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Environmental purchasing and firm performance: an empirical investigation

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Abstract

Much debate has occurred in the extant literature as to whether socially responsible actions undertaken by firms result in improved financial performance. One key dimension of social responsibility is environmental initiatives and programs. While the purchasing function can create value and significantly affect the environmental actions of a firm and its upstream supply chain, no research to date has explored the effect of environmental purchasing on firm performance. Our research provides an initial examination of this relationship. We combine survey and archival data to show that environmental purchasing is significantly related to both net income and cost of goods sold, after controlling for firm size, leverage, and primary earnings per share. © 2000 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Social responsibility deals with the managerial consideration of non-market forces or social aspects of corporate activity outside of a market or regulatory framework and includes consideration of issues such as employee welfare, community programs, charitable donations, and environmental protection. It has been alleged in the management literature that these social issues can be just as important as market factors in determining long-run success and that social issues deserve the same attention and rigorous analysis previously devoted to the market environment (Preston, 1990, p. 4).

Environmental friendliness forms an important dimension of social responsibility. Consumers and individuals are becoming increasingly aware of environmental issues, and are showing

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preferences for environmentally oriented companies (Winsemius and Guntram, 1992). Firms are increasingly recognizing the importance of becoming environmentally proactive and taking the initiative to develop and implement “green strategies” that preserve the environment (Gifford, 1997). Proactive environmental policies include developing green products and packages, conserving energy, reducing waste, recycling, and creating a corporate culture that is environmentally sensitive.

Besides the interest in environmental concerns by business in general, purchasing managers in particular are becoming more focused upon these issues. For example, in a recent survey purchasing managers listed the impact of environmental regulations on purchasing activities as their second most important future concern (Monczka and Trent, 1995). Environmental purchasing can be defined as purchasing’s involvement in supply chain management activities in order to facilitate recycling, reuse, and resource reduction (Carter and Carter, 1998).

Anecdotal evidence suggests that environmental purchasing can improve a firm’s economic position, by reducing disposal and liability costs, conserving resources, and improving an organization’s public image (Min and Galle, 1997; Stock, 1992). Interestingly, recent evidence suggests that purchasing managers seem to be dissuaded from green purchasing programs due to their perceptions that such programs are expensive to initiate and implement (Min and Galle, 1997). However, we are unaware of any existing study that examines the relationship between environmental purchasing and firm performance. Does environmental purchasing result in economic benefits, or instead costly burdens for the firm? In this paper, we empirically test the effect of environmental purchasing on firm performance.

The next section presents a review of the extant literature that focuses on the relationship between firm performance and social responsibility, environmental management, and environmental purchasing. This literature leads to the study’s hypotheses. Afterwards, we describe the methodology and analysis used to test these hypotheses. We conclude by presenting and discussing our findings and their impact on theory and managerial practice.

2. Literature and hypotheses

Various studies have found contradictory relationships between a firm’s social responsibility and financial performance. One view is that social responsibility involves additional cost to the company and hence *negatively* affects the firm’s financial performance. Different researchers have proposed different theories to account for this association. Some argue that a high degree of social responsibility results in added costs that put a firm at an economic disadvantage as compared to other less socially responsible firms (Ullman, 1985; Vance, 1975). These added costs might result from actions such as employee welfare programs, charity, community development, maintaining plants in economically depressed locations, and establishing environmentally friendly policies. Further, concern for social responsibility may limit a firm’s strategic alternatives. For example a firm may decide not to produce for a certain market, such as weapons or pesticides, and might avoid relocating plants and investing in certain opportunities (McGuire et al., 1988).

Others have found no relationship between corporate social responsibility and firm performance. For example, Alexander and Buchholz (1978) used the same social responsibility ratings as Vance (1975) but adjusted rates of return (dividend yields and change in stock price) for risk. They

found that the degree of social responsibility based on these ratings was not significantly related to stock market performance. Abbott and Monsen (1979) evaluated the relationship by analyzing the data of the annual reports in the Fortune 500 Social Responsibility Disclosure of 1971–1974. They found that being socially involved does not appear to increase investor total rate of return.

Another contrasting view is that social performance is *positively* correlated to a firm's economic performance. Moskowitz (1972), Parket and Eilbirt (1975), and Sturdivant and Ginter (1977) found that social responsiveness is positively related to a firm's stock market performance. Socially responsible activities can help improve a firm's relationships with such important stakeholders as banks, investors, and government agencies (McGuire et al., 1988). These improved relationships can in turn result in economic benefits including increased investment levels into the firm (McGuire et al., 1988; Moussavi and Evans, 1986; Spicer, 1978a). Improved employee morale and customer goodwill are also potential outcomes associated with socially responsible activities (Solomon and Hanson, 1985). Based on stakeholder theory, Cornell and Shapiro (1987) have argued that the cost of a firm depends not only on explicit claims (e.g. environmental regulations) but also on implicit claims (e.g. a company's promise to government officials of environmentally friendly operations). Firms that are viewed by government agencies as being more socially responsible may have lower cost implicit claims as compared to organizations that are viewed as being less socially responsible (McGuire et al., 1988).

As with corporate social responsibility, there exist two contrasting views about the relationship between environmental friendliness and firm performance. The first viewpoint argues that many managers believe that environmental management consists simply of compliance with regulations, and that a tradeoff exists where increased levels of environmental management result in increased costs (Walley and Whitehead, 1994). This relationship might exist in part due to increased costs associated with the transference of externalities, such as the cost of polluted air, back to the firm (Bragdon and Marlin, 1972; Klassen and McLaughlin, 1996). Barbara and McConnell (1990) studied the effect of abatement capital (capital employed to offset the negative environmental effects of the firm) on industry productivity. They found that abatement capital was responsible for a decline in productivity. Gallop and Roberts (1983) studied the effects of environmental regulations on the cost of operations of the electric utilities industry. They found a similar effect of environmental regulation on industry productivity.

There is also a body of research that suggests a positive relationship between environmental friendliness and firm performance. In particular, Klassen and McLaughlin's (1996) proposed model and empirical findings suggest a positive effect of environmental performance on firm performance. They suggest that the financial performance of the firm is affected by environmental performance through both market (revenue) and cost pathways.

Revenues can be positively impacted when customers prefer the products of environmentally friendly firms (Winsemius and Guntram, 1992), resulting in increased market share vis-à-vis less environmentally oriented competitors. Environmentally friendly products can be differentiated through certification programs such as the Green Cross or Ecologo. Further, it is possible that environmental management may be necessary to maintain markets in the long-run, as noted by Klassen and McLaughlin (1996, p. 1201): "For example, the laminated disposable 'drink box' industry (e.g. Tetra Pak) was threatened with restrictions on the use of their products in Maine unless some acceptable post-consumer recycling systems were implemented (Associated Press, 1989)."

Costs can be lowered when firms invest in environmental management systems that result in a decrease in accidental environmental releases and liability. Costs may be reduced through proactively managing environmental regulation, which may create barriers and first-mover advantages that are difficult for competitors to imitate (Barrett, 1992; Dean and Brown, 1995; Porter and van der Linde, 1995). Lower costs can also result from reduced material waste and the identification and reduction of inefficient processes (Klassen and McLaughlin, 1996). Recent anecdotal evidence links strong environmental performance to lower manufacturing costs, often by eliminating waste (Porter and van der Linde, 1995).

Because purchasing is at the beginning of the value chain, a firm's environmental efforts will likely not be successful without integrating the company's environmental goals with purchasing activities (Walton et al., 1998). Purchasing can contribute to a firm's overall environmental goals and undertakings in a number of ways. Purchasing can identify packaging that can be more easily recycled or reused. This activity can have a significant environmental impact, as packaging materials account for the largest portion of the municipal waste stream (Min and Galle, 1997). Supply managers must consider the ultimate disposition of the materials and components that enter the firm and Stock (1992) suggests that these life-cycle issues, "need to be considered as part of the purchasing and procurement process". Purchasing managers at Mercedes work in cross-functional teams to determine the environmental consequences of components throughout their life-cycles and use the results of these analyses as purchase decision criteria (Carter et al., 1998).

Purchasing managers can in turn ask upstream members of the supply chain to commit to waste reduction goals and to design and provide the purchasing firm with the materials and components identified through the design for disassembly and life-cycle analysis. In the case of General Mills, this included purchasing's development of the recycling centers and reverse distribution infrastructure needed to supply General Mills with packaging and container supplies (Carter et al., 1998).

Purchasing can contribute to such design for reuse, recycling and disassembly by suggesting alternative sources of supply and using early supplier design involvement options (Burt and Sukup, 1985; Dowlatshahi, 1992; Ellram and Pearson, 1993; Handfield, 1993; Stuart, 1991). Also, by being located at the forward flow of materials within an organization, purchasing is placed in an advantageous position to implement resource reduction activities. As suggested in the above examples, purchasing can play a key role in environmental activities.

Despite the potentially important role purchasing can play in making the firm environmentally friendly, the authors are unaware of any existing study that examines the impact of environmental purchasing on firm performance. The conflicting literature from both corporate social responsibility and environmental management suggests two alternative hypotheses regarding the relationship of environmental purchasing and firm performance:

H1: *Environmentally friendly purchasing policies lead to increased firm performance.*

H1A: *Environmentally friendly purchasing policies lead to decreased firm performance.*

3. Data and methodology

The environmental purchasing construct was developed in a prior study that examined the interorganizational factors impacting environmental purchasing in the US (Carter and Carter,

1998). Scale development for the environmental purchasing construct followed Churchill's (1979) 8-step procedure, and included a pre-test, followed by a pilot test that was conducted with a group of 50 purchasing managers. In defining the sampling frame, the researchers wanted to avoid sampling industries with relatively little or no environmental purchasing activity. Kopicki et al. (1993) suggest that managers in the consumer products industries are likely to be highly involved with environmental logistics issues, including environmental purchasing. Further, researchers have found the level of social responsibility to vary among industries (Shetty, 1979). This study chose to sample consumer product manufacturers to narrow the scope of the sampling frame, since there appeared to be a sufficiently high level of environmental purchasing in these industries.

The initial interviews with purchasing managers, along with an open discussion of the survey instrument following the pilot test, indicated that the activities included in the survey are within the potential realm of responsibilities and job tasks of purchasing personnel at both the middle and top management levels. The survey was sent in the fall of 1995 to purchasing executives at the Manager level or higher within their firms, and was generated from the membership list of the National Association of Purchasing Management (NAPM). The survey was sent to all 1083 managers included in the list who worked in separate consumer products firms.

Dillman's (1978) Total Design Method was used to minimize non-response bias. Thirty-four surveys were returned due to an incorrect address and a total of 437 usable questionnaires were returned, resulting in a response rate of 41.7%. The data was tested for non-response bias by comparing the responses of early respondents and late respondents (Armstrong and Overton, 1977; Lambert and Harrington, 1990). A multivariate *T*-test (The Hotelling–Lawley Trace) computed along the key study variables found no significant differences between the early and late respondents.

The environmental purchasing scale was developed through a confirmatory factor analysis in an earlier study (Carter and Carter, 1998). The scale items used to measure the construct are shown in Appendix A. Convergent validity is evidenced by the large factor loadings (Anderson and Gerbing, 1988). The composite reliability (Fornell and Larcker, 1981) was above 0.70, the recommended minimum (Nunnally, 1978). As shown in Appendix A, a composite score for the environmental construct was obtained by multiplying each scale item by its standardized factor loading and taking the sum of these products for each firm. This gives a composite score for the environmental purchasing construct, which we refer to as EPINDEX.

Klassen and McLaughlin's (1996) theoretical model suggests that environmental management improves firms' financial performance through both increased revenues and decreased costs. In examining the effect of environmental purchasing on firm performance, we chose net income and cost of goods sold as dependent variables. Past research has found social responsibility to be related to company size, with larger companies assigning greater importance to social responsibility (Shetty, 1979). Following the lead of Spicer (1978b), we chose to include three instrumental control variables (Beaver et al., 1970): Size (Revenues), Leverage (the ratio of senior securities to total assets), and Earnings (primary earnings per share adjusted to remove the effect of all special items), and estimated the following two ordinary least squares equations:

$$\text{Net income (NI)} = B_1 \text{ Size} + B_2 \text{ Leverage} + B_3 \text{ Earnings} + B_4 \text{ EPINDEX} + \varepsilon, \quad (1)$$

$$\text{Cost of goods sold} = B_1 \text{ Size} + B_2 \text{ Leverage} + B_3 \text{ Earnings} + B_4 \text{ EPINDEX} + \varepsilon. \quad (2)$$

We augmented the survey data with COMPUSTAT data on the financial performance of the firms. Data obtained from COMPUSTAT were sales, net income, cost of goods sold, earnings, and leverage for 1996.

4. Results

The results from these regression analyses are presented in Table 1. The results displayed in the table show that EPINDEX is positively related to net income ($P < 0.05$), and negatively related to cost of goods sold ($P < 0.001$). Together, the results strongly support the study's hypothesis that environmental purchasing is positively related to firm performance.

5. Discussion

One critique of earlier studies (Moskowitz, 1972; Vance, 1975) is that stock performance was only examined for a period of a few months (Alexander and Buchholz, 1978). Many prior studies also relied on ratings of business people and students to assess the degree of social responsibility of large, well-known firms (Alexander and Buchholz, 1978; McGuire et al., 1988). It is likely that these raters do not have intimate knowledge of the actual activities of the firms that they rated. A related critique can be made as to whether or not disclosures found in annual reports are a valid measure of corporate social responsibility. These disclosures may at least partly exemplify public relations efforts.

The overall findings in Table 1 provide the first empirical evidence linking environmental purchasing and firm performance, and as such make a significant contribution to the literature. The findings also provide a unique test of Klassen and McLaughlin's (1996) theoretical model, linking environmental management to lower costs and increased income. Klassen and McLaughlin test their model using event study methodology, with media reports of environmental performance as the antecedent variable and stock market performance as the final, dependent variable. Our findings complement their findings, providing further evidence of a significant link between environmental and firm performance.

Table 1
Regression results with EPINDEX (standardized estimates)

Variable	Net income	Cost of goods sold
Size	0.7234***	0.9919***
Leverage	0.0609	−0.0120
Earnings	0.0065	−0.0011
EPINDEX	0.2118*	−0.0757**
Adjusted R^2	0.60	0.98

*** Significant at the 0.0001 level.

** Significant at the 0.001 level.

* Significant at the 0.05 level.

5.1. Managerial implications

The results have clear implications for managers in that a positive effect of environmental purchasing activities on firm performance suggests purchasing and supply managers should focus greater attention on such activities. We conclude our paper by examining some of the individual activities that comprise environmental purchasing and specific ways that purchasing managers can contribute to a firm's environmental initiatives.

Recycled packaging has been used in some industries for decades, because it has been a low cost alternative to virgin material. For example, General Mills has used recycled cereal boxes since the 1950s. With the more recent environmental initiatives of many firms, it is likely that more recycled packaging has become available at lower costs, due to the development of reverse logistics infrastructures including recycling facilities (Stock, 1998).

Package lightweighting can not only reduce the cost of packaging, but can reduce transportation costs by increasing the amount of product which can be shipped and reducing packaging weight. However, purchasing managers should note that blindly following a goal of package lightweighting can lead to increased damage and spills, which are more costly and harmful to the environment than the benefits accrued through packaging reduction (Gray and Guthrie, 1990).

Purchasing can also contribute to a firm's environmental initiatives through involvement in design of products for disassembly, recycling, or reuse. Here, a cross-functional approach is generally taken (Paton, 1993). Purchasing can play a key role in cross-functional design of products through their interaction with manufacturing, marketing, and engineering (O'Neal, 1993). As noted by Burt and Soukup (1985, p. 95), "The most vulnerable aspect of the product development system in many companies is their failure to use the full creative capabilities of potential suppliers." Thus purchasing can act also as a liaison between engineers within its firm and suppliers, and play a key role by cataloguing suppliers' technical and design expertise and developing an environment that will encourage suppliers to be more creative and take risks (Birou and Fawcett, 1994).

Purchasing managers can also contribute to a firm's environmental programs and initiatives by using a life-cycle analysis to evaluate the environmental friendliness of products and packaging. While formal total cost of ownership programs are difficult to establish across functional boundaries and are often stand alone systems in many purchasing organizations (Ellram and Siferd, 1998), a formal program does not have to be in place to reap the benefits from a life-cycle analysis perspective. However, purchasing managers must be able to look beyond the basic costs of inputs, and begin to assess the potential impact on manufacturing performance (Sarkis and Rasheed, 1995), customer satisfaction (Menon and Menon, 1997), and relationships with external stakeholders such as customers and regulatory agencies (Freeman, 1984).

Like marketing, purchasing is a boundary spanning function (Webster, 1992; Williams et al., 1994) and can be particularly effective in implementing environmental programs and processes not only within a firm but also outside the firm, by asking suppliers to commit to waste reduction goals. Such goals can include asking suppliers to minimize packaging and use recyclable or reusable packaging, pallets, and containers (Stock, 1992).

To conclude, Min and Galle (1997) find that the two most highly rated obstacles to effective green purchasing are purchasing managers' perceptions that environmental programs are costly and that recycling is uneconomical. Our findings suggest that in fact the opposite is true. While

Table 2

Environmental purchasing scale items^{a,b,c,d} (currently, our department...)

EP1: Purchases recycled packaging (0.54)
EP2: Purchases packaging that is of lighter weight (0.56)
EP3: Uses a life-cycle analysis to evaluate the environmental friendliness of products and packaging (0.68)
EP4: Participates in the design of products for disassembly (0.62)
EP5: Asks suppliers to commit to waste reduction goals (0.69)
EP6: Participates in the design of products for recycling or reuse (0.72)

^a Scale items were measured on a 5-point Likert scale, where 1 denotes To No Extent and 5 denotes To A Very Great Extent.

^b Standardized factor loadings are given in parentheses. All factor loadings are significant at ($p < 0.0001$), suggesting convergent validity.

^c Composite reliability = 0.80, indicating construct reliability.

^d In the current study, Environmental Purchasing = $\sum \lambda_i V_i$, where λ_i is the factor loading of the i th scale item and V_i is the i th scale item.

Walley and Whitehead (1994) advocate that the existence of a win-win mindset is the result of cherry picking success stories, and cannot be sustained, our results indicate that purchasing managers can contribute to the environmental endeavors of their firms while enhancing firm performance.

Appendix A

See Table 2.

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