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STAKEHOLDER INFLUENCES ON SUSTAINABILITY PRACTICES IN THE CANADIAN FOREST PRODUCTS INDUSTRY

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We examined how managers' perceptions of different types of stakeholder influences in the Canadian forestry industry affect the types of sustainability practices that their firms adopt. Both influences involving withholding of resources by social and ecological stakeholders and those involving directed usage of resources from economic stakeholders were found to drive such practices. We found that the industry and its stakeholders have moved beyond a focus on early stages of sustainability performance such as pollution control and eco-efficiency. However, more advanced practices, such as those involving the redefinition of business and industrial ecosystems where firms locate in a region so that they can exchange and utilize wastes generated by other firms, are in their infancy. Stakeholders and firms in the industry are focused on the intermediate sustainability phases involving recirculation of materials and redesign of processes including sustainable harvesting of lumber.

The application of sustainable development or sustainability to business strategy has been actively debated (e.g., Gladwin, Kennelly, and Krause, 1995; Hart, 1995; Shrivastava, 1995; Starik and Rands, 1995). The concept of the 'triple bottom line,' which involves the reconciliation of the economic, social, and environmental performance of an organization (Elkington, 1998), has begun to resonate with many corporate leaders whose job it is to assess the impact of the external environment on their organizations (McGee, 1998). Yet, achieving sustainability is a journey for businesses and, while many are on the path, no firm is sustainable (Ramus, 2001).

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Clarkson (1995) argued that transferring corporate social responsibility (including social and environmental performance) into business objectives is best undertaken using a stakeholder perspective—more specifically, by transferring intangible social and environmental issues into tangible stakeholder interests. Accordingly, our objective was to empirically examine associations between different types of sustainability practices adopted by individual firms within a single industry context and different types of stakeholder influences as perceived by managers of individual firms.

We carefully chose our research context, the forest products industry, to reflect an industry that has the potential to progress to advanced sustainability practices. First, this was suitable for an examination of stakeholder influences on strategy due to the multiplicity of (often conflicting) stakeholder pressures affecting firms in the Canadian forestry industry. Second, this industry, unlike those such as mining and petroleum dependent on non-renewable and extractive resources, has a

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renewable resource base and can potentially meet the most commonly quoted definition of sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (UNWCED, 1987: 8).

CORPORATE SUSTAINABILITY STRATEGY

Over the last decade, firms have begun to proactively integrate environmental considerations into their business strategies (Buysse and Verbeke, 2003; Henriques and Sadorsky, 1999; Sharma and Vredenburg, 1998), and have moved beyond regulatory responses that involve costly investments in controlling polluting wastes and emissions (Walley and Whitehead, 1994). These proactive strategies include eco-efficient strategies for reducing wastes, materials, and energy use (Hart and Ahuja, 1996) and preventing pollution at sources (King and Lenox, 2001; King and Shaver, 2001; Russo and Fouts, 1997) via the redesign of processes and products (Klassen and Whybark, 1999). Fewer firms have ventured any further by locating to sites where they can use the waste products of other facilities, which in turn can use the firm's wastes (industrial eco-systems), or by fundamentally redesigning their business models. A prominent example of business redefinition is Interface's redefinition of its product as 'floor comfort' via leasing of carpets. Interface is responsible for its product life cycle including take-back and recycling of fiber (Hart and Milstein, 1999). Fewer still have looked at the social impacts of their upstream global supply chains in terms of fair wages, social justice, income distribution, or the impact of resource use on future generations.

While more advanced corporate sustainability strategies have been discussed in the literature, empirical research has focused mainly on measuring waste emissions as the sole indicator of corporate sustainability performance (e.g., Cordano and Frieze, 2000; King and Lenox, 2000, 2002; Klassen and Whybark, 1999). This is partly because, in a quest for reliable quantitative measures of a firm's sustainability performance, U.S.-based researchers have mined the toxic release inventory database (TRI). Moreover, the focus of public policy and regulations, especially in the United States, on end-of-pipe pollution control may have also influenced the current empirical focus on emissions. Regulations in the United States (and several other jurisdictions) have yet to incorporate policies to promote corporate adoption of broader sustainability elements such as redesign of products and processes to reduce environmental and social impacts, product stewardship, protection of habitats, operation within a region's environmental carrying capacity, protection of the interests of future generations, as well as the equitable balancing of the interests of all segments of society (Gladwin *et al*., 1995; Hart, 1995, 1997; Starik and Rands, 1995). Due to the difficulty of obtaining reliable and accurate measures that can compare firms on more advanced aspects of a firm's sustainability performance, scholars have often relied on individual case studies and anecdotal evidence to develop a more holistic understanding of the evolution of corporate sustainability.

We went beyond a singular focus on waste emissions as a measure of sustainability by content analyzing annual reports, environmental reports, public documents, and websites of firms in order to examine specific reported *actions* that each company had undertaken to meet the fundamental principles of sustainability. Prior to specifying our theoretical arguments, we also conducted exploratory interviews with managers in six forest product firms to understand the relevant stakeholder pressures and sustainability practices in our research context.

While individual forestry firms can potentially develop strategies to maintain and renew their resource base for future generations, the path toward sustainability requires changes in business models, appropriate technologies, scale of operations, organizational forms, and performance objectives. For example, highly capitalized forestry companies with expensive equipment based on current technologies have to clear-cut large areas in order to achieve minimum productivity levels. Sustainable companies may have to use knowledge-based technologies that enhance value creation from fewer selected trees.

Henriques and Sadorsky (1999) showed that managerial perceptions of the importance of stakeholder pressures were associated with a more proactive stance toward environmental commitment by Canadian firms. These authors did not examine individual practices of Canadian firms

but rather their overall postures on environmental commitment (Hunt and Auster, 1990; Roome, 1992). We went beyond a preliminary examination of managerial perceptions of overall stakeholder pressures by examining the links between different types of stakeholder influence strategies (Frooman, 1999) and different types of sustainability practices adopted by individual firms. By focusing on Canadian forest products firms who are all members of a tightly knit industry association, we examined whether firms within a common institutional environment exhibited variations in their sustainability practices, and whether managers in these firms perceived differential stakeholder influences on the type of sustainability practices adopted by their firms.

The rest of the paper is organized as follows. We begin by drawing on the stakeholder influence literature (e.g., Freeman, 1984; Frooman, 1999; Rowley, 1997; Wood, 1994) to propose a typology of strategies that different stakeholders will adopt to influence corporate sustainability practices, depending on their resource interdependence with the focal firm and the type of their stake. We next present a series of hypotheses linking different types of influence strategies with different types of sustainability practices. The arguments in this section are supported by insights from qualitative interviews conducted with managers in the industry. We then describe the research method for the survey conducted among Canadian forest product firms to gather data on stakeholder influences and the secondary research conducted using company documents to develop independent measures for sustainability practices. We finally report our findings and conclude with a discussion of implications of our findings for research, practice and policy making.

STAKEHOLDER INFLUENCES ON SUSTAINABILITY PRACTICES

The stakeholder literature argues that stakeholders who are important, primary (Clarkson, 1995; Freeman, 1984), or considered salient by managers in terms of their power, legitimacy, and urgency (Mitchell, Agle, and Wood, 1997), influence organizational strategies. Stakeholder influences can be direct or indirect based on the resource dependence (Pfeffer and Salancik, 1978) between the focal firm and the stakeholder (Frooman, 1999), or based on the position of the focal firm in the stakeholder network (Rowley, 1997). Stakeholders that do not control resources critical to the focal firm's operations or those who do not have the attributes of saliency (Mitchell *et al*., 1997) may be able to influence the focal firm only indirectly via other stakeholders (Frooman, 1999; Rowley, 1997). Several stakeholders considered secondary by managers in the past, such as local communities, non-governmental organizations (NGOs), and international regimes (such as the Intergovernmental Panel on Climate Change which coordinated the Kyoto Protocol), have become more salient in assessing the social and ecological impacts of business.

Stakeholder influences

Based on resource interdependence (Pfeffer and Salancik, 1978) between the focal firm and its stakeholders, Frooman (1999) categorized stakeholder influences into 'usage' and 'withholding' as well as 'direct' and 'indirect' strategies. He presented four scenarios of resource interdependence.

The first scenario is where the focal firm and its stakeholders have high resource interdependence on each other. Frooman (1999) argued that under such conditions, the stakeholders would be likely to use a *direct* strategy to influence the firm's *usage* of the resources so that their objectives were accommodated. For example, in the forestry industry, major customers such as construction companies and furniture manufacturers have worked with supplier forestry companies to implement certification standards and more sustainable timber-harvesting practices.

Under the second scenario, stakeholder power, stakeholders control critical resources but are not in turn resource dependent on the firm. In such a scenario Frooman (1999) argued that stakeholders would be more likely to use a *direct* strategy to *withhold* resources from the focal firm unless it adopted certain practices. For example, Canadian regulators can deny a forestry company license to operate on Crown (government) lands unless it adopts certain sustainable practices.

In a third scenario, when the focal firm and the stakeholders have no resource interdependence on each other, the stakeholders would be likely to exercise *indirect* strategies via other stakeholders to either influence *usage* of resources that the other

stakeholder holds or influence the other stakeholder to *withhold* the resource from the firm altogether. The type of strategy adopted would depend on whether the stakeholders exercised influence via stakeholders who, in turn, were resource interdependent with the focal firm or via those that held stakeholder power. For example, environmental groups have actively participated in environmental assessment hearings in Canada to influence provincial government agencies to deny renewal of Crown leases on forestry lands to firms (indirect withholding strategy). Environmental groups have also picketed large buyers such as Home Depot and Lowe's in the United States and forced them to change their procurement practices so that they buy wood products only from Canadian companies that adopt sustainable practices (indirect usage strategy).

In the fourth scenario presented by Frooman (1999), the stakeholder group is resource dependent on the firm but the firm has no resource dependence on the stakeholder group (e.g., minor suppliers and easily replaceable employees). In such a situation, the firm's sustainability practices are unlikely to be influenced by stakeholder pressures.

The resource dependence relationships between the focal firm and its stakeholders, the type of influence strategy adopted by stakeholders (as adapted from Frooman, 1999), and examples of stakeholders in each category, are shown in Table 1.

Due to the variety of economic, social, and ecological stakes involved, corporate sustainability solutions transcend organizational boundaries (Westley and Vredenburg, 1991) and require the firm to take cognizance of perspectives from a wide range of external and internal stakeholders. Therefore, Frooman's (1999) framework is especially useful in explaining the types of influences that stakeholders will exercise on a firm's sustainability practices.

Table 1. Resource dependence between the firm and stakeholders and stakeholder influence strategies (based on Frooman, 1999)

Firm's dependence on stakeholders	Stakeholder's dependence on firm	
	High	Low
High	*Interdependence* Customers Investors/shareholders Financial institutions Insurers Trade associations Local communities[a] Suppliers[b] Managers[c] ↓ Direct-usage influence strategy	*Stakeholder power* Regulators/government agencies End consumers Media[d] Local communities[a] Activist shareholders ↓ Direct-withholding influence strategy
Low	*Firm power* Suppliers[b] Employees[c] ↓ Limited influence	*No interdependence* Environmental NGOs Social NGOs Special interest groups/activists Aboriginal groups International regimes (UNEP, Kyoto) ↓ Indirect usage/withholding influence strategy

[a] Local communities are resource interdependent for jobs and economic growth on the firm but they are also concerned about ecological and social impacts and can contest the firm on its environmental and social impacts via regulatory hearings and protests and can withhold license to operate.
[b] Suppliers may influence a firm's strategy, depending on their size relative to the focal firm, the proportion of their business that the firm represents, and the proportion of inputs that the supplier represents for the firm.
[c] A distinction is made between managers who are a unique and valuable resource for the firm and junior employees who can be easily substituted in factor markets.
[d] The media can influence other stakeholder groups to withhold legitimacy (a valuable resource) from the firm. Therefore, it has stakeholder power.

Stakeholder influence strategies and sustainability practices

Pollution control

The earliest phase of corporate sustainability performance focused on end-of-pipe pollution control. Books such as Rachel Carson's *Silent Spring* (Carson, 1962) raised awareness about the negative health and environmental impacts of emissions from smoke stacks, effluents flowing into water bodies, and toxic chemicals improperly disposed of by businesses. Local communities mobilized into 'not in my backyard' movements that influenced regulators to require the reporting of emissions via public databases such as the Toxic Release Inventory (TRI) in the United States and the enactment of regulations such as the U.S. Superfund Amendments and Reauthorization Act, 1986 (SARA) for the clean-up of wastes and emissions.

Pollution control includes activities such as installing equipment for the capture of toxic emissions such as sulfur dioxide, treatment of chemical effluents before discharging them into water bodies, detoxification of wastes prior to disposal, making wastes biodegradable, and clean-up of contaminated sites. Forest product companies adopting this approach install secondary treatment plants to reduce the toxicity of discharged pulp mill effluents such as chlorinated organics measured as adsorbable organo-halogens (AOX) per ton of pulp as well as elements such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), dioxins, and furans. In their forestry operations, these companies may reduce the toxicity of water effluent containing chemical pesticides, and leave some rows of trees uncut to prevent soil erosion and contamination of watersheds.

Almost all industrialized countries now regulate toxic wastes and emissions. Pollution control is a standard practice that corporations must undertake to remain within the law. Such practices require the assimilation of wastes (Gladwin *et al*., 1995) and are usually well defined by regulations in terms of the technologies and processes to be used by firms in an industry, the concentration of chemicals that can be discharged, and the treatment and disposal of these wastes through recovery systems. Therefore, pollution control practices are defined in situations of stakeholder power (Frooman, 1999) where the regulators and government agencies have the direct power to enact laws and enforce organizational responses and the independent media have the power to publicize violations of regulations by firms and damage the firm's reputation. With the introduction of directors' and officers' liability for infringement of pollution laws during the 1990s, regulators have become the most important stakeholders in driving pollution control practices. It is unlikely that firms will vary significantly in their pollution control strategies or activities since any variation would infringe the law and invite penalties and liabilities for senior managers. Henriques and Sadorsky (1999) found that firms that focused on regulatory compliance (or pollution control) perceived both regulators and media as important, while the firms that focused on proactive voluntary practices did not.

> *Hypothesis 1: Firms will undertake pollution control sustainability practices when subjected to withholding influences from regulators.*

Eco-efficiency

End-of-pipe pollution control requires substantial investments that do not pay back and have a negative impact on profitability (Walley and Whitehead, 1994). Therefore, many corporations were quick to realize that it was cheaper to reduce process wastes before they were generated instead of investing in expensive equipment for clean-up. Moreover, reducing process wastes also improved productivity and efficiency of material use. Firms realized that by using less material and energy, they not only lowered their negative environmental impacts but also improved their bottom line. During the 1990s, firms saved hundreds of millions of dollars by plucking the 'low-hanging fruit' of excessive wastes, material, and energy use (Hart and Ahuja, 1996).

Eco-efficiency (Hart, 1995, 1997) or conservation approaches (Gladwin *et al*., 1995) involve the changing of processes and products to reduce wastes at source, reducing the use of energy and materials, water conservation, and greater fuel efficiency. Firms improve the efficiency of their operations to reduce material use, install more energy-efficient equipment and lighting, and reuse or recirculate steam and water. Pulp mills may modify operations to elementally chlorine-free (ECF) processes to reduce chlorine toxicity. Forestry operations will use low-input agriculture that reduces chemical and pesticide use. Sawmills will use

more efficient processes to extract more value from a tree (for example, use wood chips and tree branches) and reduce and reuse the wastes generated.

Initial investments in conservation often result in substantial cost savings due to the elimination of wasteful use of energy and materials (Hart and Ahuja, 1996). This 'low-hanging' fruit is harvested through a series of small to medium internal investments that are often undertaken based on clear economic rationale (Christmann, 2000; Hart, 1995; Russo and Fouts, 1997; Sharma, 2000). These practices are also undertaken by imitating the best practices of other firms in the industry. These best practices may be disseminated via industry or trade associations. Since these practices have positive economic impacts, it is likely investors will support such practices and reinforce internal organizational and managerial motivations for undertaking eco-efficiency practices. It became evident during our exploratory interviews that eco-efficiency had been widely disseminated in the industry and Canadian firms were fairly advanced in such practices. For example, the paper mill manager of the Canadian subsidiary of a large Scandinavian forest products company explained:

> It is interesting that while our Scandinavian operations are much more advanced in more sustainable wood harvesting and advanced chlorine free processes, we have been able to inform our head office and European mills about advanced eco-efficiency techniques that mills adopt in North America.

Hypothesis 2: Firms will not undertake eco-efficiency sustainability practices in response to influences from external stakeholders.

Recirculation

Most businesses are engaged in the first two phases of corporate sustainability practices of controlling pollution and eco-efficiency. Perhaps fewer have undertaken the next phase of improving the recirculation of inputs and outputs in their operations. Improving recirculation involves the reduction of the ratio of virgin to recycled material use in each succeeding time period (Gladwin *et al*., 1995). In their forestry operations, firms will improve regeneration so that the total number of trees being planted each year is increasingly higher than the trees being harvested. Paper and wood mills will reuse process waste, develop by-products from internal wastes, and improve recycling.

Canadian pulp and paper mills have made major investments in systems, processes, training and organizational change to introduce recirculation systems for paper. For example, while Canada accounts for 19 percent of the world's paper and timber trade, it exports between 75 and 80 percent of its total production (Industry Canada, 1999). It is therefore not a major recycler of paper. However, both European and U.S. markets have enacted regulations or follow practices that require increasing recycled content in paper and newsprint respectively. According to managers in the industry and reports in the media, these changes have been influenced by environmental NGOs who pressured major wood, paper, and newsprint customers to boycott forest products without a minimum recycled content. Under pressure from its markets, Canadian firms have had to invest in systems and capabilities to collect over two million tons per year of waste paper from the United States alone in addition to large quantities from Western Europe to enhance circulation.

On the other hand, cheap and easy access to lumber in Canada has not motivated many firms to develop sources of alternative fibers as basic inputs for manufacturing paper, even though Canadian universities have developed technologies and processes for use of non-wood based fibers (CPPA, 2000). This is because market pressures for increasing recycled content are much higher than pressures for the adoption of alternative fibers. According to the plant manager of a large Canadian newsprint mill:

> The environmental groups and regulators in our markets are more concerned about the pre- and post-consumer recycled content rather than the source of the virgin fibre. If they start hitting us on the source, we will have to make more fundamental changes and much larger investments.

In contrast to the short-term profitability enhancement implications of eco-efficiency, recirculation requires investments in organizational systems and processes that may not result in any directly visible short-term savings or may generate benefits after a time lag via a reduction in the cost of virgin materials and opening up of markets. Therefore, firms may not undertake these investments as readily as eco-efficiency. Recirculation is likely to be driven by demands of social

and ecological stakeholders who use indirect usage strategies by putting pressure on major customers of pulp, newsprint, paper, and wood products to demand these changes from the supplier forest product firms. As a result, forest product companies began to publicize their forest regeneration rates and paper/newsprint recycled content rates in the mid-1990s in their annual reports and marketing materials in order to send signals to their major customers and environmental NGOs in the United States and Western Europe. Therefore:

Hypothesis 3: Firms will undertake recirculation sustainability practices when subjected to usage influences from customers.

Eco-design

A few firms have begun to make more fundamental design changes in their products and processes by reducing or eliminating packaging, making products more durable and easy to disassemble and reuse, examining the life cycle environmental impacts of their products, services and operations, and eliminating harmful and toxic chemicals. This includes analyzing the materials and energy used in the production, transportation and consumption of products/services as well in their disposal, and the impact of operations on ecosystems.

The products of the forestry industry tend to be commodities with low differentiation. Therefore the scope for changes in product eco-design is limited and the main changes have been in the reduction and take-back of packaging used for shipping paper products. Changes at the process level have been more significant. Pulp and paper mills have adopted totally chlorine-free (TCF) processes to eliminate chlorine waste altogether. Similarly, process changes have completely eliminated toxins such as dioxins and furans even though regulations allow small concentrations of wastes.

Design changes to reduce ecological impacts below levels demanded by regulations are unlikely to have obviously visible economic benefits. Only proactive firms who link such practices to long-term learning, reputation building, and operating legitimacy (Hart, 1995; Sharma and Vredenburg, 1998) will undertake internally motivated fundamental design changes. For other firms, investments in TCF processes and other process changes to eliminate toxic wastes have occurred due to zero tolerance by local communities, environmental groups, and media that do not accept the specifications and risk levels allowed by regulations and demand the complete elimination of toxins. These stakeholders have used multiple usage strategies ranging from protests at company facilities, militant action against polluting companies, releasing reports to media about the negative health impacts of toxic discharges, lobbying the government to enhance regulation, participating in public environmental assessment and review processes to deny operating licenses to companies, and pressuring and boycotting customers so that they cancel orders from companies with toxic emissions (even within regulated limits) or demand design changes and information before orders are confirmed.

The pulp mill manager of an integrated forestry firm in eastern Canada explained the combined community and environmental group pressures under which they reduced toxic discharges well below regulated levels:

> The corporate office does not require us to exceed regulations. Why do we go beyond regulations? We live in the community and our families and friends are exposed to these chemicals and use the river and woods for recreation. Even though the chemicals may be within regulated risk levels, we will not be able to operate by invoking legal protection if the community will not accept emissions allowed by law. Moreover, environmental groups increase the community awareness about health impacts of chemicals. I personally think this is a positive thing.

Similarly, the forestry manager of the subsidiary of a U.S. forestry firm explained:

> Our initiatives for preserving old growth trees and watersheds exceed regulations and head office policies. We know the realities on the ground and our head office doesn't.

Hypothesis 4a: Firms will undertake eco-design sustainability practices when subjected to withholding influences from social and ecological stakeholders.

Eco-design may involve new technologies and employees may play a role in generating ideas during their interactions with other managers in trade association meetings and internal task forces.

Hypothesis 4b: Firms will undertake eco-design sustainability practices when subjected to usage influences from economic stakeholders.

Ecosystem stewardship

Ecosystem stewardship involves the firm taking responsibility for the environmental and social impacts of its operations on the carrying capacity of ecosystems and the societal/cultural heritage of local communities and social groups. Ecosystem stewardship in the forest products industry can take two major forms. In forestry operations, it involves sustainable harvesting to meet the ultimate objective of no net loss of genetic, species, or ecosystem diversity (Gladwin *et al*., 1995). This includes species habitats, animal migration patterns, the diversity of flora and fauna, wetlands and watersheds, as well as the traditional rights of indigenous and aboriginal people. This requires harvesting practices that reduce disturbance and stress on habitats, polyculture forestry (to improve biodiversity) and maintain buffer zones for species, communities, and water bodies.

While most regulations do not include biodiversity indicators, these are included in some certification systems such as the Forest Stewardship Council (FSC) or the Canadian Standards Association—Sustainable Forestry Management (CSA-SFM) standard. Some advanced regulatory jurisdictions such as British Columbia's Forest Practices Code, 1995 incorporated diversity into their regulations. A few forestry companies in British Columbia such as McMillan Bloedel (now a division of Weyerhaueser Canada) have changed their harvesting methods from clear cutting to selective harvesting by using knowledge-based and less capital-intensive approaches to enhance the value generated from fewer trees. Many companies have also adopted sustainable land management practices that preserve natural habitats, species migration corridors, and biodiversity.

In the pulp, paper, and wood manufacturing operations, stewardship involves establishing operational cycles or industrial ecosystems that create a closed loop of inputs and outputs between several different facilities or companies so that the net ecological and social impacts on a regional ecosystem are within its carrying capacity. Even though there are several documented examples of industrial ecosystems that are established or are being developed (e.g., Shrivastava, 1995), we could not find examples of forest products firms that have participated in such closed loop systems.

Social and ecological stakeholders such as environmental NGOs, local communities, and wildlife protection groups are concerned about ecological diversity and exercise influences directly, or indirectly via the firm's economic stakeholders (such as customers) on whom the firm is resource dependent. Harvesting methods of Canadian forestry firms are influenced by withholding stakeholder influence strategies such as disruption of operations by environmental NGOs and local communities. These stakeholders participate in environmental assessment proceedings and also lobby to influence regulators to withhold renewal of leases on Crown lands. In fact, local communities, citizen groups, and environmental NGOs organized to influence the provincial government of British Columbia to revise its Forest Practices Code in 1995 to ensure that harvesting methods preserved biodiversity and protected habitats and promoted social equity for indigenous people. These groups have also indirectly withheld legitimacy from targeted forestry firms by influencing the media to cover their activities unfavorably. They have frequently disrupted forestry company operations. For example, local communities, NGOs, and celebrities ranging from famous musicians and actors undertook militant action in Clayoqout Sound in British Columbia to prevent logging trucks from going in to cut an old-growth temperate rainforest. Eventually McMillan Bloedel announced changes in its harvesting practices.

Changes in harvesting methods may not have immediately visible economic benefits. Economic stakeholders such as customers will demand certification so that they can satisfy their own customer (end-consumers) who are concerned about the sustainability of the forestry products they buy. Harvesting practices will be based on market needs for different certification methods such as the Forest Stewardship Council (FSC), ISO 14001, or the CSA-SFM. Pressures from customers arise as a result of protests and boycotts by end-consumers and environmental NGOs. For example, Home Depot and Lowe's stores across North America have been boycotted by end-consumers and picketed by environmental NGOs (Brooks, 2000; Stueck, 2000), protesting against the selling of forest products that are not certified as coming from sources with sustainable harvesting and land management practices. Therefore, ecosystem stewardship, especially sustainable harvesting and land management practices, has been undertaken in response to both direct withholding strategies as well as indirect usage and withholding influence

strategies adopted by social and ecological stakeholders via other stakeholders. The chief forester of a Canadian subsidiary of a U.S. forestry company explained their shift to selective logging:

> The benefits of selective logging, either to our bottom line or to the long-term sustainability of our forestry resources, are not entirely clear. However, we can't compete in our European markets as a company that clear-cuts. We are undergoing FSC certification to reassure our major customers.

Hypothesis 5a: Firms will undertake ecosystem stewardship sustainability practices when subjected to withholding influences from social and ecological stakeholders.

Hypothesis 5b: Firms will undertake ecosystem stewardship sustainability practices when subjected to usage influences from economic stakeholders, especially via demands for certification.

Business redefinition

Sustainable business models involve business redefinition that visualizes a business future with no negative impacts on the environment and social equity (Hart, 1997; Hart and Milstein, 1999). These changes would involve redefining the forest products business in terms of the consumer functionalities delivered. Paper and newsprint may be entirely substituted by electronic or other means of communication that would not require extractive resources such as trees. Business models may focus on generating revenue from services instead of products, such as the renting out of digitized products over the Internet instead of selling heavily packaged products via traditional high energy-consuming distribution systems.

Forestry firms may generate part of their revenues through ecotourism and forestry and habitat education. Firms may target emerging markets and marginalized segments of society through new technologies that help preserve their forest cover by integrating them into value systems that deliver electronic- rather than paper-based communication. Energy may be entirely obtained from wind and solar power sources using conversion technologies such as fuel cells that minimize ecological footprints. These business models would benefit all stakeholders via solutions that provide return for investors, preserve ecosystems, and promote social equity.

It is likely that economic stakeholders such as customers and investors are concerned about the need to manage immediate pressures from social and ecological stakeholders with the least disruption to existing operations. Therefore, economic stakeholders are likely to focus on short-term regulatory issues related to pollution control, market issues related to sustainable certification, and economic issues such as eco-efficiency. Only when social and ecological stakeholders without an economic stake are focused on long-term sustainability impacts of business, intra-generational equity, human rights, and long-term ecosystem health, will they challenge fundamental business models and frames of reference. For example, Greenpeace wants to see a complete substitution of wood by alternative fibers such as kenaf and hemp. Sometimes, major crises and clashes with social and ecological stakeholders, such as Royal Dutch-Shell's highly publicized clashes with the Ogoni people in Nigeria and the debacle over the disposal of the Brent Spar offshore platform in the North Sea, catalyze a fundamental shift in thinking about the business model. Shell has initiated such a process of examining the long-term sustainability impacts of its business.

Hypothesis 6: Firms will undertake business redefinition sustainability practices when subjected to withholding influences from social and ecological stakeholders.

RESEARCH METHODS

The Canadian forestry products industry was chosen as the setting because it has a renewable resource base that can allow individual firms to potentially progress to advanced sustainability practices. We conducted exploratory interviews with forestry managers and mill managers in six Canadian integrated forest product firms to develop better understanding of the sustainability practices and stakeholder influences relevant to the industry. It is important to note that during the 2 years preceding the data collection the forest sector, which is highly fragmented, has moved toward consolidation and greater efficiency. There were more mergers in the first 4 months of 2000 than in all of 1999. In 1999, the Forest Products Association of Canada (FPAC, previously known as the Canadian Pulp and Paper Association—CPPA) had 44

members. Consolidation has subsequently reduced FPAC membership to 31 members. During this transition, we were able to collect sustainability data for 38 companies.

Our exploratory interviews indicated that the location of the facility matters in determining the set of external stakeholders. Some facilities are located on, or in proximity to, lands on which First Nations (aboriginal) communities have traditional rights; others are located within close proximity to large urban areas; some are located close to national parks and sensitive ecological habitats that NGOs and governments seek to protect; and/or others are located close to rivers or oceans subject to Federal clean water regulations. Therefore, our unit of analysis was the facility level.

Two sets of data were collected: a sustainability practice database and a stakeholder influence database. The sustainability practices database was collected exclusively from 1999–2000 secondary sources including annual reports, environmental reports (if available) and company websites (if available). While most corporate annual reports and websites report aggregate financial data, the environmental investments and the sustainability practices were reported for the individual facilities in which they were undertaken, even in corporate documents.

A content analysis (Krippendorff, 1980; Weber, 1985) of annual reports, environmental reports (if available), and company websites (if available) was used to collect data on sustainable practices. The annual report is the most publicized and visible document produced by publicly owned companies (Wolfe, 1991). This document is the principal means by which a corporation explains past performance, expectations of future results, and any other information its managers feel is important to convey (Staw, McKechnie, and Puffer, 1983). A content analysis of these documents was chosen over self-reporting methods in order to ascertain a company's priorities *vis-à-vis* sustainable practices rather than what a single manager believes are the company's priorities. Data on various sustainable practices were categorized and coded (see the Appendix for a complete description).

The stakeholder influence database was collected using the survey method. Facility-level surveys and a follow-up mailing were sent to 249 units (approximately 60% of these facilities were publicly owned) between August and October 2000. Sixty-three respondents replied, resulting in a 25 percent response rate (78% of respondents were from publicly owned facilities and 22% were from privately owned facilities). The majority of the respondents (57%) were located in Alberta and British Columbia, 35 percent in Ontario and Quebec, and 8 percent in the Maritime provinces. The type of facilities included sawmill/wood-processing units (42.9%), paper mills (36.5%), and integrated facilities (20.6%). In order to assess the size of the organization as a whole to which these facilities belonged, the number of employees was collected from annual reports. Of those facilities that were associated with public companies, the mean number of employees was 9772. Individual facilities sold products to customers worldwide. Respondents' customers were located in the United States (74.2%), Canada (46.8%), Western Europe (35.5%), Asia (21%), and Latin America (4.8%).

We then matched the facility survey respondents with the corporate publicly reported sustainability practices data. More specifically, we ran factor analyses on the complete sustainable practices database to reduce the number of individual practices (see below) and then matched the factors with the associated firm-level facility. Of the 38 companies for which we collected sustainability data, 22 companies had at least one facility respond.[1] The match resulted in 49 facility respondents with sustainability data.[2]

Measures

Sustainability practices

The company documents were content analyzed based on categories of sustainability practices described in the previous section (Gladwin *et al*., 1995; Hart, 1995, 1997; Hart and Ahuja, 1996; Russo and Fouts, 1997; Starik and Rands, 1995; Natural Resources Canada, 2000), that is, pollution control, eco-efficiency, recirculation, eco-design, ecosystem stewardship, and business redefinition. Two factor analyses were performed. The first used items that highlighted early phases of sustainability initiatives, namely pollution control and eco-efficiency. The second factor analysis used

[1] In some cases, a company had two facilities and both responded (100% response rate), while in other cases seven facilities were sent surveys but only one facility responded.

[2] At times in our analyses, our dataset is slightly reduced by missing survey observations.

sustainability practices of more advanced sustainability phases. The two sets of items were separated because the two sets of practices reflected very different environmental strategies: reactive vs. proactive (Russo and Fouts, 1997; Sharma and Vredenburg, 1998). The first set involves following regulatory guidelines (to avoid penalties) or reducing energy costs, both of which are undertaken because organizations can see clear links between these activities and ability to operate within the law and enhance their profitability. The practices included were detoxification, synthetic reduction, fuel efficiency, and energy efficiency.

The second set of practices involves greater management involvement and resource commitment (Russo and Fouts, 1997). These require investments in organizational systems and processes that may not result in any directly visible savings and may generate benefits in the long term via license to operate, reputational premiums, and business models for future competitiveness (Hart, 1997). The practices included here are sustainable yield management, access restrictions, reforestation, durable design, de-packaging, internal recycling, designing products for easy disassemble or reuse, product life-cycle analysis and the use of alternative fibers. The Appendix provides a complete list of the practices and the coding employed.

Table 2 presents the results of the factor analyses. In the first factor analysis, two factors emerged with large positive eigenvalues (1.78 and 1.17), which together accounted for 73.6 percent of the total variance (with subsequent varimax rotation). In Table 2a, pollution prevention is captured by detoxification and synthetic reduction, and eco-efficiency is captured by fuel efficiency and energy efficiency. In the case of practices that require strategic organizational changes and major investments (Table 2b), four factors resulted with large positive eigenvalues (2.2, 2.1, 1.7, and 1.1) and together accounted for 79.4 percent of the total variance. Factor 1 captures sustainable harvesting practices. Included in this factor are sustainable

Table 2. Results of sustainable practices factor analyses

(a) Items reflecting the early phases of sustainability practices[a]

Item	Factor 1: Eco-efficiency	Factor 2: Pollution control
Detoxification	0.10	**0.84**
Synthetic reduction	0.08	**0.86**
Fuel efficiency	**0.87**	0.02
Energy efficiency	**0.84**	0.17
Alpha coefficient	0.64	0.63

[a] Loadings stronger than ±0.50 are in bold type.

(b) Items reflecting the sustainability practices that require organizational investments[a]

Item	Factor 1: Sustainable harvesting	Factor 2: Recirculation	Factor 3: Eco-design	Factor 4: Use of alternative fibers
Sustainable yield management	**0.91**	−0.09	−0.04	−0.20
Access restriction	**0.77**	0.12	−0.26	0.15
Reforestation	**0.80**	0.03	0.37	0.11
Durable design	−0.11	**0.85**	−0.12	−0.11
De-packaging	−0.05	**0.83**	0.20	−0.09
Internal recycling	0.28	**0.72**	0.08	0.21
Designing product for easy disassemble or reuse	−0.05	−0.12	**0.89**	0.04
Product life-cycle analysis	0.14	0.38	**0.83**	−0.10
Use of alternative fibers	0.02	−0.03	−0.03	**0.98**
Alpha coefficient	0.78	0.68	0.74	N/A

[a] Loadings stronger than ±0.50 are in bold type.

yield management, access restriction, and reforestation. The second factor captures the recirculation of inputs and includes such practices as durable design, de-packaging, and internal recycling. The third factor reflects practices associated with eco-design. These include designing products for easy assemble or reuse and the use of product life-cycle analyses. The last factor consisted of one practice, namely the use of alternative fibers. The alpha coefficients, used to evaluate construct validity, are presented at the bottom of each table and suggest that our categorization is relatively robust.

Withholding and usage influence strategies

The respondents' general perceptions of stakeholder withholding and usage influence strategies were collected via our facility-level survey instrument. The withholding influence strategies examined include customers canceling orders, directors'/officers' liability, environmental group protests at company facilities, environmental group protests at customer sites (e.g., Home Depot), environmental groups disrupting company operations, environmental groups releasing reports to the media, environmental groups lobbying the provincial government, local community protests at company facilities, and local community disruptions of operations. Each respondent was asked to denote to what extent these influences were important in shaping their company's sustainability policies/practices (1 = no impact to 7 = complete influence). Table 3 presents the descriptive statistics and correlations of the sustainable practices (factors) and withholding influence strategies.

The usage influence strategies examined include respondents' perceptions of customer demand for information on product sustainability, customer demand for information on corporate practices, customer demand for product certification, local community participation in environmental reviews, environmental group participation in environmental reviews, employee information via taskforce recommendations, individual employee suggestions, and information via trade conferences/seminars. Each respondent was asked to denote to what extent these influences were important in shaping their company's sustainability policies/practices (1 = no impact to 7 = complete influence). Table 4 presents the descriptive statistics and correlations of the sustainable practices (factors) and usage influence strategies.

The sustainability hypotheses require six dependent variables (the six sustainability factors as determined by our data) and a number of independent variables (withholding and usage strategies). Previous research on environmental strategy (Russo and Fouts, 1997; Sharma, 2000) suggest that organization size is an important control variable. Larger organizations are argued to have greater resources and larger-scale operations to create organizational slack for innovation search behavior (Russo and Fouts, 1997) and may be subject to greater public scrutiny, prompting greater social responsiveness (Pfeffer and Salancik, 1978). In the data analysis, we took the logarithm of an organization's number of employees as a proxy to control for firm size. In the data analysis, we also included a measure to control for ISO 14001 certification. The measure was included to take into account the fact that some facilities may or may not be in the process of establishing (or have established) ISO 14001 protocols. In general, when such protocols are established, the organization publicizes this event to signal to their stakeholders that they are 'good citizens.' In fact, there is evidence from the United States that firms whose downside risk of choosing the wrong standard is minimal and who face the greatest scrutiny are more likely to be early adopters of ISO 14001 certification (King and Lenox, 2001). Consequently, moving towards certification can be seen as a way to temper stakeholder pressure and we include it as a control variable in our analysis.

Analyses

The methodology used to examine the hypotheses is the general linear model (GLM). The GLM method was chosen over the multiple regression approach for three reasons. First, GLM allows us to analyze a number of dependent variables at one time. Second, GLM is able to provide a solution for the normal equations when the independent variables are not linearly independent.[3] Third, unlike the multiple regression model, which is usually applied to cases where the independent variables

[3] Let X be the matrix of independent variables. If the independent variables are not linearly independent, the inverse of the X′X matrix would not exist and the multiple regression method would not yield a solution. This problem is solved in GLM by using a generalized inverse of the X′X matrix in solving the normal equations (StatSoft, 2001).

Table 3. Descriptive statistics and correlations of sustainable practices and withholding influence strategies

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Pollution control	0.17	1.05														
2. Eco-efficiency	0.16	0.96	0.10													
3. Recirculation	−0.03	0.85	0.62**	0.56**												
4. Eco-design	0.31	1.52	0.00	0.00	−0.40**											
5. Sustainable harvesting	0.13	0.66	−0.12	0.28*	0.04	−0.21										
6. Use of alternative fibres	0.06	1.03	−0.02	0.26	−0.03	−0.08	0.03									
7. Customers cancel orders	1.74	1.44	−0.12	0.26	−0.03	0.01	0.16	−0.07								
8. Directors'/officers' liability	3.65	1.71	−0.17	0.08	−0.11	0.28	0.02	0.11	0.17							
9. Enviro. protests at company facilities	1.42	0.84	0.00	0.12	−0.14	0.23	−0.01	−0.04	0.30*	0.25*						
10. Enviro. protests at customer sites	1.81	1.08	0.18	−0.00	0.03	0.19	−0.07	−0.06	0.15	0.11	0.40**					
11. Enviro. disrupting operations	1.57	1.01	0.07	−0.03	−0.19	0.31*	−0.20	−0.07	0.24	0.18	0.78**	0.44**				
12. Enviro. releasing reports to media	2.76	1.39	0.16	0.00	0.00	−0.01	0.24	−0.07	0.29*	0.32*	0.30**	0.24	0.28*			
13. Enviro. lobbying provincial govt.	2.87	1.28	0.19	−0.11	−0.11	0.35*	−0.07	−0.20	0.18	0.40**	0.20	0.29*	0.27*	0.73**		
14. Local protests at company facilities	1.49	0.98	−0.19	0.22	−0.02	−0.07	0.16	−0.06	0.54**	0.36**	0.45**	0.19	0.48**	0.19	0.13	
15. Local disruptions of operations	1.50	1.14	−0.06	0.06	−0.06	0.07	−0.02	−0.09	0.37**	0.39**	0.49**	0.21	0.51**	0.06	0.18	0.81**

* $p < 0.05$ (2-tailed); ** $p < 0.01$ (2-tailed)

Table 4. Descriptive statistics and correlations of sustainable practices and usage influence strategies

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12
1. Pollution control	0.17	1.05												
2. Eco-efficiency	0.16	0.96	0.10											
3. Recirculation	−0.02	0.85	0.62**	0.56**										
4. Eco-design	0.31	1.52	0.00	0.00	−0.40**									
5. Sustainable harvesting	0.13	0.66	−0.12	0.28*	0.04	−0.21								
6. Use of alternative fibres	0.06	1.03	−0.02	0.25	−0.03	−0.08	0.02							
7. Customer demand info on product sustainability	2.60	1.42	0.26	0.04	0.12	0.15	0.00	−0.09						
8. Customer demand product certification	2.84	1.64	0.18	−0.14	−0.17	0.49**	−0.13	−0.07	0.72**					
9. Local comm. participate in enviro. review	2.35	1.26	−0.06	0.06	0.06	0.06	0.05	−0.30*	0.33**	0.23				
10. Environmental group participate in enviro. review	2.54	1.34	0.11	0.10	0.13	0.07	0.07	−0.27	0.32*	0.29*	0.74**			
11. Employee info via individual suggestions	2.85	1.28	0.05	0.00	−0.03	0.12	0.14	−0.40**	0.24	0.17	0.44**	0.32*		
12. Employee info via taskforce recom.	2.84	1.49	0.18	0.10	0.08	0.19	0.03	−0.31*	0.33*	0.22	0.37**	0.29*	0.82**	
13. Info. from trade conferences/seminars	3.18	1.39	0.06	0.17	0.01	0.08	0.27	0.18	0.27*	0.30*	0.31*	0.34*	0.42**	0.36**

* $p < 0.05$ (2-tailed); ** $p < 0.01$ (2-tailed)

are continuous, the GLM is frequently applied to analyze any ANOVA or MANOVA design with categorical predictor variables, any ANCOVA or MANCOVA design with both categorical and continuous predictor variables, as well as any multiple or multivariate regression design with continuous variables (StatSoft, 2001).

We employed the multivariate GLM approach to estimate the impact of withholding influence strategies on sustainability practices, as well as the impact of usage influence strategies on individual sustainability practices.[4]

RESULTS

Hypothesis 1, which predicts that firms will undertake pollution control sustainability practices when subjected to withholding influences from regulators (Table 5), was not supported. The only positive impact was firm size. The larger the company, the greater the use of pollution control sustainability practices, probably because larger companies generate greater amounts of wastes and emissions. No stakeholder, using either withholding or usage (Table 6) strategies, influenced this sustainability practice, suggesting that since the industry has moved beyond the pollution control phase, breaking the law may not be a distinguishing practice among forest products companies.

Hypothesis 2, which predicts that firms will not undertake eco-efficiency sustainability practices in response to usage influence strategies from external stakeholders, was supported, in that no external stakeholder using either withholding (Table 5) or usage (Table 6) strategies influenced the use of eco-efficiency sustainability practices. Of course, we did not test for internal drivers of eco-efficiency practices and our results only show that external stakeholder influences for undertaking these practices were not perceived by managers.

Hypothesis 3, which predicts that firms will undertake recirculation sustainability practices when subjected to usage influences from major customers, was supported (Table 6). Customer demand for information on product sustainability had a positive and significant impact on recirculation sustainability practices. Furthermore, no other usage influence strategy was found to have an impact on these practices (Table 5). The only other positive impact was firm size. The larger the company the greater the use of recirculation sustainability practices, probably because larger companies sell in a variety of markets and can not avoid customer demands for more sustainable forest products. Smaller companies, on the other hand, can find niche markets or single buyers who may not be so demanding.

Hypothesis 4a, which predicts that firms will undertake eco-design sustainability practices when subjected to withholding strategies from social and ecological stakeholders, was supported by our results (Table 5). Directors'/officers' liability, environmental protests at company operations, and environmental groups lobbying provincial government each had a positive and significant impact on eco-design sustainability practices. Surprisingly, environmental groups releasing reports to the media and local protests at company facilities had a negative and significant impact on eco-design sustainability practices. Furthermore, certification had a positive and significant impact on eco-design sustainability practices.

Hypothesis 4b, which predicts that firms will undertake eco-design sustainability practices when subjected to usage strategies from economic stakeholders, was also supported by our results (Table 6). Customer demand for product certification and employee information via taskforce recommendations each had a positive and significant impact on eco-design sustainability practices. Surprisingly, customer demand for information on product sustainability had a negative and significant impact on eco-design sustainability practices.

Ecosystem stewardship is proxied by sustainable harvesting practices. Hypothesis 5a, which predicts that firms will undertake ecosystem stewardship sustainability practices when subjected to withholding influences from social and ecological stakeholders, was supported by our results. Using Table 5, we observe that environmental groups releasing reports to media have a positive and significant impact on sustainable harvesting practices, while their lobbying provincial government has a negative and significant impact on sustainable harvesting practices. Certification has a positive and significant impact on sustainable harvesting.

Hypothesis 5b, which predicts that firms will undertake ecosystem stewardship sustainability

[4] Environmental group protests at customer sites, environmental groups disrupting operations, environmental group participation in environmental reviews, and local disruptions of operations are not included in our final analysis because they were found to not have an impact on our sustainability practices.

Table 5. Multivariate general linear model results of the relationship between sustainability practices and withholding influence strategies[a]

Independent variables	Dependent variables					
	Pollution control H1	Eco-efficiency H2	Recirculation H3	Eco-design H4a	Sustainable harvesting H5a	Use of alternative materials H6
Intercept	−3.963*** (−2.92)	−3.299** (−2.35)	−3.495*** (−3.06)	−0.020 (−0.01)	−0.200 (−0.26)	−0.668 (−0.46)
Customer canceling orders	−0.142 (−1.16)	0.096 (0.76)	−0.048 (−0.65)	0.062 (0.37)	0.013 (0.18)	−0.053 (−0.41)
Directors'/officers' liability	−0.184 (−1.77)	−0.000 (−0.01)	−0.113 (−1.29)	0.335** (2.39)	0.003 (0.05)	0.045 (0.40)
Environmental group protests at company facilities	0.317 (1.38)	0.213 (0.89)	−0.048 (−0.25)	0.758** (2.44)	−0.172 (−1.31)	0.094 (0.41)
Environmental groups lobbying provincial government	0.173 (1.06)	−0.146 (−0.86)	−0.139 (−1.01)	0.713*** (3.23)	−0.273*** (−2.93)	−0.190 (−1.09)
Environmental groups releasing reports to media	−0.138 (−0.87)	−0.100 (−0.60)	−0.026 (−0.20)	−0.474** (−2.21)	0.187** (2.06)	0.028 (0.17)
Local protests at company facilities	0.062 (−0.32)	0.109 (0.54)	0.158 (0.97)	−0.679** (−2.59)	0.087 (0.78)	0.019 (0.09)
Certification	−0.056 (−0.39)	−0.134 (−0.90)	−0.179 (−1.48)	0.491** (2.51)	0.265*** (3.22)	−0.252 (−1.64)
Size [ln(employees)]	0.569*** (3.32)	0.477*** (2.70)	0.586*** (4.06)	−0.449 (−1.94)	−0.037 (−0.38)	0.225 (1.24)
R^2	0.450	0.290	0.430	0.543	0.425	0.147

[a] The number of observations is 41. T-values in parentheses. *** $p < 0.01$ and ** $p < 0.05$

Table 6. Multivariate general linear model results of the relationship between sustainability practices and usage influence strategies[a]

Independent variables	Dependent variables					
	Pollution control H1	Eco-efficiency H2	Recirculation H3	Eco-design H4b	Sustainable harvesting H5b	Use of alternative materials H6
Intercept	−4.245*** (−3.13)	−2.420 (−1.60)	−3.983*** (−3.77)	2.581 (1.35)	0.083 (−0.13)	0.542 (0.37)
Customer demand for information on product sustainability	0.144 (1.02)	0.071 (0.45)	0.242 ** (2.19)	−0.654*** (−3.27)	0.069 (1.01)	0.028 (0.18)
Customer demand for product certification	0.076 (0.64)	−0.217 (−1.63)	−0.181 (−1.95)	0.574*** (3.42)	−0.239*** (−4.16)	−0.075 (−0.58)
Local community participating in environmental review	−0.184 (−1.51)	0.017 (0.13)	0.046 (0.49)	−0.069 (−0.40)	−0.090 (−1.54)	−0.181 (−1.36)
Individual employee suggestions	−0.084 (−0.35)	−0.080 (−0.30)	−0.056 (−0.30)	−0.488 (−1.44)	0.1573 (1.35)	−0.4376 (−1.65)
Employee information via taskforce recommendations	0.168 (0.80)	0.081 (0.35)	0.074 (0.45)	0.748** (2.53)	−0.240** (−2.37)	0.026 (0.11)
Information via trade conferences/seminars	−0.113 (−0.96)	0.140 (1.06)	−0.089 (−0.97)	−0.007 (−0.04)	0.117** (2.41)	0.332** (2.57)
Certification	−0.116 (−0.73)	0.049 (0.27)	−0.140 (−1.13)	0.364 (1.61)	0.404*** (5.24)	−0.146 (−0.88)
Size [ln(employees)]	0.545*** (3.12)	0.279 (1.43)	0.514*** (3.78)	−0.490 (−1.99)	−0.092 (−1.09)	0.097 (0.51)
R^2	0.388	0.224	0.451	0.477	0.613	0.359

[a] The number of observations is 41. t-values are in parentheses. *** $p < 0.01$; ** $p < 0.05$

practices when subjected to usage influences from economic stakeholders, was supported by our results. Sustainable harvesting practices were influenced by usage strategies from economic stakeholders (Table 6). Information via trade conferences/seminars had a positive and significant impact on sustainable harvesting practices. Surprisingly, customer demand for product certification and employee information via taskforce recommendations each had a negative and significant impact on sustainable harvesting practices.

Note, however, that certification itself had a positive and significant impact on sustainable harvesting. Our results suggest that, in the case of sustainable harvesting, there is a struggle between the economic needs of the organization and the demands placed on the organization by such stakeholders as customers and employees.

Hypothesis 6, which predicts that firms will undertake business redefinition sustainability practices when they are subject to withholding influences from social and ecological stakeholders, was not supported (Table 5). Here business redefinition sustainability practices are proxied by the use of alternative fibers. The only strategy to impact the use of alternative materials was information via trade conferences/seminars—a usage influence strategy undertaken by employees. This is not surprising since the larger firms, who are members of the CFPA, have large investments in existing technologies and are reluctant to fundamentally change their technologies and business models, even when pressured by environmental NGOs such as Greenpeace.

DISCUSSION AND CONCLUSIONS

This study integrates literature about stakeholder influence strategies (Freeman, 1984; Frooman, 1999; Rowley, 1997; Wood, 1994) and ecologically sustainable organizations (Gladwin *et al.*, 1995; Hart, 1995, 1997; Starik and Rands, 1995) to develop and empirically test a series of hypotheses to explain how managerial perceptions about different types of stakeholder influence strategies will be associated with different types of corporate sustainability practices adopted by individual firms in the Canadian forest products sector. The novelty of our study is that not only are we able to show stakeholder influences on sustainability practices, but we are also able to shed some light on how different types of stakeholder pressure affect individual sustainability practices.

Our findings suggest that member firms of the CFPA cannot be discriminated based on the early phases of sustainability performance: pollution control and eco-efficiency. For these relatively medium to large firms—all members of the CFPA—these two practices are standard and individual firms can only be distinguished on practices undertaken as part of more advanced phases of sustainability performance. On the other hand, even though the industry appears to have gone beyond pollution control and eco-efficiency, at the other end of the spectrum individual firms have barely begun to make fundamental changes in their business models. More advanced sustainability practices—eco-design and ecosystem stewardship—require substantial investments in organizational systems and processes and are occurring under pressure from both withholding influence strategies from social ecological stakeholders and usage influence strategies from economic stakeholders. In the case of sustainable harvesting, however, pressures from economic stakeholders (via usage influence strategies) appear to have a negative impact on such practices. One possible explanation for this result is that such practices do not result in any immediate and directly visible savings. Consequently, such influences are meeting some resistance from firms.

Moreover, the advanced sustainability practices are voluntary initiatives, which tend to be long term in nature. In undertaking such practices, a firm does not have a set of guidelines or regulations to turn to when addressing criticisms from stakeholders. Consequently, when criticisms are launched against the firm regarding these practices, it must assess the potential damage these criticisms/disruptions may have on their reputation and legitimacy in the eyes of its economic and social/ecological stakeholders. Recirculation practices, on the other hand, are governed by both domestic and foreign markets and their respective regulatory processes (recycling guidelines). As a result, a firm can claim that it is following a set of guidelines/regulations in one or more of its markets to counter negative publicity.

A remarkable finding is the multiplicity of withholding influences (regulators via directors and officers liability, environmental NGO protests at company facilities, and environmental NGO lobbying provincial government), usage influences

(customer demand for certification), as well as employee influences (involvement in environmental taskforces), were perceived by managers on eco-design. This indicates that as the industry has moved beyond the early phases of pollution control and eco-efficiency, most stakeholders are now focused on more fundamental changes in design of processes, products, and systems to prevent pollution. The influence of regulations via directors' and officers' liability was a significant influence on eco-design since in Canada, unlike the United States, regulations are focused on environmental outcomes in terms of water and air quality rather than on wastes and emissions. This allows individual firms flexibility of design approaches in meeting air and water quality targets rather than focusing on waste clean-up. Therefore, the industry appears to be in the eco-design or pollution prevention phase of sustainability performance and has begun to undertake early steps in eco-stewardship and business redefinition.

Another interesting finding is that size of the firm matters for the earlier phases of sustainability performance: pollution control (larger quantities of wastes and greater visibility), eco-efficiency (larger potential savings through material and energy conservation), and recirculation (larger savings through reduction in use of virgin material). However, size does not matter for the more advanced stages of eco-design, eco-stewardship, and business redefinition. These phases require innovation and knowledge-based approaches, both unrelated to size effects. Therefore, smaller firms can potentially create competitive niches via disruptive innovations in more sustainable product designs or business models (Hart and Milstein, 1999). The other control variable, certification, was significantly associated with sustainable harvesting and eco-design. This is logical because all forestry certification systems require changes in harvesting methods. Certification systems also affect pulp and paper production processes (totally chlorine-free processes).

Limitations and research implications

Three limitations of this study should be recognized. First, the number of observations was limited by the fact that the Canadian forestry industry has experienced a great deal of consolidation. Consequently, we employed empirical techniques that imposed fewer assumptions on the data (i.e., a large sample is not required) when testing our hypotheses. Future research would entail collecting a larger facility-level database with the encouragement of head offices enabling the researcher to include stakeholder pressures as moderating variables (Baron and Kenny, 1986) when examining the relationship between sustainability practices and stakeholder influence strategies.

The second limitation is the fact that our cross-sectional analyses do not shed light on changes in sustainability practices over time. Here, yearly follow-up surveys conducted over a number of years would be able to capture whether or not sustainability practices were affected by the same stakeholder influence strategies over time and whether the same types of stakeholder pressure affected the same stakeholder influence strategies over time. Longitudinal data would also reveal which sustainability practices become more or less salient for industry stakeholders over time, and how these practices relate to societal interpretation of sustainable development.

The third limitation is the fact that we focus our attention on certain operational elements of sustainability practices of individual firms. Future research would attempt to examine organizational sustainability holistically or at multiple levels (Daly and Cobb, 1994; Jennings and Zandbergen, 1995; Starik and Rands, 1995). It would be meaningful to study how the relative influence of stakeholder networks at regional, national, and international levels influence corporate sustainability practices. At what stage in an organization's path to sustainability do institutional forces become less important than stakeholder pressures? Is it possible that institutional forces play a larger role in developing organizational understanding and meaning of sustainability (Hoffman, 1999), while stakeholder influences are more important in shaping sustainability practices? A comparative analysis of institutional pressures and stakeholder influences on firms in a common institutional/industrial context would reveal how organizations develop an understanding of sustainability and begin to act accordingly. Our hope is that this study provides a starting point for such an examination.

Managerial implications

The Canadian forest products industry seems to have moved beyond pollution control and eco-efficiency to the next phase of sustainability practices,

namely those that require significant investments in knowledge-based organizational systems and practices. For incumbent firms, these phases can be more difficult to undertake due to the fact that any savings may not be directly visible or may occur only in the long term. Our results demonstrate the ambiguity that can arise when demands from economic stakeholders appear to move companies away from practices like ecosystem stewardship (e.g., sustainable harvesting). For these firms, business redefinition and redesign of products and processes appear to be in their infancy and seem only to be influenced by information derived from trade conferences/seminars. However, this is precisely the space within which smaller incumbents can seize competitive advantage via disruptive innovations (Hart and Milstein, 1999) since incumbent firms are locked into existing technologies, customers, and investments (Christensen, 1997).

Sustainability practices in the Canadian forestry industry appear to be affected by both withholding influences, which tend to be more confrontational, and usage influence strategies, which tend to be more collaborative. As noted earlier, however, the usage influence strategies appear to have the effect that is opposite to the one intended in some cases. If collaborative efforts continue to fail, the use of more confrontational approaches may become more common. Therefore, for companies that resist undertaking the more advanced practices, the intensity of social and ecological stakeholder influences are likely to increase, resulting in a reduction in managerial zone of discretion (Sharma, 2000) and negatively affecting their corporate reputation.

Consequently, our results support the need for a firm to dynamically engage its stakeholders so as to systematically identify, explore, and integrate their views and keep its fingers continuously on the 'sustainability pulse' of its core and distant constituents (Hart and Sharma, 2004). Even though an individual group of stakeholders may not have the power to affect the firm on its own, its ability to self-organize, spread its views via the Internet, and find common cause with other stakeholder groups suggests that a company ignores even remotely affected stakeholders only at its own peril (Hart and Sharma, 2004).

Firms can proactively avoid adversarial conflicts and/or generate knowledge for disruptive innovation by training its line managers in life-cycle analysis to help them understand how the operations of the firm, its suppliers, and customers create negative social and environmental impacts on remote and distant stakeholders. Considering their forestry resources as a non-human stakeholder that provides an important function within its eco-system may allow firms to adopt a more holistic view and identify potential process innovations to lessen the negative impact of its operations and increase profits by generating returns from the true value of a forest (medicinal plants, eco-tourism, rare woods, biodiversity) rather than just the low-value timber that it yields.

Implications for public policy

If companies do not engage their stakeholders proactively on their sustainability concerns, these groups may demand that governments intervene and impose regulatory provisions to protect their communities and ecological environment. The Oxley–Sarbanes Act is a prime example of a regulation that came about as a result of some companies not being able to meet stakeholders' needs insofar as financial reporting is concerned. Regulatory prescriptions impose solutions on firms that constrain their strategy and limit their innovative capacity.

The Canadian Constitution does not clearly spell out distinct jurisdictional responsibilities for federal and provincial governments and their responsibilities can overlap, creating the potential for uncertainty regarding the level of government that has the authority to regulate for specific environmental problems and objectives. As a result, the division of powers regarding environmental policy between the various levels of government flows to a great extent from jurisdiction over natural resources (Vourc'h, 2001). Each of the provinces and territories has considerable jurisdictional power over environmental and social regulations.

Consequently, for many resource and environmental areas and issues, responsibility is shared between federal and provincial (or territorial) governments in consultation with affected aboriginal groups. The implication, of course, is that the two levels of government have to cooperate to act effectively. The shared nature of environmental jurisdiction has led all parties involved to use a stakeholder approach when dealing with environmental issues (Vourc'h, 2001). Various ministerial councils, such as the Canadian Council of

Ministers of the Environment, use this approach. Although the amount of public scrutiny of government decision making and setting environmental policy was minimal until the 1990s, today the stakeholder approach implies a broader consultation with the private sector, individuals, environmental, and other interest groups who may be affected. The cooperative model of negotiation between the government regulator and the polluting party (Vourc'h, 2001) allows governments to collaboratively achieve pollution targets without passing specific regulations. Therefore, the Canadian public policy framework is a useful example to look at for developing a formal system of multi-stakeholder engagement including businesses and government. This would avoid adversarial and legalistic solutions that constrain corporate strategy and divert corporate resources toward unproductive uses such as political lobbying and litigation.

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APPENDIX: SUSTAINABLE PRACTICES

Pollution control

Detoxification

1. No information.
2. Compliance (phase out persistent substances—chlorinated compounds, dioxin, furans—reduction on non-persistent substances).
3. Phased out persistent substances and went beyond compliance in relation to the reduction of non-persistent substances.
4. Phased out use of non-persistent (but toxic) substances in some operations.
5. Changed processes completely in order not to use toxic substances (all facilities).

Synthetic reduction

1. It is not a practice or there is no information.
2. Mentioned but no examples.
3. There are examples. The action is only reactive. Compliance with law.
4. There are examples. The action is proactive. Indicators goes beyond compliance with law.
5. Proactive with indicators going beyond legal requirements. There is also a conscious effort in developing new technologies that will reduce synthetic materials.

Eco-efficiency

Fuel efficiency

1. No information.
2. Mentioned but no examples.
3. Examples of reducing fuel consumption.
4. Examples of looking for different energy sources instead of fossil fuels.
5. Examples of use of different energy sources by reuse of waste from the company's operations.

Making building, plants, offices energy-efficient

1. No information.
2. Mentioned but no examples.
3. There are examples of solutions for saving energy in buildings for facilities (reactive).
4. There are examples of special projects developed for creating energy-efficient buildings, facilities, or energy systems.
5. Examples go beyond one project—practiced throughout the company.

Recirculation

Internal recycling

1. No information.
2. Mentioned but no examples.
3. Yes, *office wastes or waste material* (solvent, ink, rejected products) from production are recycled *or* manufacturing waste (bark, chemicals, sawdust, wood chips) and/or energy are reused and recycled.
4. All categories of waste (office, material, and manufacturing wastes) are reused or recycled.
5. Examples of internal recycling show long-term commitment. Firm is looking into and investing in technologies to reuse and recycle. There are indicators and plans.

Depackaging

1. No information.
2. Mentioned but no examples.
3. Developing packaging material that is more efficient, durable, or reusable. There is still some waste.
4. Reuse of packaging. Zero waste packaging of products.
5. Not using packaging at all.

Durable design

1. No information.
2. Mentioned but no examples.
3. Reactive examples. Company has developed product after competitors have advanced in the field (e.g., use of recyclable material).
4. Proactive examples. Company has innovated product designs.
5. Proactive examples and a conscious *effort in investment* and development of sustainable designs. Company has more than one sustainable design being developed.

Eco-design

Product life-cycle analysis

1. No information.
2. Mentioned but no examples.
3. Examples of projects.
4. Company has studies about the life-cycle analysis on one or all of its products.
5. Company has utilized the results of life-cycle analysis of its products to change design, process, supply sources, or systems.

Designing product for easy disassemble of reuse

1. No information.
2. Mentioned but no examples.
3. Example of products designed for recycling.
4. Company has invested in designing products for easy disassemble or reuse (not just recyclable) but lags competition.
5. Company has invested in designing products for easy disassemble or reuse (not just recyclable). It has a range of designs and/or investments in projects.

Ecosystem stewardship

Sustainable yield management

1. Does not have a sustainable management of forests or no information.
2. Claims to follow principles of sustainable forest management. Company has adopted an environmental policy. No examples of specific actions. It is preparing a plan.
3. Subscribes to the principle of sustainable forest management following provincial regulation. Company already has a 1-year or a 5-year operating plan (established harvest methods, regeneration and tending activities, locations and details of activity).
4. Company has gone beyond regulation in some aspects. It is in the process of accomplishing its operational plans in the short term.

5. It has gone beyond regulation in all aspects. Company has a 25-year management plan following the set of CCFM Criteria and Indicator. Plan includes forest inventories, mapping, measurement of growth rates, calculation of allowable harvest volumes, provisions for reforestation after harvest, provisions for protecting the forest from fire, insects and disease, and provisions to protect water quality, wildlife habitat and recreational values.

Notes:

According to the Canadian Constitution, provincial governments in Canada have primary responsibility for managing public lands and resources. Several provinces have adopted or are planning to adopt provincial sets of criteria and indicators which were created based on the Canadian Council of Forest Ministers' (CCFM) framework: biodiversity, ecosystem productivity and condition, soil/water conservation, global ecological cycles, multiple benefits, and social responsibility.

Provincial/territorial governments regulate harvest volumes of maximum level of harvest consistent with a sustainable supply of timber (annual harvest not to exceed what the forest can grow sustainably in the long term.). The Annual Allowable Cut was adjusted in 1990 to include private lands. The volume of timber harvest includes only industrial roundwood harvested on both Crown and private lands.

Access restriction

1. No access is restricted for sensitive habitats or community.
2. Access is restricted but there are no details on how it is done.
3. Access is restricted and examples of areas preserved are given.
4. Access is restricted, examples of areas preserved are given, numbers and measurements are also provided.
5. Access is restricted and there is a conscious effort in *documenting* sensitive areas to preserve.

Note:

Fisheries Act

26. (1) One-third of the width of any river or stream and not less than two-thirds of the width of the main channel at low tide in every tidal stream shall be always left open, and no kind of net or other fishing apparatus, logs or any material of any kind shall be used or placed therein.

Reforestation

1. It is not a practice or no information has been provided.
2. It is a practice but there are no details.
3. Natural regeneration, planting or seeding (compliance indicators).
4. Natural regeneration, planting or seeding beyond compliance.
5. Natural regeneration, planting or seeding beyond compliance. Concern with polyculture.

Note:

By law, all forest that is harvested must be regenerated by natural regeneration, planting or seeding. Industry and government work together to ensure that there's a sustainable cap on the amount of forest land which can be harvested each year. This is called an annual allowable cut (AAC). Across Canada, natural regeneration accounts for 53 percent of regeneration efforts. It is augmented by planting and direct seeding.

Business redefinition

Use of alternative fibers in pulp and paper manufacture

1. No information.
2. Mentioned but there are no examples.
3. There are examples of mixing alternative material with wood.
4. There are examples of regular alternative fibers usage.
5. There are examples of alternative fibers that show continuous investment on developing these alternatives.