

2004s-43

**The International Library Of Environmental
Economics And Policy – Volume xx
Corporate Strategies For
Managing Environmental Risk**

Bernard Sinclair-Desgagné

Série Scientifique
Scientific Series

Montréal
Septembre 2004

© 2004 Bernard Sinclair-Desgagné. Tous droits réservés. *All rights reserved.* Reproduction partielle permise avec citation du document source, incluant la notice ©.
Short sections may be quoted without explicit permission, if full credit, including © notice, is given to the source.



CIRANO

Le CIRANO est un organisme sans but lucratif constitué en vertu de la Loi des compagnies du Québec. Le financement de son infrastructure et de ses activités de recherche provient des cotisations de ses organisations-membres, d'une subvention d'infrastructure du Ministère du Développement économique et régional et de la Recherche, de même que des subventions et mandats obtenus par ses équipes de recherche.

CIRANO is a private non-profit organization incorporated under the Québec Companies Act. Its infrastructure and research activities are funded through fees paid by member organizations, an infrastructure grant from the Ministère du Développement économique et régional et de la Recherche, and grants and research mandates obtained by its research teams.

Les organisations-partenaires / The Partner Organizations

PARTENAIRE MAJEUR

. Ministère du Développement économique et régional et de la Recherche [MDERR]

PARTENAIRES

- . Alcan inc.
- . Axa Canada
- . Banque du Canada
- . Banque Laurentienne du Canada
- . Banque Nationale du Canada
- . Banque Royale du Canada
- . Bell Canada
- . BMO Groupe Financier
- . Bombardier
- . Bourse de Montréal
- . Caisse de dépôt et placement du Québec
- . Développement des ressources humaines Canada [DRHC]
- . Fédération des caisses Desjardins du Québec
- . GazMétro
- . Hydro-Québec
- . Industrie Canada
- . Ministère des Finances du Québec
- . Pratt & Whitney Canada Inc.
- . Raymond Chabot Grant Thornton
- . Ville de Montréal

- . École Polytechnique de Montréal
- . HEC Montréal
- . Université Concordia
- . Université de Montréal
- . Université du Québec à Montréal
- . Université Laval
- . Université McGill
- . Université de Sherbrooke

- ASSOCIE A :
- . Institut de Finance Mathématique de Montréal (IFM²)
- . Laboratoires universitaires Bell Canada
- . Réseau de calcul et de modélisation mathématique [RCM²]
- . Réseau de centres d'excellence MITACS (Les mathématiques des technologies de l'information et des systèmes complexes)

Les cahiers de la série scientifique (CS) visent à rendre accessibles des résultats de recherche effectuée au CIRANO afin de susciter échanges et commentaires. Ces cahiers sont écrits dans le style des publications scientifiques. Les idées et les opinions émises sont sous l'unique responsabilité des auteurs et ne représentent pas nécessairement les positions du CIRANO ou de ses partenaires.

This paper presents research carried out at CIRANO and aims at encouraging discussion and comment. The observations and viewpoints expressed are the sole responsibility of the authors. They do not necessarily represent positions of CIRANO or its partners.

The International Library Of Environmental Economics And Policy – Volume xx

Corporate Strategies For Managing Environmental Risk

*Bernard Sinclair-Desgagné**

Résumé / Abstract

Cet article est en fait l'introduction d'une anthologie (à paraître chez Ashgate) de contributions marquantes de l'analyse économique aux stratégies environnementales corporatives. On vise donc à intégrer les articles retenus autour de trois pôles : la stratégie corporative, la stratégie environnementale, et les questions de mise en œuvre.

Mots clés : économie de la stratégie d'entreprise, économie de l'environnement, implantation de la stratégie.

Résumé anglais This paper is the introduction to a forthcoming anthology (published by Ashgate) of economic contributions to the subject. It ties the articles together, starting with a primer on corporate strategy, then considering corporate environmental strategy, and concluding on implementation issues.

Keywords: *economics of strategy, environmental economics, implementation of strategy.*

* Laboratoire d'économétrie de l'École polytechnique, Paris, CIRANO, CIRAIG, and HEC Montréal, Canada, email: bsd@hec.ca.

INTRODUCTION

For at least two decades, in the aftermath of the Exxon Valdez and Bhopal disasters, corporations have been facing mounting external and internal pressure to manage environmental resources and risks effectively. To address the queries and concerns of managers, corporate boards and other stakeholders, codified management, audit and reporting schemes have been introduced and implemented, substantial segments of the consulting industry and of business school training have turned to identify and convey best practices across firms, and a thriving research literature has explored, developed, put to scrutiny, and rationalized a rapidly growing body of new ideas. At this point, however, there is a need to organize the latter, so that practitioners and researchers can more easily appraise it and move on. One way to meet this demand is to write up a unifying survey, a task several authors (e.g., Epstein, 1996; Laville, 2002; Lesourd and Schilizzi, 2001; Reinhardt, 2000; Schmidheiny, 1992) have already successfully undertaken. A worthwhile (complementary) alternative is to single out some of what seem to be key (or at least representative) contributions to the field. This route is the one adopted here.

The articles collected in this book describe some aspects of corporate environmental strategy (Part I) or consider related implementation issues (Part II). They previously appeared in business policy or in economics journals. Deliberate focus was put on these areas, not to play down the numerous valuable insights from the so-called functional disciplines of management - accounting, finance, marketing, operational research, organizational behaviour, and human resources - but because this book's main theme is the *integration* of environmental goals with other corporate objectives, and business policy *is* the integrating discipline of corporate management. This theme makes up the common thread this introduction will now use to tie the selected articles together.

PART I: The purpose and content of Corporate Environmental Strategy

The objective of this section is to define and locate environmental concerns within the realm of corporate strategy. The initial part provides what could be seen as a concise primer on the latter (without any pretence of exhaustiveness, of course). It is followed by an overview of what corporate *environmental* strategy currently is or should be.

I.A Fundamentals

First, one may ask, generally speaking, what is corporate strategy? Corporate strategy can be seen as a *framework* that allows a given business firm and its embedded business units to articulate and coordinate their specific ends and means. Its main goal is to provide the corporation's various stakeholders with a sense of identity and purpose that fosters short-term performance and long-term business sustainability.

Corporate strategy thus begins on two simple questions: What kind of business is ours, and what for? To be sure, some answering statements will necessarily boil down to the basic profit motive. But current best practices usually go beyond that. As Dave Packard, the co-founder of Hewlett-Packard, once said:

I think many people assume, wrongly, that a company exists simply to make money. While this is an important result of a company's existence, we have to go deeper and find the real reasons for our being. As we investigate this, we inevitably come to the conclusion that *a group of people get together and exist as an institution that we call a company so that they are able to accomplish something collectively that they could not accomplish separately* (...). (quoted by Handy, 2002, p. 54; emphasis added)¹

A good corporate strategy has therefore to outline the present and expected realizations of a collective, while conveying that the latter is greater than the sum of its parts.

To be largely endorsed and pursued, collective outcomes – be they some (possibly new) services, products, technologies, or simply a significant growth figure – must be weighed based on a criterion that is as objective and consensual as possible, and to which the firm can commit. A widely shared benchmark is the “*value*” the business corporation can create. It corresponds to the difference between the buyers' willingness-to-pay for the firm's products or services and the suppliers' opportunity cost of providing the necessary inputs (see, e.g., Brandenberger and Stuart, Chapter 2). In competitive situations, these two components of value would come down to the market price of the best alternative the firm's clients and the firm's suppliers respectively have.

¹ This viewpoint, by the way, is consistent with the early “joint-production” theory of the firm initially proposed by Alchian and Demsetz (1972), as well as the “cooperative” approach to the firm developed, for instance, in Ichiishi (1993).

To also get across that the whole is greater than the sum of its parts, emphasis must be put on what makes the firm unique and allows it to not only create but also *capture value*. Developed throughout the 1980s and 1990s, the so-called “resource-based view of the firm” currently provides the intellectual foundation for this task.² A prominent concept of this approach is that of “core competencies,” which refer to firm-specific assets that competitors would find difficult to imitate or acquire, such as some outstanding *organizational* skills in project management, logistics, or manufacturing.³ Of course, these capabilities have to credibly match some real opportunities (Porter, 1996). And the foreseeable distribution among stakeholders of the ensuing captured value has to make everyone willing to stick to the firm (Ichiishi, 1993).

To lead to action, finally, a good corporate strategy should bear some concrete means of achieving the stated objectives. Such means are in part implicit and amount to transmitting a certain *corporate culture*, thereby providing the specific lenses and collective heuristics that the firm’s stakeholders will (often routinely) use to deal with complexity and ambiguity in their daily business decisions (Schoemaker, Chapter 6). Another helpful contribution is to communicate some insights and call attention on particular features of the *corporate landscape*. This landscape comprises three terrains of action (Spulber, Chapter 7): the market, the internal organization, and the public arena.

Drawing *market boundaries* brings the firm’s employees and suppliers to focus on what the firm does or should be doing, for whom, and how. The exercise, however, involves somewhat more subjectivity and judgment than is usually presumed in standard economics textbooks (Geroski, 1998). In business, there is usually no single way to characterize a market. The main input of a successful corporate strategy is often to convey some key market opportunities or features in a creative, refreshing and invigorating way. Examples of such mobilising insights include Barnes and Noble’s definition of its business as one of selling not only books but also the pleasure of reading

² The books by Foss (1997) and by Rumelt, Schendel, and Teece (1994) contain some seminal contributions to this area.

³ One obstacle to imitation which is inherent in core competencies is that they often generate “causal ambiguity” in the eyes of an outsider. This can mean, for instance, that any potential competitor would find it impossible to apprehend the recipe for success without entering the industry and undergoing costly experimentation. Whether causal ambiguity in this sense truly constitutes an entry barrier was first examined by Lippman and Rumelt (Chapter 4).

and intellectual exploration, Home Depot's characterization of its mission as that of seeking "(...) to bolster the competence and confidence of customers whose expertise in home repairs is limited," and Starbuck's vision that coffee may not be just another familiar grocery item but also one that is associated with social life, status, and comfort.⁴

Any definition of the firm's mission and markets usually comes with suggestions concerning the *enabling organization*; for only through an appropriate organization can value be created and captured (Rajan and Zingales, 2001). Corporate strategy may not be very detailed on this matter and yet indicate quite clearly the sort of hierarchy (steep or flat), tasks distribution, and human resource management (recruiting, performance evaluation, compensation policies, and career paths) the firm needs. A nice example is the statement once made by Jan Carlzon while serving as CEO of Scandinavian Airlines: "If you're not serving the customer, your job is to be serving someone who is."

Corporate strategy may finally require reaching out to politicians, government agencies, and the public at large. Maintaining a positive *corporate image* enhances trust and goodwill across all stakeholders, thereby lowering the costs of complying with existing regulations, hiring and retaining talented employees, building customer and supplier loyalty, and attracting investors. To achieve this, corporate strategy can use three complementary channels. A common one is the active promotion of *business ethics* and moral codes that go beyond minimal compliance with existing laws and regulations; this may actually be an effective mean to overcome biases, counter short-termism, and ultimately preserve managerial discretion in decision making (Arrow, Chapter 1; Henderson, Chapter 3). Although it deserves strong qualifications, corporate philanthropy - which can take the form of donations to non-profit entities seeking to enhance computer literacy or to disclose and deter corruption - is also often used to improve the quality of the competitive context in which the firm operates (Porter and Kramer, 2002).⁵ Last, corporate strategy may point out to building constructive *business-government relationships*, often to encourage regulations that would raise the costs of competitors

⁴ For further discussion of these examples, and for other examples as well, see Kim and Mauborgne (1999).

⁵ On the current trend to make corporations more transparent and expose unscrupulous business practices, see Tapscott and Ticoll (2003).

(Salop and Scheffman, Chapter 5), but increasingly to reduce uncertainty or to share and coordinate efforts in research and development (Yoffie, Chapter 8).

This completes our brief account of the main functions and chapters of corporate strategy. This subsection began with a quote suggesting that an effective corporate strategy should address collective concerns which put the firm's financial bottom line into perspective. Foremost nowadays among these concerns is a company's management of environmental resources.

I.B Environmental Strategy

Since the recurrent smog alerts of the 1970s, the major oil spills and industrial accidents of the 1980s, and the accumulation of alarming evidence about acid rain, the ozone layer, global warming and biodiversity, business corporations have shown increasing awareness of environmental issues.

Clearly, public opinion has been, and still is, a key driver of this outcome. *Conveying a positive image* to an often skeptical public therefore occupies a key part of every corporate environmental strategy (Elkington, Chapter 11). Throughout the 1990s, the number of corporate environmental reports in the United States has tended to double each year (Epstein, 1996). In Japan, the Ministry of the Environment has found that the proportion of publicly-traded firms that produced an environmental report went from 31% to 46% between 1998 and 2000. And according to a KPMG (1999) study, the same phenomenon is now taking place, perhaps even more drastically, across Europe. Several companies would also signal their concern for the environment through participation in government-sponsored voluntary programs (Arora and Cason, Chapter 9). Credible signalling can further happen through a firm's adherence to some non-mandatory international standard, such as ISO 14000 or EMAS (the Environmental Management and Audit Scheme, which is prevalent in Europe), or industry-wide principles, such as the Responsible Care initiative⁶ in the chemical industry or the Coalition for Environmentally

⁶ The Canadian Chemical Producers' Association was initially responsible for launching the Responsible Care initiative in the 1980s. It later came to the US Chemical Manufacturers Association which made it a condition of membership. In a nutshell, the Responsible Care Programme stipulates that any chemical firm, regardless of where it starts, demonstrate continuous annual improvement in its emissions to air, land, and water and be accountable against six criteria: community awareness and emergency response, process

Responsible Economies (CERES)⁷ in the financial sector. Finally, the use of some meaningful and subsequently implemented slogans, such as “Pollution Prevention Pays (PPP)” at 3M or “Waste Reduction Always Pays (WRAP)” at Dow Chemical, would certainly contribute to reassure a company’s stakeholders.

Business firms have also been facing tighter and changing environmental regulations. In order to lower compliance costs or draw competitive advantage from future legislation, corporate environmental strategy would therefore *target the regulatory process*. According to Avila and Whitehead (1993), for example, Dow Chemical works with governments to get pollution prevention instilled in manufacturing instead of resorting to end-of-pipe treatment. Substantive industry participation in setting environmental standards is also common in many European countries (Porter and van der Linde, Chapter 15).

New environmental regulations have often triggered *organizational responses*. For these regulations typically are result-oriented, thereby giving managers increased discretion on how to allocate environmental resources (Bodily and Gabel, Chapter 10). Several companies thus went on to create top-level executive positions focusing on environmental matters, to promote closed-loop manufacturing, to link together the pursuit of environmental quality and a philosophy of “total quality management (TQM),” or to encourage the adjustment of internal management procedures and the supply chain in order to conserve energy more effectively, deal with waste more efficiently, and enhance the traceability of pollutants.

In many firms, environmental strategy would also mean “*greener products*.” According to some Gallup surveys, more than 75% of consumers say they include environmental criteria in their purchasing decisions. Several companies (e.g., MacDonald’s, Mobil, etc.) have then seen at their own expense that consumer loyalty towards their products depends crucially on perception that these products be ecologically benign. Furthermore, regulations which ask manufacturers to take

safety, pollution prevention, secure distribution, employee health and safety, and product stewardship (that is, a company’s responsibility for its products throughout their entire life cycle). For an excellent account of how this programme was implemented successfully at Dow Chemical, see Avila and Whitehead (1993).

⁷ CERES mainly regroups institutional investors, particularly pension fund managers. It asks member corporations to work towards the sustainable use of natural resources, the reduction or safer disposal of waste, the wiser use of energy, and the marketing of safe products and services (see Kleiner, Chapter 13).

responsibility for recycling their products are now increasingly enforced in Europe, Japan, and North America (Hayes, Chapter 12). Hence, a responsible corporate environmental strategy would not only publicize some sporadic demonstrations of environmental concern; it would also press for diligent continuous experimentation with the life cycles of current products (Kleiner, Chapter 13), looking across product attributes in order to deliver the right goods and eventually find lucrative market niches.⁸

In specific industries, notably in the chemical sector, environmental awareness has even become a characteristic of *corporate identity*. At Dow Chemical, for example, the environment comes only second among six defining features (after competitiveness, and before free and fair trade, education, technology, and corporate credibility); it is also the one attracting the largest share of people, managerial time, and money (Avila and Whitehead, 1993).

Despite some clearly emerging best practices, however, corporate environmental strategy is still subject to *questionable discrepancies* across firms. Such differences primarily concern the level of integration of environmental issues into regular business activities. Some firms' environmental strategy remains only an element (albeit a major one) of corporate public relations, while other firms are making every effort to get all business units involved in environmental goal-setting and implementation. The matter essentially boils down to whether stronger and deeper environmental awareness can ultimately shape a firm's core competencies and systematically create value (all other things remaining equal). Most economists would argue that the answer to the latter is negative (Palmer, Oates, and Portney, Chapter 14). But a large number of case studies suggest otherwise: committing to stricter environmental objectives can reduce uncertainty, overcome organizational inertia, mitigate agency problems, and foster creative thinking (Porter and van der Linde, Chapter 15).⁹ *Zero-waste approaches*, for

⁸ For example, Kim and Mauborgne (1999) report that, looking through the entire life cycle of light bulbs, "(...) Philips came to understand that the price and life of bulbs did not account for the full cost of lighting. Because lamps contained environmentally toxic mercury, companies faced high disposal costs at the end of a lamp's life. (...) So in 1995, Philips introduced the Alto, an environmentally friendly bulb (...). The new market Alto created has superior margins and is growing rapidly; the product has already replaced more than 25% of traditional fluorescent lamps used in stores, schools, and office buildings in the United States."

⁹ According to the so-called "Porter hypothesis," smarter environmental regulation would render such a commitment possible.

instance, can stimulate organizational learning, because waste and emissions often carry important information about flaws in product design or the production process. At Interface Corporation - a leading maker of materials for commercial interiors, Chairman Ray C. Davis once defined waste as “any measurable input that does not produce customer value,” and he accordingly considered all inputs to be waste unless shown otherwise; the upshot was a treasure hunt that, between 1994 and 1998, kept resource inputs constant while raising revenues by \$200 million. *Whole-system thinking*, more generally, can lead to identify and make small corrections that have considerable repercussions. In an experiment at its Swiss headquarters, for example, Dow Europe cut office paper flow by about 30% simply by discouraging unneeded information; this and other small steps ended up raising labor productivity, because managers could then concentrate on what they really needed to read. *Shifting business model*, finally, can set the firm on a rewarding path, especially if it allows to capture consumers’ savings on ecosystem services. So did Dow Chemical and Safety-Kleen when they chose to lease dissolving services instead of selling solvents; this strategy entailed significant cost reductions, since it permitted reusing the same solvent a large number of times.¹⁰

Such success stories have been widely publicized. It is therefore unsurprising that, according to a survey by the consulting firm Arthur D. Little, 83% of CEOs and board members believe they can create value from *implementing* a sustainable-development approach to corporate strategy. This enthusiasm usually fades away after unexpected costs arise or anticipated benefits fail to materialize. “Talk is cheap; environmental efforts are not.” (Walley and Whitehead, Chapter 21) And firm leaders still lack some implementation guidelines that would allow them to turn their good intentions into reality. The collection of articles in the second part of this book is meant to fill this gap.

PART II: Implementation issues

Pursuing an ambitious environmental strategy raises a wealth of issues, from the shop floor to corporate headquarters, from procurement units to logistics to the sales force. Of course, corporate boards and top executives are not expected to address every subject in

¹⁰ The examples of this paragraph, and many examples of this sort, can be found and are commented further in Lovins, Lovins and Hawken (1999).

full details; their role is rather to ensure that concerns can be dealt with effectively. In this respect, an important generic matter to be taken into account is that *asking managers to further deliver on environmental issues calls for an expansion of their respective agendas*. The articles collected in the second part of this book study the ramifications of this for organizational design, incentives, governance and leadership. These articles are sometimes mathematically demanding. However, the non-specialist could skip the formal arguments without missing the main conclusions.¹¹

II.A Organizational design

Serious environmental programs can be broad and complex, thereby exposing managers to *informational overload*. In this context, net returns to managerial effort will decrease rapidly, and the fate of the firm might end up resting on dangerous but time-saving rules-of-thumb and routines, misleading but convenient heuristics, and deficient but cosmetic problem solving.¹²

A natural way to cope with complexity is to introduce a partition of tasks and some division of labor. The advantages of making people concentrate on different complementary components of a complex product or process are well-known since at least Adam Smith: in so doing, workers acquire better skills more quickly, execute their job faster, and are more prone to innovate. On the other hand, the greater the specialization, the more difficult it becomes to *coordinate* the actions of everyone. The challenge of organizational design is precisely to balance the gains from specialization with the ensuing costs of information processing and communication.

¹¹ The texts by Milgrom and Roberts (1992), and Rubin (1990) constitute excellent analytical surveys of the generic means a corporation has to run its strategy. Some reviews of applications to the problem of implementing an *environmental* strategy include Gabel and Sinclair-Desgagné (2000), Sinclair-Desgagné and Vachon (2000), and Sinclair-Desgagné (2001).

¹² Corbett and Van Wassenhove (Chapter 17) provide an overview of various environmental programs (such as “limiting pollution”), and discuss some possible effort-saving analogies with already existing, and *complex*, management approaches (such as “production planning with capacity constraints”). Walley and Whitehead (Chapter 21), however, illustrate the large expenses that the implementation of an environmental strategy often entails; and DeCanio (Chapter 18) compellingly argues that individuals’ cognitive limitations combined with organizational lacunae can put the outcome of an environmental program at risk.

This tradeoff is analyzed by Bolton and Dewatripont (Chapter 16). They uncover two important organizing principles: (i) a manager who is not overloaded should avoid delegating items to subordinates, and (ii) when delegation must occur, a manager's data should be sent to only one other agent (in order to avoid duplication). It follows that *efficient organizations are pyramidal*: a manager in some layer l ($= 0, 1, \dots, L-1$) sends messages to just one supervisor in layer $l + 1$, and receives items only from agents located in layer $l - 1$ (the latter case, of course, if $l > 0$).

Yet, all rearrangements that seek to make an organization more effective in handling information are subject to several caveats. Radner's article (Chapter 19), for instance, warns that the number of necessary managers must remain proportional to the quantity of items to be processed per unit of time, and that *delays in information processing would grow with the number of submitted data items*. More precisely, let N denote the number of new data items that need to be treated every T units of time, C the delay in processing information, and P the number "processors," it can be shown that the size and delays of an efficient organization are subject to the following lower bounds:¹³

$$P \geq N / T$$

$$C \geq 1 + \log_2 N.$$

Furthermore, as shown by Sah and Stiglitz (Chapter 20), the somewhat greater centralization inherent in pyramidal structures entails *more variability in the quality of managers*. The reason is that, when they run a centralized organization, highly capable decision-makers have a larger positive impact, but highly incapable managers have a greater negative effect as well when they reach a similar position.¹⁴

Most practical accounts of organizational design would conclude, finally, that the success of a given structure depends also crucially on the induced managerial incentives.

II.B Incentives

The subject of incentives is by far the most studied by economists. The more the better, indeed, since the common diagnostic when a firm displays poor environmental

¹³ A mathematical proof is given by Radner (Chapter 19). Note that the logarithm in the second inequality suggests that delays might nevertheless increase at a decreasing rate.

¹⁴ Of course, much more can be said about the fallibility of alternative organizational forms, such as committees and polyarchies. The interested reader may look at Sah (1991) for an overview.

performance is that managerial incentives were inadequate (see, for instance, DeCanio, Chapter 18; and Lovins et al., 1999).

The basic framework used by economists to study incentives is the principal-agent model.¹⁵ In this context, Gabel and Sinclair-Desgagné (Chapter 25) first pointed out that implementing an environmental strategy means that the firm's principals would now add to their subordinates' regular business duties the task of dealing with environmental matters. This so-called *multi-tasking* representation bears two important, but pessimistic, conclusions about the incentive system that would normally follow. First, if the new corporate demands pull managerial effort to its physical limit, then it may not be wise to link an employee's compensation to environmental results (Gabel and Sinclair-Desgagné, Chapter 25).¹⁶ Second, even when the physical constraints on managerial effort are not binding, the relative imprecision of environmental performance appraisal in the short-run makes it less desirable to provide strong incentives on the *regular* business tasks (Holmstrom and Milgrom, Chapter 24).¹⁷ Conforming to the latter, however, would undoubtedly have a depressing effect on a firm's competitiveness.

To avoid this dilemma, Holmstrom and Milgrom (Chapter 24) recommend that environmental and standard business tasks be assigned to different people. Current production technology and business processes, however, may not allow such a specialization. Besides, someone at some point (e.g., the corporate CEO) must always take charge of environmental as well as standard business matters. In this case, the scheme proposed by Sinclair-Desgagné (Chapter 26) might constitute a suitable remedy.

¹⁵ For a thorough presentation of this model and its implications for various functional disciplines of management, such as finance, marketing, organizational behaviour, and human resources, see Milgrom and Roberts (1992).

¹⁶ Yet, several firms have already adopted some form of incentive schemes based on environmental outcomes. According to Avila and Whitehead (1993), for example, Dow Chemical's performance improvement review has a number of elements - among which environmental performance - built into its process, bonus system and incentive pay for employees. Whether such a scheme is optimal is another question.

¹⁷ Chapter 24 spells out a compelling rationale for this statement, which can be sketched as follows. Because of the difficulty of measuring environmental performance in the short-run and of relating it somewhat accurately to a manager's effort, bonuses and contingent rewards should depend little on environmental appraisals. In this situation, however, if incentives on regular business tasks were to remain strong, then managerial attention would naturally keep focusing on these tasks at the expense of environmental concerns.

This scheme operates as follows. Let A refer to some regular business assignment and B denote the additional environmental task. The output in A is routinely monitored, but an evaluation of performance in the environmental task B happens only after observing sufficient output in regular business assignments (the intuitive justification being that this output level might have been achieved while neglecting task B). An evaluation that reveals an apparent disregard for the environmental task will then trigger a penalty; yet, the incentives associated with task B are set so that, *ex ante*, the agent would wish an assessment of environmental performance to take place. Under this system of *rewarding contingent appraisals*, standard business and environmental tasks become *complementary* from the agent's viewpoint, so strong incentives to work on one side will not drive effort away from the other side. On the contrary, a manager complying with standard business goals will often be subject to an environmental evaluation and would therefore be well-advised to also carry out the firm's environmental plan; and a manager who cares about the environment could only get some retribution after also putting enough attention into regular business in order to trigger an environmental appraisal.

Another way to overcome the dilution of incentives that the introduction of environmental considerations seems to bring about is to harness the managers' *career concerns*.¹⁸ Managers not only seek short-term pecuniary benefits; they also worry about long-term career prospects. The latter is linked to their professional reputation, which may improve or deteriorate depending on previous achievements in key aspects of their job. Managers may therefore not react negatively to a dampening of their usual incentive pay, provided they are convinced that dealing properly with environmental issues is something business corporations keep track of, and value.

Keeping records of some top executive's environmental results, however, might be done more effectively and credibly when it is exposed to the scrutiny of several active stakeholders (which may include the firm's shareholders, of course, as well as its employees, customers, suppliers, lenders, and local neighbors). This currently constitutes a major investigation topic for governance scholars and practitioners.

¹⁸ The best and most up-to-date introduction to the economic analysis of career concerns is the sequence of articles by Dewatripont, Jewitt and Tirole, which are reproduced as Chapters 22 and 23 in this book. Chapter 22 provides the foundation of such an analysis and may be skipped by the non-technical reader. The other chapter presents a meaningful application to government agencies (and, by extension, to large business corporations).

II.C Governance

To convey its environmental strategy to managers, a corporation might choose to explicitly involve some interested parties. This raises a number of governance issues.

Koehler and Chang (Chapter 28), for instance, emphasize the growing practice of corporate *environmental disclosures*. The quality of the environmental information that would be voluntarily disclosed to a veto-empowered stakeholder by a business firm is next considered by Sinclair-Desgagné and Gozlan (Chapter 31). After casting this situation into a game-theoretic model, they find that the disclosed environmental data would be most abundant and precise when the stakeholder worries about environmental risks, the cost of producing environmental figures is low, and a responsible firm is able and willing to set itself apart by delivering more accurate information. Whether this case occurs or not depends in particular on public policies affecting the stakeholder's *a priori* beliefs and cost of dealing with (often intricate) environmental information.

The fact that good environmental management usually requires contributions from a whole chain of people also brings about *measurement problems*. In Chapter 29, Meyer points out that most output-based measures remain centered on what goes on within a function rather than on what happens *across* functions.¹⁹ His proposal is to empower the entire set of participants to a given process, so they can best create (holistic) measures to track that process. Life-cycle analysis - a technique seeking to capture all the environmental impacts of a product, from the extraction of its basic inputs to its disposal or recycling - might constitute a helpful framework for this endeavour.

Once appropriate measures are defined, they could be used to prepare disclosures, for continuous improvement of products and processes, to design *internal markets* which internalize environmental externalities (e.g., via suitable *transfer prices*), and to support external or internal *environmental audits*. The mode in which the right measure is

¹⁹ To fulfill their environmental strategy, several firms have recently undergone significant reforms of their accounting processes (see Porter and van der Linde, Chapter 15), switching to “full cost accounting,” which attempts to assign all costs to specific product or processes, up to “total cost accounting,” which further includes cost items beyond traditional concerns, such as indirect or hidden costs (e.g., compliance costs, insurance, on-site waste management, operation of pollution control, and future liability) and less tangible benefits (like revenue from enhanced company image). Despite all of this, however, Meyer’s criticism still seems to hold.

applied, however, has to be carefully set; otherwise the firm could still get disappointing results. Concerning environmental audits, for example, Sinclair-Desgagné and Gabel (Chapter 30) stress that they should rather be contingent on what happens in tasks that compete for managerial attention, instead of simply occurring at fixed or random times.

The active involvement of stakeholders with possibly conflicting interests finally poses another difficult governance challenge. From an executive's viewpoint, each stakeholder may constitute a real principal, entitled to have a say in job design, supervision and compensation. This creates what is called a "*common agency*." In this situation, a significant caveat is then *a systematic decrease in the power of incentives* (Tirole, Chapter 32). In Holmstrom and Milgrom (Chapter 24)'s multi-tasking context, for instance, such a decrease would be proportional to the number of actual principals (see Dixit, Chapter 27). Fortunately, there is at least one valuable alternative to formal incentives: leadership.

II.D Leadership

The matter of leadership always comes to a corporate executive's mind when it is time to implement a new strategy.²⁰ There is accordingly a huge literature on the subject in the fields of management, human resources, and organizational behaviour.²¹ Yet, economists have so far devoted little attention to it.

A notable exception is the article by Benjamin Hermalin, which is reprinted in Chapter 33. This paper captures one important feature of leadership: the fact that a leader is by definition someone whom several people are willing to follow without being forced (or paid). This can happen, even among rational agents who can foresee each other's opportunistic behavior, when the candidate to leadership spends enough energy towards a stated collective goal to convince others that this end must be worth pursuing. This sort of "leadership by example" - some would call it *emulation* - can certainly substitute for costly communication.

²⁰ Consider, for instance, the following testimony by Dow Chemical's CEO and Chairman Frank Popoff: "What happened at Dow was that after we recognized the environment as an issue and went through the continuum of denial, data, dialogue, and delivery, we finally saw that we needed to give the whole thing leadership." (quoted by Avila and Whitehead (1993), p. 58)

²¹ For a literature survey, see Blais and Sinclair-Desgagné (2002).

More generally, good leadership allows to economize on planning, structure, and control. One reason might be that it harnesses the *intrinsic motivation* of individuals rather than relying on explicit contracts: people then derive satisfaction from endorsing and working along their leader *per se*, and not just from the possibility of ever getting some rewards or escaping some penalties.²² Leadership thus seems indispensable to successfully implement a corporate environmental strategy, as the basic arguments underlying such a strategy often appeal not to people's greed or fear but to their sense of fairness towards far-away future generations.

CONCLUSION

In a public lecture broadcast on BBC radio in 2000, John Browne, the CEO of oil giant British Petroleum, asserted that “the business community is not in opposition to sustainable development but is in fact essential to delivering sustainability, because only business can produce the technological innovations and deliver the means for genuine progress on this front.”²³ Statements like this motivate a careful study of the nature, scope, and implementation of corporate environmental strategy.

The articles collected in this book represent some significant advances in this direction. They certainly do not provide the last word on the issues they respectively address (particularly the implementation issues). Hopefully, they will draw still more attention and generate much needed insights on this important topic.

²² The issue of intrinsic motivation also came only recently on the agenda of economic researchers. One first significant account is the article by Kreps (1997). The relationship between intrinsic motivation and leadership still needs to be articulated.

²³ Quoted in Handy (2002), p. 53.

References

- Alchian, Armen, and Harold Demsetz. 1972. "Production, Information Costs, and Economic Organization," *American Economic Review*, 62: 777-795.
- Avila, Joseph A., and Bradley W. Whitehead. 1993. "What is Environmental Strategy?," *The McKinsey Quarterly*, 4: 53-68.
- Allen, William T. 1992. "Our Schizophrenic Conception of the Business Corporation," Conference given at the Benjamin N. Cardozo School of Law, Yeshiva University, April 13, 1992. (downloadable at www.thecorporatelibrary.com/cgii/CDG03.htm)
- Blais, Ann-Renée, and Bernard Sinclair-Desgagné. 2002. "Leadership in 3S's: Skills, Styles, Situations," CIRANO (www.cirano.qc.ca) Working Paper 2002RP-04-EN.
- Epstein, Marc J. 1996. *Measuring Corporate Environmental Performance*. Chicago, IL: Irwin Professional Publishing.
- Foss, Nicolai J. (ed.). 1997. *Resources, Firms and Strategies*. New York: Oxford University Press.
- Gabel, H. Landis, and Bernard Sinclair-Desgagné. 2000. "Organizational Responses to Environmental Concerns," in Henk Folmer, H. Landis Gabel, and H. Opschoor, eds., *Principles of Environmental and Resource Economics. A Guide for Students and Decision Makers* (second edition). London, UK: Edward Elgar.
- Gabel, H. Landis, and Bernard Sinclair-Desgagné. 1998. "The Firm, its Routines, and the Environment," in Henk Folmer and Tom Tietenberg, eds., *The International Yearbook of Environmental and Resource Economics 1998/1999: A Survey of Current Issues*. London, UK: Edward Elgar.
- Geroski, Paul A. 1998. "Thinking Creatively about Markets," *International Journal of Industrial Organization*, 16: 677-695.
- Handy, Charles. 2002. "What's a Business For?," *Harvard Business Review*, 80 (12), 49-55.
- Ichiishi, Tatsuro. 1993. *The Cooperative Nature of the Firm*. Cambridge, MA: Cambridge University Press.
- Kim, W. Chan, and Renee Mauborgne. 1999. "Creating New Market Space," *Harvard Business Review*, 77(1): 83-94.
- Kreps, David M. 1997. "Intrinsic Motivation and Extrinsic Incentives," *American Economic Review*, 87 (2): 359-364.

- KPMG, 1999, *International Survey of Environmental Reporting*, Amsterdam: Pays-Bas.
- Laville, Élisabeth. 2002. *L'Entreprise Verte*. Paris: Éditions Village Mondial.
- Lesourd, Jean-Baptiste, and Steven G. M. Schilizzi. 2001. *The Environment in Corporate Management*. Northampton, MA: Edward Elgar Publishing.
- Lovins, Amory B., L. Hunter Lovins, and Paul Hawken. 1999. "A Road Map for Natural Capitalism," *Harvard Business Review*, 77(3): 145-158.
- Milgrom, Paul, and John Roberts. 1992. *Economics, Organization, and Management*. Englewood Cliffs, NJ: Prentice-Hall.
- Porter, Michael E. 1996. "What is Strategy?," *Harvard Business Review*, 74(6): 61-79.
- Porter, Michael E., and Mark R. Kramer. 2002. "The Competitive Advantage of Corporate Philanthropy," *Harvard Business Review*, 80(12): 57-68.
- Rajan, Raghuram G., and Luigi Zingales. 2001. "The Firm as a Dedicated Hierarchy: A Theory of the Origins and Growth of Firms," *Quarterly Journal of Economics*, 116(3): 805-851.
- Reinhardt, Forest L. 2000. *Down to Earth*. Boston, MA: Harvard Business School Press.
- Rubin, Paul H. 1990. *Managing Business Transactions*. New York: The Free Press.
- Rumelt, Richard P., Dan E. Schendel, and David J. Teece (eds.). 1994. *Fundamental Issues in Strategy*. Boston, MA: Harvard Business School Press.
- Schmidheiny, Stephan. 1992. *Changing Course: A Global Business Perspective on Development and the Environment*. Cambridge, MA: MIT Press.
- Sinclair-Desgagné, Bernard. 2001. "Environmental Risk Management and the Business Firm," in Henk Folmer and Tom Tietenberg, eds., *The International Yearbook of Environmental and Resource Economics 2000/2001: A Survey of Current Issues*. London, UK: Edward Elgar.
- Sinclair-Desgagné, Bernard, and Carel Vachon. 2000. "Dealing with Major Technological Risks," in Henk Folmer and H. Landis Gabel, eds., *Principles of Environmental and Resource Economics. A Guide for Students and Decision Makers* (second edition). London, UK: Edward Elgar.
- Sah, Raaj K. 1991. "Fallibility in Human Organizations and Political Systems," *Journal of Economic Perspectives*, 5: 67-88.

Tapscott, Don, and David Ticoll. 2003. *The Naked Corporation*. Toronto: Viking Canada.

Corporate Strategies for Managing Environmental Risk

Edited by Bernard Sinclair-Desgagné

PART I THE PURPOSE AND CONTENT OF CORPORATE ENVIRONMENTAL STRATEGY

Fundamentals

- 1 Kenneth J. Arrow (1973), 'Social Responsibility and Economic Efficiency', *Public Policy*, **21**, pp. 303-17.
- 2 Adam H. Brandenberger and Harborne W. Stuart Jr (1996), 'Value-Based Business Strategy', *Journal of Economics and Management Strategy*, **5**, pp. 5-24.
- 3 Verne E. Henderson (1984), 'The Spectrum of Ethicality', *Journal of Business Ethics*, **3**, pp. 163-71.
- 4 S.A. Lippman and R.P. Rumelt (1982), 'Uncertain Imitability: An Analysis of Interfirm Differences in Efficiency under Competition', *Bell Journal of Economics*, **13**, pp. 418-38.
- 5 Steven C. Salop and David T. Scheffman (1983), 'Raising Rivals' Costs', *AEA Papers and Proceedings*, **73**, pp. 267-71.
- 6 Paul J.H. Schoemaker (1990), 'Strategy, Complexity and Economic Rent', *Management Science*, **36**, pp. 1178-92.
- 7 Daniel F. Spulber (1994), 'Economic Analysis and Management Strategy: A Survey Continued', *Journal of Economics and Management Strategy*, **3**, pp. 355-406.
- 8 David B. Yoffie (1988), 'How an Industry Builds Political Advantage: Silicon Valley goes to Capitol Hill', *Harvard Business Review*, **66**, pp. 82-89.

Environmental Strategy

- 9 Seema Arora and Timothy N. Cason (1996), 'Why do Firms Volunteer to Exceed Environmental Regulations?: Understanding Participation in EPA's 33/50 Program', *Land Economics*, **72**, pp. 413-32.

- 10 Samuel E. Bodily and H. Landis Gabel (1982), 'A New Job for Businessmen: Managing the Company's Environmental Resources', *Sloan Management Review*, **23**, pp. 3-18.
- 11 John Elkington (1994), 'Towards the Sustainable Corporation: Win-Win-Win Business Strategies for Sustainable Development', *California Management Review*, **36**, pp. 90-100.
- 12 David J. Hayes (1993), 'Beyond Cradle-to-Grave', *Environmental Forum*, September-October, pp. 14-17.
- 13 Art Kleiner (1991), 'What Does It Mean To Be Green?', *Harvard Business Review*, July-August, pp. 38-47.
- 14 Karen Palmer, Wallace E. Oates and Paul R. Portney (1995), 'Tightening Environmental Standards: The Benefit-Cost or the No-Cost Paradigm?', *Journal of Economic Perspectives*, **9**, pp. 119-32.
- 15 Michael E. Porter and Claas van der Linde (1995), 'Toward a New Conception of the Environment-Competitiveness Relationship', *Journal of Economic Perspectives*, **9**, pp. 97-118.

PART II IMPLEMENTATION ISSUES

Organizational Design

- 16 Patrick Bolton and Mathias Dewatripont (1994), 'The Firm as a Communication Network', *Quarterly Journal of Economics*, **109**, pp. 809-39.
- 17 Charles J. Corbett and Luk N. Van Wassenhove (1993) 'The Green Fee: Internalizing and Operationalizing Environmental Issues', *California Management Review*, Fall, pp. 116-35.
- 18 Stephen J. DeCanio (1993), 'Barriers within Firms to Energy-Efficient Investments', *Energy Policy*, **21**, pp. 906-14.
- 19 Roy Radner (1993), 'The Organization of Decentralized Information Processing', *Econometrica*, **61**, pp. 1109-46.
- 20 Raaj K. Sah, and Joseph E. Stiglitz (1991), 'The Quality of Managers in Centralized Versus Decentralized Organizations', *Quarterly Journal of Economics*, **106**, pp. 289-95.

- 21 Noah Walley and Bradley Whitehead (1994), 'It's Not Easy Being Green', *Harvard Business Review*, **72**, pp. 46-50, 52.

Incentives

- 22 Mathias Dewatripont, Ian Jewitt and Jean Tirole (1999), 'The
23 Economics of Career Concerns', *Review of Economic Studies*, **66**, pp. 199-217. Part I : pages 183-98, Part II : pages 199-217.
- 24 Bengt Holmstrom and Paul Milgrom (1991), 'Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design', *Journal of Law, Economics, and Organization*, **7** (Special Issue), pp. 24-52.
- 25 H. Landis Gabel and Bernard Sinclair-Desgagné (1993), 'Managerial Incentives and Environmental Compliance', *Journal of Environmental Economics and Management*, **24**, pp. 229-40.
- 26 Bernard Sinclair-Desgagné (1999), 'How to Restore Higher-Powered Incentives in Multitask Agencies', *Journal of Law, Economics, and Organization*, **15**, pp. 418-33.

Governance

- 27 Avinash Dixit (1997), 'Power of Incentives in Private versus Public Organizations', *AEA Papers and Proceedings*, **87**, pp. 378-82.
- 28 Dinah Koehler and Maximilian Chang (1999), 'Search and Disclosure: Corporate Environmental Reports', *Environment*, **41**, pp. 3.
- 29 Christopher Meyer (1994), 'How the Right Measures Help Teams Excel', *Harvard Business Review*, **72**, pp. 95-103.
- 30 Bernard Sinclair-Desgagné and H. Landis Gabel (1997), 'Environmental Auditing in Management Systems and Public Policy', *Journal of Environmental Economics and Management*, **33**, pp. 331-46.
- 31 Bernard Sinclair-Desgagné and Estelle Gozlan (2003) 'A Theory of Environmental Risk Disclosure', *Journal of Environmental Economics and Management*, **45**, pp. 377-93.
- 32 Jean Tirole (2001), 'Corporate Governance', *Econometrica*, **69**, pp. 1-35.

Leadership

- 33 Benjamin E. Hermalin (1998), 'Toward an Economic Theory of Leadership: Leading by Example', *American Economic Review*, **88**, pp. 1188-206.