking efficiency and collective purchasing, which in turn can lead to efficiency and reduced pricing.

Brand equity also is important. Because downstream consumers and retailers have started to pay attention to sustainability, companies see market value in responding to their expectations, largely because three-fourths of a firm's valuation is based on its brand equity. Resource depletion and loss of a critical supplier due to scarcity of natural resources (like water, soil, fish) and threat of increasing natural calamities are two of the major environmental risks why

companies have an interest in sustaining these resources and hence engage in green supply chain management.

Another illustration of the role of supply chain management comes from the semiconductor industry. It is especially instructive because it is a global industry, in which the supply chain extends across several countries and regulatory regimes. Although regulation of manufacturing processes across multiple regimes is difficult, a far greater challenge is product regulation. Intel Corporation, the largest semiconductor firm in the world, has production sites in six countries but sells products in over 120. As a consequence, its products must meet a wide range of differing and changing regulatory requirements. A particular challenge is dependence on a number of chemicals that people in the industry view as critical for not only current needs but for maintaining the high rate of innovation that has characterized the industry in the past. Among these chemicals are metals (e.g., lead and cadmium), fluorocarbons, specialty gases, and other chemicals that have drawn attention from regulators and environmental advocacy groups.

Preliminary answers to some of the questions raised in this paper come from a series of interviews conducted with staff in the semiconductor industry as part of a project on strategies for managing regulatory and supply chain pressures on chemical use. Among those interviewed were staff from environmental affairs, chemical policy and evaluation, environment health and safety officers, and the legal and policy staff. Although the project's initial focus was on public regulation, it became clear in the interviews that supply chain pressures influenced chemical use and management actions within the industry.

Semiconductor firms do not sell directly to consumers. Their customers typically consist of original equipment manufacturers, such as Dell or Hewlett Packard. Similarly, they do not manufacture the chemicals that are viewed as critical to their processes and products; they rely

many chemical processors to supply materials based on their specifications. Semiconductor firms thus operate in the middle of a long, complex, and global supply chain. Chemical regulations do not apply to them directly, but they do apply to suppliers that are essential to their business. Although typically not regulated directly under programs such as the US EPA TSCA and the EU REACH (Registration, Evaluation, Authorization, and Restriction of Chemical Substances), they are regulated indirectly through constraints imposed by government on their chemical suppliers. The larger firms thus serve a role of “co-regulator” as much or more than that of regulated entity.

External pressures on firms that lead them to manage their supply chains come from many sources. An obvious one is regulatory regimes adopted in different countries. Among these, the most influential is that of the European Union (EU). In July 2006, for example, the EU directive on Restriction of Hazardous Substances (RoHS) largely banned six materials (including lead, cadmium, and mercury) from new electronics products. In particular, the lead ban required major adjustments from firms, many of which have removed lead from products. Another EU program, REACH, still is unfolding; it creates the most comprehensive and data-intensive chemicals regulatory regime in the world. The compliance challenge for firms is that, although used as a model in other countries, REACH often is adapted to suit local needs or circumstances.

In addition to these multiple regulatory regimes, firms must meet customer requirements. Customers, in turn, are responding to many sources of pressure. A major one is, of course, public regulation. A second source comes from further down the supply chain, as Wal-Mart illustrates.

One of the conclusions from the interviews is that supply chain pressures are difficult to predict, perhaps even more so than public regulation. Like government policy, private regulation is affected by multiple forces, such as media attention and pressure from activists. Timing can be more challenging than it is with private regulation, however; private regulators can act more quickly and with fewer procedural constraints. Because they operate in the middle of long supply chains, semiconductor firms are part of a system of “cascading” regulation; pressures from one source (e.g., a retailer like a Wal-Mart or a Best Buy) pass down the line from customers to suppliers (e.g., Dell). This source of pressure is often categorized as a vertical supply chain pressure. Another source of pressure is from horizontal supply chains, between and among competitors. For example, if P&G announces an initiative on sustainable sourcing of palm oil for its products, this puts pressure on its competitor Kimberly Clark. Similarly, the announcement of Apple deciding to have “halogen-free” cables puts pressure on companies like Intel, HP, etc to respond to Apple’s initiative.

The expectation is that these supply chain pressures will increase, given the availability of information on chemicals, public concerns about risks, and (in the U.S.) a lack of national action, the international regulatory regimes, international competition, and the move towards harmonization of national laws to international chemical regulations and standards.

Among the other conclusions drawn from the interviews on supply chain management were:

Many chemicals suppliers, especially in developing countries, are not experienced in dealing with chemicals regulations and required technical assistance and oversight.

Intellectual property was a major concern among semiconductor firms and chemical suppliers, reflecting the increasing emphasis on product disclosure.

Although vertical pressures are more important and obvious, firms also face horizontal pressures, in which firms adopt requirements that others may be forced to imitate.

Firms lack control over end-of-life issues. Semiconductor firms are interested in playing an active role in sourcing (especially in terms of conflict minerals) as well as in end-of-life issues of proper disposal, reuse, recycling, and product take-back.

Supply chain pressures have many of the same effects as public regulation, both positive and negative. For example, they may reduce risks and lead to use of safer substitutes, but they also may increase costs or have chilling effects on product and process innovation.

In sum, supply chain pressures matter. Like other organizations occupying intermediate positions in supply chains, semiconductor firms are both a target of regulation (from equipment manufacturers or retailers) and regulator (of chemical suppliers). Most of their concerns about private sector regulation are identical to those that arise in the public sector version: costs, time for compliance, effects on innovation, confidentiality, and overall uncertainty, among others. Yet the institutional environment in which private sector regulation occurs differs substantially from the public policy version. The semiconductor industry illustrates the role of private regulation. The Sustainability Consortium illustrates the incentives for firms to organize into private sector collectives. The next section turns to the characteristics of public regulation and the contrasts.

Characteristics of Public Sector Regulation

Use the term “regulation” in an environmental context and the immediate application is to government constraints on behavior in pursuit of some social goal. Public policy under such laws as the Clean Air Act, Clean Water Act, and Endangered Species Act come to mind. What are the characteristics of public regulation and how do they compare to private sector regulation?

1. The Need for Statutory Authority. Government agencies cannot impose constraints on the private sector without having the relevant statutory authority. Regulatory statutes establish government’s authority for addressing some set of policy problems, define the scope and limits of that authority, and often impose affirmative obligations on agencies to take a specified action.

2. *Public Notice and Comment.* A core obligation of government agencies before taking regulatory action is to provide a formal public opportunity for public comment. This obligation is defined most clearly in the Administrative Procedures Act of 1946 and has been elaborated upon in many court decisions since then. Agencies must publish at a minimum a proposed rule with sufficient detail allowing the public to comment and raise issues. The agency also is obligated to respond to issues raised in the public comments before issuing the final rule.

3. *Analytical Requirements.* Environmental regulators must comply with a long list of analysis as part of the rulemaking process. Among the standard elements of the process are those on economic impacts (including cost-benefit analysis for major rules); small business impacts, information collection provisions; and effects on other levels of government, such as assessment of unfunded mandates imposed at state and local levels. These requirements derive from a range of legislative and executive actions. Agencies also adopt analytical requirements of their own; examples are environmental justice, sustainability, children's health, and technology innovation.

4. *Executive Office Review.* For almost as long as the EPA and other environmental agencies have been in existence, presidential actions and executive orders have required a White House or Office of Management Budget (OMB) review of proposed and final rules. Beginning with "Quality of Life" reviews under Presidents Nixon and Ford, through the series of executive orders on OMB review from President Carter on, review by OMB's Office of Information and Regulatory Affairs has been a required part of the rulemaking process. The White House and OMB influence is exercised through a variety of other executive orders on regulatory procedures and evaluation and through OMB's traditional role in the preparation of the administration's budget.

5. *Legislative Oversight.* Ask any federal environmental regulator where a major source of pressure exists and the answer inevitably will be Congress. An extensive literature in public policy and political science examines relationships between regulatory agencies and Congress. In addition to the appropriations process, congressional influence comes in the form of oversight hearings, statutory authorization and reauthorization, and committee-subcommittee activities. Depending on the composition of the White House and Congress, these pressures complement each other or come into direct conflict. The EPA in recent years illustrates a pattern of conflict, especially on such issues greenhouse gases, air toxics, water quality, and mountaintop removal.

6. *Probability of Litigation.* Regulatory actions of any significance face a high likelihood of litigation. The right of aggrieved parties to make challenge actions in the federal courts is well-established procedure statutes such as the APA and in the more specific regulatory statutes. Among the issues that are open to review are the scope and basis of the agency's authority, the procedures under which a rule is issued, and the factual basis for the decision. Indeed, much of the federal regulatory process may be seen as a preparation for the nearly inevitable lawsuit.

Private sector regulation does not face a comparable set of pressures and constraints. As private entities, firms imposing restrictions or requirements on suppliers have far more discretion than do public agencies. Although they may and or may not respond to the vertical or horizontal pressures on supply chain management, they do not face anything comparable to those confronting regulators like the EPA. Their authority to impose requirements on suppliers derives from their market position, not from legislative actions. They face fewer external constraints in the form of required analyses or third-party review and oversight. Although have some kind of process for soliciting comment from their suppliers regarding regulatory action they are considering, it is largely a business decision between the customer and the supplier. They are not

obligated as a routine matter to seek any kind of broader public comment on the validity, wisdom, and fairness of their proposed actions.

Litigation, of course, is a more complicated matter for private regulators. It is possible that they will be faced with lawsuits from disgruntled suppliers or from business competitors on issues related to supply chain management. To the extent that government imposes requirements on firms that then must pass them along to their suppliers and they fail to comply, they face legal action from government. Still, it is fair to say that the legal pressures for private regulators are distinctly different from that faced by public regulators, and this should be explored in more depth.

Characteristics of Private Sector Regulation

From one perspective, firms imposing environmental restrictions (such as eliminating use of certain substances) or obligations (such as adopting certified management systems) on their suppliers are engaging in a private business relationship. Yet, like other forms of private sector regulation that were discussed earlier in the paper, these firms are aiming in part to generate a positive externality for society, in the form of environmentally preferable products and processes.

Public and private regulation differs in many ways. The authority for private firms derives from their market position and power, not the coercive powers of the state. Suppliers may withdraw from private regulation simply by ending a relationship; they rarely have that option in the public sphere. The sanctions for public violations include fines, negative publicity, and even criminal prosecution. For private violations, the sanction is losing the customer, which in many cases will be more debilitating than the public sector sanctions. Public sanctions may be applied under prescribed legal processes, while applications of private ones are largely left to the discretion of the firm. Although government provides various forms of compliance assistance to

organizations it regulates, especially small firms, it is strictly limited due to resources constraints and enforcement philosophy. Private regulators may take a more collaborative and capacity-building role with respect to suppliers, especially if they are a critical part of the supply chain.

What would we need to know to achieve a better understanding of private regulation and its comparisons or contrasts with the public version? Some of what is known is addressed to some degree in the business literature. This sheds light on such issues as reasons for managing supply chains; the form private regulation takes; and a partner versus enforcer style among firms.

Thinking of private sector regulation in public policy terms, however, suggests other issues. How do firms decide which of the available policy options (e.g., banning or restricting materials, requiring product or process checklists, requiring ISO certification or membership in other green clubs, prescribing risk assessment or life cycle methods) should be imposed? What consultations occur between regulator and supplier organizations? Do regulatory firms conduct any form of standard policy analysis (risk assessments or economic analysis before imposing requirements on suppliers)? How do regulators monitor compliance? What procedures are used to drop a supplier? Are these specified in the contractual relationship or available to the public? Are the requirements themselves and procedures for applying them available for review by suppliers or even the public? What legal vulnerabilities do regulators face? To what extent will regulators expend time and money to improve supplier compliance before ending a business relationship? Viewing private regulation as a policy and not just a business issue opens a new line of inquiry.

Table 1 below suggests questions that could be pursued in studying supply chain management as a public policy issue. Although the first group of questions often is addressed in

the business literature, the remaining ones are not and offer practical value from a public policy perspective.

The second and third categories of illustrative questions relate more directly to the study of supply chain management as a private version of public regulation. The second is analogous to the issues that have been central to debates over regulatory process in the United States. The form and extent of consultation obviously has been a central issue for government regulators. Similarly, such analytical methods as risk assessment, life-cycle analysis, and cost-benefit/cost-effectiveness analysis have both influenced and been a subject of a great deal of political debate. The questions regarding monitoring and enforcement strategies parallel issues that have been central in public regulation, although in a fundamentally different strategic context. The third set of questions goes directly to the definition of private sector regulation as a public policy issue. Although representatives of government agencies may participate in some way as “stakeholders” in private sector policy making, it appears to be largely ad hoc and informal. Similarly, a better understanding of supply chain practices could valuable, policy-relevant knowledge about the value that private sector regulation does and could add to improving public sector regulation.

Table 1: Questions Relevant to Designing and Implementing Private Sector Regulation

Business Motivations and Policies

1. Why do firms engage in supply chain regulation?
2. What are the principal external pressures and how are they translated into supply chain rules?
3. What forms does private sector regulation of suppliers take?

Regulatory Processes, Analyses, and Issues

4. What consultation processes do firms typically engage in with suppliers, customers, and agencies?

5. What analyses do firms conduct in formulating supply chain environmental policies?
6. How do firms monitor suppliers for conformance?
7. What options are available and used for suppliers that are having difficulty in complying?
8. How do supply chain processes and policies in the US compare to those in other countries?

Public Policy Overlaps and Implications

9. How do supply chain policies interact with (complement or conflict with) public regulation?
 10. What is the “value-added” from private sector regulation given public policy goals?
 11. Are there ways for more effectively linking private and public sector goals and policies?
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Implications for Public Policy

A theme of this paper is that private sector regulation through environmentally related supply chain management may be viewed in the same terms as those used to study public regulation. Indeed, many of the issues with public regulation also exist in the private variation.

Several issues are characteristic of both public and private sector regulation. One set of issues relates to the design of requirements, such as the scope of regulation, time periods for compliance, and the costs of implementing standards. Another relates to the effects of regulation on intellectual property rights; this is a major issue in government chemicals policy as well as for supply chains. Other issues relate to the risk-risk tradeoffs involved in regulatory choices, including the risks of substitutes taking the place of restricted chemicals. A major source of contention in both public and private regulation is the availability of substitutes. Finally, there is debate over the actual risks imposed by chemicals in processes and products, with industry arguing that chemicals should be regulated on the basis of actual risks than the potential hazard.

An argument of this paper is that private sector regulation may usefully be examined from a public policy perspective. Indeed, approaching it in these terms has several implications. In sum, the expansion of private sector regulation suggests several questions for public policy.

1. Should private firms with supply chain leverage be viewed as “co-regulators”? When private firms impose requirements based on government standards, they act as co-regulators. Based on the need to protect the reliability and efficiency of their supply chains, as well as to avoid liability and negative publicity, they extend government’s capacity to promote compliance. Private regulators also provide an important source of compliance and technical assistance to their suppliers, and may function more effectively in that role than do government regulators. After all, they have a business incentive to improve supplier performance, while regulators may be more focused on generating enforcement results and lack resources for providing assistance. In sum, there may be greater incentive in the private sector for improving performance along a range of environmental indicators than in detecting and sanctioning non-compliance.

The notion of organizations as co-regulators while also being objects of regulation is not as alien as it might at first seem. Publicly owned sewage treatment works, for example, have long been both targets of EPA rules as well as partners in regulating indirect dischargers. Such relationships may offer useful models for firms with leverage over their supply chains and who potentially could serve in a formalized capacity as co-regulators with government agencies.

2. Should government policy makers learn about and incorporate supply chain policies in the development and design of regulatory and other actions? Regulation typically proceeds as a process of developing and applying rules based on limited information about the characteristics of regulated firms. In contrast, a “backward mapping” approach begins with an understanding of the context in which firms operate and designs regulations that incorporate such knowledge.

Private sector regulators do more than develop standards or restrict use of materials; they also may provide information and technical assistance to suppliers as part of managing their business.

The problem is that regulatory agencies are not built with the capacity to understand the context in which firms operate and to use such information in designing their programs. They are poorly structured in terms of their capacity to understand the business and strategic context in which firms operate. In the now decades-long debate over the role of voluntary programs at the EPA, for example, there has been limited appreciation of the benefits of working collaboratively with business organizations. Such EPA programs as Climate Leaders, Performance Track, Design for the Environment, and Green Suppliers Network provide one of a few, non-adversarial forums to learn about business. One expert active in supply chain environmental policies stressed private sector interest in having the EPA as a “partner, expert, and networker rather than just regulator.”

3. Should public and private regulators coordinate standard-setting more systematically?

The growth in non-governmental certification and standard setting creates many opportunities for public-private coordination. An illustration is President Obama’s Executive Order 13514 on “Federal Leadership in Environmental, Energy, and Economic Performance,” issued in 2009. In setting standard and targets for federal agencies, it incorporates by reference LEED, EPEAT, and other certification systems. Yet many other such systems that could be supported jointly by the public and private supply chain policies. Combining the market power of the federal government with that of large firms such as Wal-Mart would constitute substantial leverage for encouraging more environmentally beneficial goods and services in the marketplace. Such coalitions as The Sustainability Consortium would enhance those opportunities for leveraging supply chains.

4. *Are supply chain practices relevant to selecting and designing policy instruments in public policy?* For years, technology-based regulation was the instrument of choice for achieving environmental objectives. Regulators were directed to develop and apply standards based on the definition of “best available technology” or other standard with some consideration of cost. More recently, strategies based on information disclosure, emissions and effluent trading, and public-private partnerships have been incorporated into the program designs. Information disclosure, for example, is used in the Toxic Release Inventory and other community-right-to-know programs, in product labeling and warning, and the 1996 amendments to the Safe Drinking Water Act. The concept of emissions trading is reflected in the acid rain allowance-trading program under the Clean Air Act, point/non-point water quality trading, and proposals for carbon dioxide trading.

Could and should regulators design programs differently given the existence of supply chain requirements? The policy instruments available to public agencies include regulation of emissions and discharges, product restrictions and bans, market trading mechanisms, fees, and information disclosure, among others. Knowledge of private sector policies and instruments could allow agencies to designing policies that are more consistent with private sector regulation. An illustration is product disclosure requirements that large firms often impose on suppliers. Government agencies contemplating similar requirements could study the private sector policies to identify opportunities for consistency in design. In the interviews with semiconductor firms, for example, a concern was divergence or incompatibility among private and public regulation.

5. *What can private regulators learn from the experience with public regulation?* At first glance this may seem like a strange question, given the steady stream of criticism that regulatory agencies have borne over the years. To be sure, public agencies have to meet many procedural, analytical, and participation requirements that need not apply to the private sector. Yet there are

reasons for private regulators to at least consider lessons to draw from public sector counterparts. Agencies have developed a range of analytical methods in economic and cost-effectiveness analysis, risk assessment, environmental impact assessment, and others that may or not be applied in private sector regulation. In addition, many agencies have adopted innovative approaches to engaging in public dialogue, seeking the views of regulated firms, and applying consensus-building techniques to processes for standard setting. This experience may offer useful lessons for private sector regulation.

Implications for the Study of Regulatory Policy

The arguments in this paper have been that (1) supply chain management by firms exercising substantial market leverage goes beyond business objectives by creating positive environmental externalities for society (2) this form of private sector regulation warrants more attention and study from a public policy perspective and (3) it may be possible to increase the effectiveness of private sector regulation for achieving public social and private business goals and (4) more systematic study of the similarities and contrasts may provide valuable lessons for both kinds of regulation. This paper does not advocate any kind of interference with private sector and supply chain regulation, but simply a greater awareness of the relationships among them and an analysis of the possible gains from a policy perspective of conducting further research in this area.

To conclude, a research program that would meet these objectives could begin with the following questions:

1. In what ways (procedural, analytical, substantive) does private sector supply chain regulation resemble or differ from public sector regulation?

2. Do analytical issues addressed through either individual firm supply chain regulation or collective regulation through such organizations as TSC provide the information that is needed to generate public goods (a better and safer environment) as well as private ones (a more efficient) and reliable supply chain?

4. What are the motivations, at a far more detailed level than is discussed here—for firms to organize into supply chain collectives, and what are the implications for the public good produced by such organizations?

5. What methods could be used to measure the benefits and costs of private sector supply chain regulation?

Conclusions

A general conclusion of this paper is that there should be more explicit integration of public and private sector research on environmental performance, as well as on a range of other issues. The growing emphasis in contemporary society on public-private partnerships, on using networks rather than hierarchies, the blurring of public and private authority, and the stress on the concept of “governance” over “government” underscores the need for such integrating research. Business and public policy scholars need to look beyond their disciplinary silos to a world in which the production of public environmental goods is rapidly changing.

References

- Allen, S. (2012). Changes in supply chain structure: the impact of expanding consumer choice. *Food Supply Chain Management*, 314.
- Cousins, P. D. and Lamming, R.C. (2004). The role of risk in environment-related supplier initiatives. *International Journal of Operations and Production Management* 24 (6), 554.
- Drumwright, M. E. (1994). Socially responsible organizational buying: Environmental concern as a noneconomic buying criterion. *Journal of Marketing* 58 (3), 1.
- Esty, D.C. and A.S. Winston. (2006). *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage*. New Haven, CT: Yale University Press.
- Friedman, F. B. (1992). The changing role of environmental manager. *Business Horizons*, 25-28.
- Fiorino, D. J. (2011). *Implementing Sustainability in Federal Agencies: An Early Assessment of President Obama's Executive Order 13514*. Washington, DC: IBM Center for the Business of Government.
- Green, K., Morton, B., and New, S. (1996). Purchasing and environmental management: interactions, policies, and opportunities. *Business Strategy and the Environment*, 5, 188-197.
- Gunningham, N., Kagan, R.A, and Thornton, D. (2003). *Shades of Green: Business, Regulation, and Environment*. Palo Alto, CA: Stanford University Press.
- Hart, S. (1995). Beyond greening: Strategies for a sustainable world. *Harvard Business Review*, 68-76.
- Haufler, V. (2001). *A Public Role for the Private Sector: Industry Self-Regulation in a Global Economy*. Washington, DC: Carnegie Endowment for International Peace.
- Hall, J. (2001). Environmental supply-chain innovation. *The Journal of Corporate Environmental Strategy and Practice (GMI)*, 35.

- Handfield, R., Sroufe, R., and Walton, S. (2005). Integrating environmental supply chain strategies. *Business Strategy and the Environment*, 14, 1-19.
- Kingdon, J. (1984). *Agendas, Alternatives, and Public Policies*. Boston: Little, Brown
- Lee, K. H. and Kim, W.J. (2011). Integrating suppliers into green product development: An empirical case study of the semiconductor industry. *Business Strategy and the Environment*, 20, 527-538.
- Mitnick, Barry (1980). *The Political Economy of Regulation: Creating, Designing, and Removing Regulatory Forms*. New York: Columbia University Press
- Markley, M. J. (2007). Exploring future competitive advantage through sustainable supply chains. *International Journal of Physical Distribution and Logistics Management*. 37 (9), 763.
- Porter, M. C. and van der Linde (1995). "Toward a New Conception of the Environment-Competitiveness Relationship," *Journal of Economic Perspectives*, 9: 119-132.
- Pujari, D., Wright, G., and Peattie, K. (2003). Green and competitive: Influences on environmental new product development performance. *Journal of Business Research*, 56, 657-671f
- Potoski, M. and Prakash A (2006). "Covenants with Weak Swords: ISO 14001 and Firms' Environmental Performance," *Journal of Policy Analysis and Management*, 49, 745-769.
- Potoski, M. and Prakash, A. (2009). *Voluntary Programs: A Club Theory Perspective*. Cambridge, MA: MIT Press.
- Press, D. and Mazmanian, D.A. (2009). Toward Sustainable Production: Finding Workable Strategies for Government and Industry, in Vig, N.J. and Kraft, M.E. (Eds.) *Environmental Policy: New Directions for the 21st Century*, 8th ed. Washington, DC: CQ Press.
- Reinhardt, F. L. (2000). *Down to Earth: Applying Business Principles to Environmental Management*. Boston: Harvard Business School Press.
- Roberts, S. (2002). Supply Chain Specific? Understanding the Patchy Success of Ethical Sourcing Initiatives. *Journal of Business Ethics*, 44(2/3), 159-170.

- Rao, P., Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance? *International Journal of Operations & Production Management* 25 (9–10), 898–916
- Srivastava, S. (2007). Green supply-chain management: A state-of-the-art literature review. *International Journal of Management Reviews*, 9(1), 53-80.
- Vachon, S. and Klassen, R.D. (2008). Environmental management and manufacturing performance: The role of collaboration in the supply chain. *International Journal of Production Economics*, 111, 299-315.
- Walker, H., Sistro, D.L., and McBain, D. (2008). Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors. *Journal of Purchasing & Supply Management*, 14, 69-85.
- Zhu, Q.H., Sarkis, J. (2006). An inter-sectoral comparison of green supply chain management in China: drivers and practices. *Journal of Cleaner Production* 14 (5), 472–486