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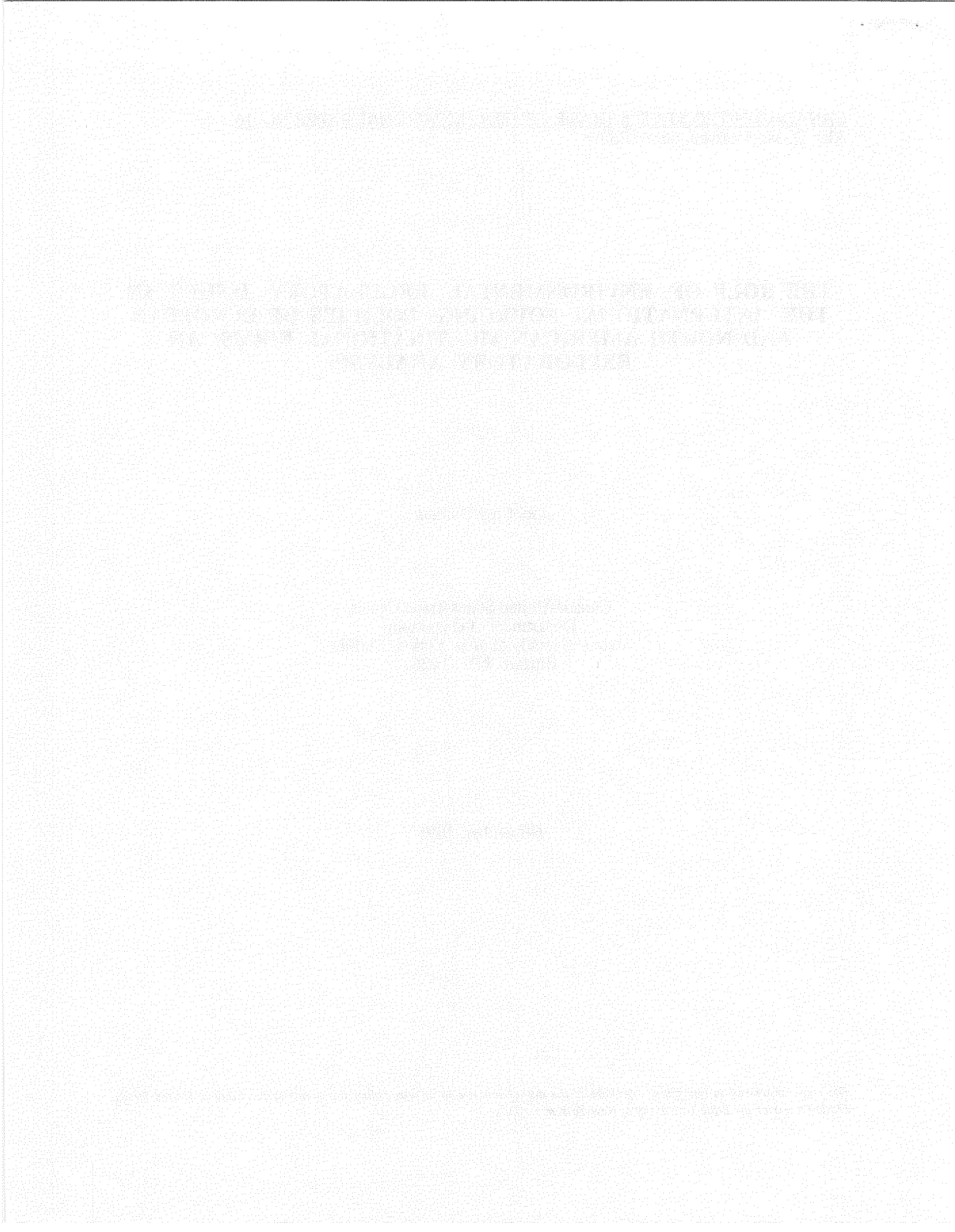
**THE ROLE OF ENVIRONMENTAL REGULATORY ISSUES IN
THE INTERNATIONAL SOURCING POLICIES OF EUROPEAN
AND NORTH AMERICAN MULTINATIONAL FIRMS: AN
EXPLORATORY ANALYSIS**

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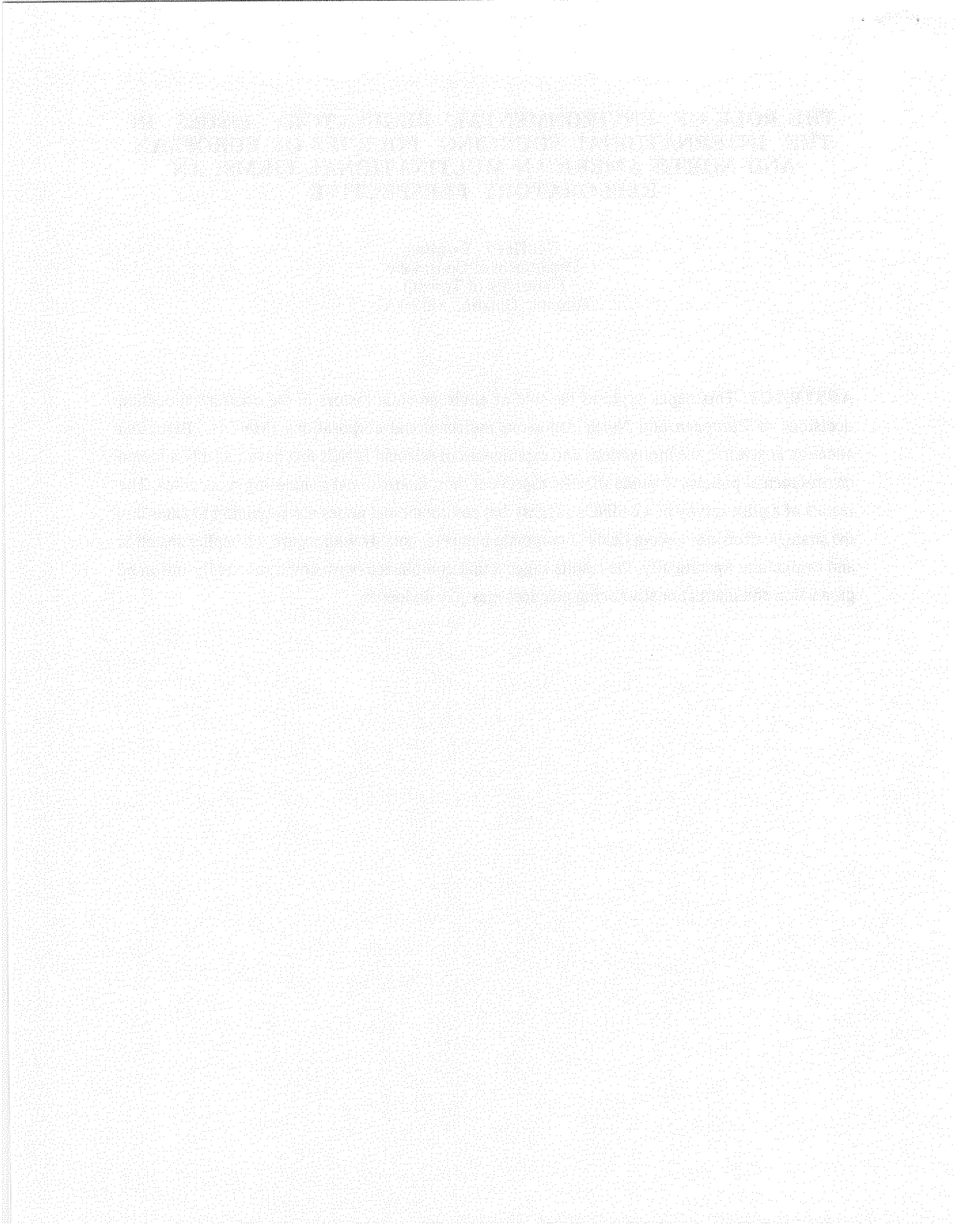
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**THE ROLE OF ENVIRONMENTAL REGULATORY ISSUES IN
THE INTERNATIONAL SOURCING POLICIES OF EUROPEAN
AND NORTH AMERICAN MULTINATIONAL FIRMS: AN
EXPLORATORY PERSPECTIVE**

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ABSTRACT. This paper explores the role of environmental factors in the contract-allocation decisions of European and North American multinational corporations (MNCs). Particular attention is given to the motivations and experiences of selected MNCs that have recently adopted environmental policies to guide specific aspects of their international purchasing procedures. The results of a pilot survey of 12 MNCs suggest that environmental issues are beginning to enter into the strategic decision-making fields of corporate planners, notably with regard to supplier selection and evaluation. Specifically, the results suggest that compliance with environmentally-informed production and international sourcing practices may pay dividends.



INTRODUCTION

Academic interest in the structure of international production linkages has grown considerably over the last few years (Dicken, 1992; Swamidass and Kotabe, 1993; Porter, 1990). Much of this research yields a global map of interfirm transactions based upon classes of variables that are familiar to most students of international business, including product life cycle (PLC) factors, tariff and non-tariff trade barriers, transportation and logistical constraints, production costs, and questions of input quality (Dicken, 1992, 1994). While these types of variables are likely to remain central to corporate sourcing policy, the economic and organizational context out of which the importance of these variables arises may have changed to some degree recently. For example, recent work by Dunning (1993) and Hanink (1994) suggests that a strategy of cost-minimization may not always be optimal from a revenue perspective. Reasons given for this viewpoint include the fact that cheap components sometimes fail, leading to higher defect rates for final products.

At the same time, an exclusive preoccupation with cost-minimization can sometimes conflict with other corporate objectives (see Rothwell, 1992). While several illustrations of these potential conflicts have been identified in the recent literature (for example, quality maximization, the ability to rapidly adapt and/or redesign products for niche markets, and the desire for minimized defect rates), the focus in this paper is restricted to the role of environmental factors. As the current century draws to a close, international standards regarding environmental responsibility are beginning to become part of the cost-benefit calculations of a growing number of firms (Coeck, 1993; Ettlinger, 1993). This is evidenced by the increasing use of internal and external (supplier) environmental auditing procedures, the expansion of executive and administrative functions to include environmental concerns, and balance sheet accounting of environmentally related activities both from an impact and cost point of view. Importantly, this new calculus has been increasingly applied to outside suppliers. According to Hutchinson (1992), for example, outside suppliers are increasingly being required to satisfy a broad combination of environmental criteria to ensure the longevity of long-term supply contracts.

To a degree, these evolving standards are being applied to external suppliers by corporations that enjoy oligopsonist or monopsonist relations with their subcontractors. In the forest products sector, for example, several European and US newsprint buyers have been conducting environmental audits of Canada's McMillan Bloedel (a company that has

recently been embroiled in a bitter environmental controversy over its old growth clearcut practices in Canada's Clayoquot Sound). Thus far, many of these buyers have threatened to terminate contracts with McMillan Bloedel -- though no action had actually been taken as of May 1995 (Globe and Mail, May 28, 1995). At the same time, of course, broader compliance with environmental standards has also been evolving on the basis of formal interfirm partnerships (Rothwell, 1992), informal trust-based relationships (Sako, 1992), and independent supplier initiatives (Ettlinger, 1993). Notable examples of such standards include supplier commitment to recycling, worker safety, pollution control, and the elimination of dangerous materials in the production process. While this policy stance has not been powered by wholly altruistic motives in most cases, the growth of environmental awareness among certain types of firms suggests a change in corporate philosophy that merits investigation.

Set against this context, the purpose of this paper is to discuss the extent to which environmental standards have become part of the national and international contract-allocation decisions of European and North American MNCs. We treat the environmental dimension to decision-making as a potentially new (and underresearched) policy variable in corporate planning. The goal is to evaluate the importance of environmental considerations in the cost-benefit appraisals of companies that source parts, components, and/or raw materials from both domestic and foreign locations. Data for the paper come from extensive telephone interviews (largely unstructured) with corporate executives from 12 MNCs that were preidentified as having a formal interest in environmental matters. Importantly, the sample contains several global firms that enjoy technological leadership in specific product areas, including IBM (US), Xerox (US), Dupont (US), British Telecom (UK) and Northern Telecom (Canada). While the initial investigation involved more than 30 European and North American MNCs from a wide range of industry sectors, the 12 manufacturing companies that form the basis of this paper were ultimately selected because of their explicit interest in environmental policy.

Having said this, it should be recognized that the data were collected from the perspective of client firms (buyers) rather than from a two-way/interactive perspective. In this regard, the data are not strong enough to shed light on the experiences and characteristics of suppliers. Moreover, it should also be recognized that separating rhetoric (public relations) from tangible policy action is an intrinsic problem in research of this type. While the survey

data point to the emergence of particular types of organizational and policy change, the extent to which these new corporate postures have delivered measurable results remains unclear at this point in time. Nevertheless, the data offer a reasonable starting point for the topic at hand. Specifically, the data identify the emergence of particular types of organizational and/or policy platforms that provide potential vehicles for change -- if not change itself. Prior to an examination of the results, however, it is appropriate to outline a brief research context. Two questions are especially pertinent here. First, under what conditions might environmental factors enter into the contract-allocation decisions of MNCs? Second, and more broadly, why would any industrial corporation seek to introduce environmentally sensitive practices?

RESEARCH CONTEXT

Across most of the advanced market economies, rising international competition has prompted many industrial corporations to downscale their operations by means of vertical and/or horizontal disintegration (Swamidass and Kotabe, 1993; Porter, 1990). Recent downswings in the business cycle have added further fuel to these cutbacks, leaving many corporations with significantly reduced capacity. In a general effort to cut unit costs and restore profits, strategic downscaling has occurred across virtually all segments of corporate America, Canada, and Western Europe. Significantly, this process has also been accompanied by a rapid growth of international sourcing (imports of raw materials, finished goods and intermediate inputs), organized on the basis of both intracorporate and interfirm lines (Haninck, 1993). While cost-minimization is perhaps the single most popular explanation for the growth of international sourcing (see Chaddick and Dale, 1987), it should be recognized that some corporations have been implementing environmental strategies that appear to portend higher unit costs than might otherwise be the case. At first blush, in fact, corporate compliance with the spirit of environmental responsibility suggests a paradoxical departure from the cost-driven imperatives of private sector management. The question thus arises: why would any corporation seek to inflate its unit costs by implementing an environmental strategy?

Several interlinked factors can be identified that might shed light on this question. To begin with, any company can tolerate rising input costs provided that revenue growth is faster (Root, 1994). Clearly, then, a strategy that promises higher unit costs would make good

sense if the strategy were ultimately designed to enhance sales performance. According to Coeck (1993), for instance, firms that focus on the "greening of strategic management" enjoy a competitive advantage in markets where "green consumerism" has expanded. A second and related factor concerns the long-run advantages associated with early adoption of environmentally informed procedures. Companies that keep pace with, anticipate, or surpass contemporary standards regarding environmental compliance are less likely to encounter penalties or other punitive actions from government. Although the historical record indicates that penalties have typically been minimal in Europe and North America (Coeck, 1993), few companies welcome bad publicity. For example, in what has now come to be regarded as an international test case for environmental interest groups, the much-publicized Clayoquot Sound controversy involving McMillan Bloedel has already mobilized powerful consumer groups in Europe and North America, several of which are prepared to boycott the company's products in an effort to force compliance with alternative forest management techniques. Third, companies that anticipate changes in environmental standards (whether legally defined or not) can in some cases save substantial amounts of money by opting for an early deployment of new methods. Over the long-run, for example, early anticipation of regulatory change may in some cases endow early movers with learning-curve economies (Porter, 1990), lower adoption costs (Roy and Whelan, 1992), and/or other first mover advantages over late adopters (for instance, the ability to formally proclaim that new practices have been implemented). Directly or indirectly, then, it is conceivable that environmentally sensitive strategies may ultimately be motivated by interlinked sets of cost and revenue factors, rather than by factors that simply reflect environmental interests on their own.

Having said this, however, it should be noted that rather little empirical work has been carried out on the role of environmental standards as policy variables in strategic planning (for a discussion of this issue in the context of US military-industrial firms, see Ettliger, 1993). Moreover, little is known about the extent to which MNCs have been opting for environmentally informed procedures. At the outset, then, it must be emphasized that the investigation which follows offers an exploratory perspective rather than a systematic analysis. As noted earlier, the 12 MNCs that form the basis of this paper were chosen because of their explicit interest in environmental policy. This should not be taken to imply that other European or North American MNCs are somehow devoid of such interests. Rather, the intent is to generate research questions on the basis of empirical findings from

12 corporations that have been actively and visibly involved with environmental matters for several years.

Keeping these points in mind, the remainder of this paper is divided into three main sections. The first of these describes the recent experiences of two major MNCs in the telecommunications sector (British Telecom PLC [UK] and Northern Telecom [Canada]). The second section offers a discussion and synthesis of the exploratory findings, using selected examples from other sectors. The final section offers a brief agenda for new empirical work on the potential connections between environmental strategy design and corporate sourcing policy.

ENVIRONMENTAL POLICIES IN THE TELECOMMUNICATIONS SECTOR

British Telecom PLC

The internal environmental policies set by British Telecom PLC (BT) were initially developed in the late 1980s upon the recognition that mounting regulatory pressure would soon entail stricter adherence by industrial firms to evolving government-imposed environmental standards. It was viewed by BT, however, that environmental standards set by the UK central government were not the only sources of that external pressure. Increasing employee expectations regarding environmental problems, a growing green consumerism in the marketplace and the (public relations) exigencies of good corporate citizenship were equally important sources of pressure which forced BT to establish some form of company-wide environmental policy. Ultimately, these pressures led to the view within BT that a comprehensive environmental policy was required which would place environmental considerations (for the first time) in a central position with respect to the overall planning and management decisions of the corporation.

Effectively adding a new bureaucratic layer to the decision-making process, the environmental policies of BT are currently administered through an environmental management group which reports directly to the Deputy Chair of the company. The overall responsibilities of the environmental group include the coordination of environmental programs, the development of corporate environmental strategies and the monitoring and

reporting of progress made toward both externally and internally specified goals. The environmental group consists of three separate units: (1) The Environmental Issues Unit (EIU) which provides the monitoring and communications function on environmental issues; (2) a Liason Panel which acts as a forum for exchanging views on environmental issues; and (3) an Environmental Policy Steering Group (EPSG) which consists of managers with line business responsibilities.

At first glance it would appear that the environmental group, particularly the ESPG, has executive powers in as much as it reports directly to the Deputy Chair. However, the ESPG has no control over environmental programs nor is it assigned a budget. Environmental policies are established through the ESPG, but the implementation of those policies lies with the business operating divisions. This crossover of environmental functions with line business functions appears to be consistent with what is occurring in other major MNCs (Hutchinson, 1992).

While the environmental standards established within BT thus far cover a wide range of areas, including energy, building services, motor transportation, product design, waste disposal, and occupational hygiene, it is within BT's procurement standards that the organizational and sourcing impacts are most evident. Essentially, the procurement standards set to date are governed by two basic principles. First, BT's suppliers are expected to comply with a specific set of environmental standards. For example, BT's waste disposal service suppliers are subject to environmental auditing procedures by independent consultants. In addition, all existing and potential suppliers are required to provide BT with information regarding their own environmental policies, as well as an assessment of the environmental impacts of products supplied to BT. Significantly, BT expects supplier firms who lack environmental policies to demonstrate improvement over time to ensure the security of their supply relationships with BT's purchasing divisions. Secondly, on tenders in excess of US\$1.2 million (750 thousand pounds sterling), suppliers are required to provide a full environmental assessment of products, services, and processes (BT, 1993). In arriving at a sourcing decision, this environmental information is used along with information related to product/service cost, quality, and reliability (among other things). While the relative weight given to environmental considerations in this context is unclear, a competitive advantage is likely to be afforded (other things being equal) to firms demonstrating high environmental performance standards (BT, 1993).

The rationale for the procurement standards adopted by BT fall mainly out of the concern for the whole life impacts of different products. In particular, it is believed that the environmental risks associated with any BT products can be minimized at the procurement stage. In this regard, suppliers with environmental programs in place are more likely to deliver long term benefits. Equally important, however, is the view that because of the monopsonistic position BT enjoys in the UK's telecommunications sector, significant knock-on effects through the supply chain can be realized. The success of this strategy is evidenced, for example, in BT's paper purchasing standards. Today, approximately 80 percent of BT's paper purchases meet internally specified standards with respect to forest management practices, pulp wood production, energy consumed during paper manufacture, de-inking processes, recycling, and emissions during manufacture (BT, 1993). In addition, preference is given to manufacturers of electronics products which have CFC-free production processes.

In terms of the company's backward linkages through the supply chain, then, it would appear that BT is currently playing an advocacy role in relation to a broad spectrum of environmental matters. However, given the internal bureaucratic position of the company's environmental division, as well as the environmental information and/or compliance conditions required of external suppliers, the potential for a qualitatively and geographically redesigned supply chain in the future would appear to be significant. In this sense, the advocacy role of today may become a more proactive/interventionist role tomorrow.

Northern Telecom

Northern Telecom's (NT) formal concern with environmental issues began in the late 1980s with the establishment of its Health, Safety and Environmental group. Recently, however, this group has been renamed and is now called the Environmental Ethics Department. The principal mandate of the Environmental group was to establish a company-wide policy for the protection and enhancement of the environment. It was believed by NT that a critical link existed between the environment and the future economic success of the company. NT was especially concerned with developing initiatives in relation to environmental issues which affected their business most. More specifically, in 1987 it became NT policy to have environmental considerations enter into the planning and decision-making process to their full extent (NT, 1987).

While this particular policy innovation meant casting an eye toward environmental issues in research and development (R&D) and manufacturing processes, NT's environmental initiatives also covered any acquisitions or divestitures they might be considering. Additionally, NT would attempt to identify, assess and manage any risks of an environmental nature which were associated with their operations and products -- essentially a product life cycle management approach (PLCM -- ie. cradle to grave) was adopted here. The most notable aspect of the environmental platform adopted by NT in 1987 was that, to the extent possible, they would eliminate or reduce harmful discharges, hazardous materials, and wastes. Finally, NT took it upon itself to play as broad an advocacy role with respect to the environment as was possible. This role was to include working with suppliers, customers and business partners to achieve the highest possible environmental performance standards (NT, 1987).

What NT has achieved with respect to the environment is significant. In 1992, for example, NT eliminated the use of CFC-113 solvents from its production process. In fact, since 1988 NT has built only CFC-free production facilities. Interestingly, the elimination of CFC-related processes has led to a number of favorable financial impacts. For example, in the production of printed circuit boards, a standard process is to have the boards "washed" with CFC solvents to remove any soldering residue and flux. By implementing a "gas-wave soldering" technology, the need for a CFC wash of the printed circuit boards has been eliminated. The projected savings of this "no-clean" process are expected to reach approximately C\$50 million by the year 2000. Effectively, these savings will be realized as a result of the elimination of a complete stage in the production process. More recently, NT has also eliminated the use of methyl-chloroform and halons from its manufacturing processes.

Much effort is also devoted within NT to playing a broad advocacy role. NT's efforts in this regard include education and training of suppliers, corporate partners and the telecommunications industry in general. For example, as a co-founding member of the Industry Cooperative for Ozone Layer Protection (ICOLP), NT devotes considerable time and effort in disseminating non-proprietary information on the ways and means of eliminating CFC use in production. Successful corporate partnerships have been based on this approach, including Nortel/Exicom Australia (which is a supplier to British Telecom). In addition to Exicom eliminating CFC use after the formation of the partnership with NT,

they have also since eliminated the use of a protective oil from the printed circuit board cleaning system previously used.

Because of the broad stewardship mandate assumed by NT, the environmental group was established with executive functions within the corporate hierarchy in 1987. The environmental group reports through the Senior VP of Environmental Ethics directly to the CEO, and environmental considerations are now central to the decision making process.

In line with its stewardship mandate, NT is in the process of instituting purchasing standards which are likely to impact significantly on its supply chain. At a general level, NT's purchasing standards are designed to integrate environmental considerations into supplier selection and purchasing decisions. The sourcing policy, as outlined presently, is designed to ensure that current and potential suppliers are in compliance with all relevant government-imposed environmental standards and regulations. In addition, preference is extended to suppliers which have environmental policies in place -- in particular, policies geared toward the elimination of hazardous materials and chemicals used in manufacturing products and processes and the elimination of ozone depleting substances. Preference is also given to firms practicing the 3Rs (reduce, reuse, recycle) in packaging. Finally, NT encourages its suppliers to adopt PLCM practices. Essentially, suppliers are expected to assume responsibility for their products' environmental impacts from "cradle to grave". This includes encouraging firms to maximize the ease of product disassembly and the reuse of materials at the end of the product life cycle. Effectively, adhering to the combination of these standards implies a competitive advantage for a supplier. In this context, the possibility for a reconfiguration of NT's supply chain clearly exists.

SURVEY RESULTS: LESSONS FROM OTHER SECTORS

The two case examples described above reveal at least four common themes as far as environmental initiatives are concerned. First, the greening of corporate strategy has the potential to reshape the geography of supply linkages (sourcing policy). For some firms, domestic and/or international supply contracts are no longer allocated on the basis of cost or quality criteria alone. Second, the various policy innovations adopted by BT and NT have the potential to reduce the costs associated with particular stages of production. NT's experience is particularly demonstratable in this regard. Third, environmental

considerations have been elevated to the executive domain within the corporate hierarchies of both firms. And, finally, the adoption of an advocacy stance by both companies coincides with the growing mood of green consumerism in the marketplace.

Having said this, significant environmental initiatives among MNCs outside the telecommunications industry can also be discerned. In this regard, however, data from our survey reveal a noticeable degree of variability in terms of the organizational and sourcing impacts associated with environmental policies (Table 1). All of the MNCs that were interviewed have formal environmental policies/standards in place which, at a minimum, comply with domestic regulations. In all cases, these domestic standards are also applied to their overseas operations. Given that many of these firms source parts and materials from developing countries in Southeast Asia, South America and elsewhere, the presence of harmonized standards via intracorporate trade has the potential to elevate the environmental performance of distant host regions. In effect, overseas subsidiaries that are governed by the internal standards set by corporate headquarters in some cases require similar standards to be met by local suppliers in these host regions. To an extent, then, it is possible that the environmental policies of these MNCs will eventually generate ripple effects through the international supply chain. Over the long run, for example, it is possible that low-cost suppliers that operate in environmentally lax regulatory regimes may lose their competitive edge unless steps are taken to comply with externally defined standards.

In relation to organizational impacts, however, the picture is not entirely consistent across the sample. In some instances, in fact, it appears that environmental concerns are situated within existing public relations structures. In other cases (notably IBM and Dupont), environmental matters form important executive functions. Within Dupont, for example, managers who control specific business divisions also have environmental stewardship responsibilities. This model, which is similar to BT's approach, is designed to ensure an immediate crossover of stewardship concepts into the business sphere. These managers report directly to the CEO of Dupont. On the surface, it would appear that more horizontal forms of management are being adopted in these instances.

The results are also equally mixed in relation to sourcing strategies. In some cases (for example, Fisher-Price and Xerox), while internal environmental policies are clearly articulated, these policies do not appear to be strictly applied to outside suppliers. Attempts

are made to make suppliers aware of the environmental problems associated with their products and processes and to adopt the standards of the contractor, but when advocacy of this nature fails, no indication was given that a supply relationship might be severed. To an extent, of course, the ability of any given company to enforce compliance (or terminate contracts) ultimately depends upon at least two factors: (1) the availability of alternative suppliers that can offer suitable inputs; and (2) the degree of monopsony or oligopsony power enjoyed by the contractor. In other words, the ability of any given company to transmit policy innovations down the supply chain may be conditioned by the extent to which subcontractors are dependent on the purchasing firm. In this regard, it is possible to hypothesize that firms with clearly defined environmental policies (but no enforcement mechanisms to govern suppliers) enjoy only weak bargaining power when it comes to initiating policy changes outside the corporation. It is conceivable that many European and North American MNCs might fall into this category -- irrespective of any technological or commercial leadership they might enjoy in specific markets. Certainly, Xerox's market share has declined in recent years (Root, 1994).

At the other end of the spectrum, evidence from our survey suggests that supply relations can in some cases be dramatically altered by non-compliance. For example, Dupont conducts comprehensive audits of its waste management and hazardous materials treatment suppliers. These audits are designed to point out to suppliers where deficiencies might exist in containment methods, treatment, and drainage (among other things). If deficiencies are noted, Dupont requires compliance with their own standards. Dupont's auditing procedures are systematic, in that repeat visitation to suppliers is common. Ultimately, relationships with suppliers not complying with Dupont's recommendations are terminated. This system of auditing applies to both new and long term suppliers. In this particular case, of course, the need for strict environmental compliance can be understood in terms of the nature of the firm's products. Indeed, environmental risks within the chemical industry are severe enough to elevate environmental policy beyond the domain of public relations. Questions of product and process liability also enter the picture in this regard, adding an element of urgency to the company's environmental thrust.

Environmental considerations also enter into the sourcing decisions of Varity Corporation. In particular, Varity is concerned about emission standards for diesel engines it sources primarily from outside North America. In this regard, Varity has established an operating

group that checks suppliers on an ongoing basis. Essentially, suppliers are encouraged to meet US Environmental Protection Agency (EPA) emission standards, irrespective of the destination of the final product. Any supplier not meeting EPA standards, as they evolve, is denied long term contracts. By adopting EPA standards as a benchmark for all of its final products, Varsity far exceeds the environmental requirements set by most other developed nations.

Other sourcing impacts appear to arise less in relation to supplier products and processes than they do to packaging and/or waste management. For instance, AT&T requires all suppliers to package materials, of whatever nature, using recyclable material. Similarly, Fisher-Price requires its suppliers to keep packaging materials to a minimum. What is not clear here, however, is the degree to which these kinds of requirements have impacted on the supply chain. Suffice it to say that subcontractors that comply with these packaging requirements are more likely (other things being equal) to enjoy stable supply relations with their purchasers than suppliers that do not.

DISCUSSION

Some of the findings outlined above suggest research themes that warrant further investigation. To begin with, there is considerable variability in the extent to which environmental policies have been operationalized among the MNCs in this sample. Second, the environmental dimension to corporate decision making typically goes beyond a simple concern for green issues. Third, environmental policies have the potential to modify domestic and international patterns of input sourcing. And, finally, the adoption of environmentally informed procedures has in many cases led to organizational changes inside the MNCs themselves. Each of these themes is discussed in more detail below.

With regard to the first point, the survey results suggest the beginnings of the development of a typology of MNCs as far as environmental policies are concerned. While our sample is too small to offer a formal typology, it is clear that some MNCs are further along the environmental road than others. At one extreme, companies like NT and BT appear to have elevated environmental matters to executive positions within the corporate hierarchy. Not only are these firms technological and commercial leaders within specific submarkets of the telecommunications industry, but they are also very large organizations that enjoy a degree

of oligopsonist or monopsonist power in terms of input purchasing. Although suppliers may comply with corporate environmental standards on a cooperative basis, any non-compliance by subcontractors carries the risk of contract termination. In contrast to this model, several firms have developed clearly articulated internal standards but weak or non-existent compliance requirements. This group would appear to enjoy weaker bargaining power as far as policy enforcement is concerned. A third group seems to focus less on product and process concerns but more on issues related to packaging and waste reduction. While the existence of specific packaging and waste reduction standards may affect the supply chain, the extent to which this is the case remains unclear at this point in time.

A second area for future research concerns the motivations that propel the adoption of specific types of environmental policies. In the case of Dupont, for example, the environmental dangers associated with the firm's inputs and final products may have led to the development of policies that reflect the urgency of a PLCM posture. This posture is also evident in the case of NT, where internally specified standards are now in place across the entire life cycle of the firm's products. As noted earlier, moreover, the PLCM approach is not entirely motivated by a desire for good corporate citizenship. While attainment of the latter may pay dividends in terms of the movement toward green consumerism, the fact that early deployment of environmentally sensitive procedures can result in cost savings suggests that economic factors are also important. And, even in cases where immediate cost savings are not readily apparent (for example, Varsity's EPA-based emission standards), there is a general consensus among MNC managers that first-mover advantages can be realized via early adoption of new methods. At a very minimum, universal standards avoid confusion. Hence, future empirical work ought to consider the nature of competitive advantage arising out of environmental regulation across a broader sample of firms.

It is also worth noting that environmental policies have the potential to influence domestic and international sourcing patterns in ways that go beyond the extreme case of geographical switching. Previous research has suggested a geography of supply linkages that reflects the global map of production and transportation costs (Fayerweather, 1969; Dunning, 1988), the structure of tariff and nontariff trade barriers (Barff and Austen, 1993; Root, 1994), questions of input quality (Kotabe, 1992), timeliness of input delivery/just-in-time inventory management (Swamidass, 1993), and trust-based relationships (ie. embeddedness) between suppliers and buyers (Briggs, 1994; Furlong et al, 1994). While

these are powerful factors in the formation and evolution of international supply networks, environmental considerations have been conspicuously absent from the recent debate on interfirm transactions. This research suggests that environmental factors are becoming increasingly integrated with corporate decision-making.

In this regard, the geographical substitution of one supply source for another based on the changing map of cost and quality (as well as efforts toward forming trust-based supplier relationships and supply network coherence) may soon require interpretation in light of environmental factors as well. Indeed, if a growing number of MNCs actively adopt policies of the sort outlined earlier, then contract allocation based solely upon traditional classes of cost variables may become somewhat less important over time. Again, however, a broader sample of MNCs is required in order to assess the extent to which environmental matters have prompted organizational change and the consideration and utilization of supplier alternatives.

SUMMARY AND CONCLUSIONS

The adoption of environmental policies by European and North American MNCs implies a potentially significant change in corporate philosophy. For some firms, it would appear that both domestic and foreign suppliers must satisfy specific environmental criteria to guarantee long term business contracts. Here, it is argued that new sets of policy variables (ie. environmental standards) are emerging, some of which portend a major change in the institutional regulation of supply chain formation. MNCs that adopt these standards have the potential to transmit innovation imperatives beyond the internal divisions of the firm, either via forced compliance (the extreme case) or cooperative partnerships (formal or informal). The implications that surround this process are far reaching, in that both intracorporate and interfirm transactions may soon be regulated by a much wider set of decision-making criteria than has been true in the past. Clearly, the advent of PLCM environmental policy suggests that new classes of variables are entering into the locational and purchasing decisions of certain types of MNCs. Adding this dimension of corporate behavior to other forms of organizational innovation (eg. total quality management) suggests an increasingly complex set of decision rules as far as external sourcing is concerned.

Table 1: Key Dimensions of the sample's environmental policies*

Corporation	a. Environmental Audits	b. Supplier Impact	c. Organizational Impact	d. Business Crossover	e. Product Impact	f. Global Standardization
Northern Telecom	yes	yes	yes	yes	yes	n.a.
Xerox	no	no	n.a.	n.a.	yes	yes
Eastman Kodak	no	yes	yes	n.a.	n.a.	yes
IBM	yes	yes	yes	yes	n.a.	n.a.
Varity	yes	yes	yes	yes	no	n.a.
Fisher-Price	no	no	no	no	n.a.	n.a.
Apple Computer	no	no	n.a.	n.a.	yes	n.a.
Levi Strauss	no	yes	n.a.	n.a.	no	n.a.
John Deere	no	no	n.a.	n.a.	yes	yes
AT&T	no	no	n.a.	n.a.	n.a.	yes
Dupont	yes	yes	yes	yes	n.a.	yes
BT	yes	yes	yes	yes	yes	yes

* Where the corporation in question:

- a. conducts both internal and external environmental audits on a systematic/formal basis.
- b. has explicit policies to ensure that suppliers conform to the internally specified environmental standards of the corporation.
- c. has established formal policy units that have been created with specific sets of environmental responsibilities.
- d. ensures that the task of environmental strategy construction is concomitant with executive responsibility in the operating divisions of the firm.
- e. has gained from its environmental policies in terms of product quality and/or cost.
- f. ensures that products conform to internally specified standards across all geographic markets, irrespective of where the product is manufactured.

n.a. = insufficient data to make a decisive yes/no cell entry.

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