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Beyond Size: Predicting Engagement in Environmental Management Practices of Dutch SMEs

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Abstract This study focuses on the prediction of the engagement of small- and medium-sized enterprises (SMEs) in environmental management practices, based on a random sample of 689 SMEs. The study finds that several endogenous factors, including tangibility of sector, firm size, innovative orientation, family influence and perceived financial benefits from energy conservation, predict an SME's level of engagement in selected environmental management practices. For family influence, this effect is found only in interaction with the number of owners. In addition to empirical research on SMEs' environmental behavior, this article draws on the ecological modernization literature as well as the theory of planned behavior.

Keywords Corporate social responsibility · Ecological modernization · Environmental behavior · Environmental management practices · Family firms · Innovation orientation · Small and medium enterprise (SME) · Sustainability · Sustainable development · Theory of planned behavior

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Abbreviations

CSR	Corporate social responsibility
EM	Ecological modernization
SME	Small- and medium-sized enterprise
VIF	Variance inflation factor

Introduction

This study predicts the prevalence of specific environmental management practices in small and medium-sized enterprises (SMEs) based on internal characteristics of the firm. In this article, *environmental management practices* are those actions undertaken by a business to "reduce the environmental impact of their operations" (Gadenne et al. 2009, p. 45). Environmental management practices and a similar term, *environmental management*, refer to the ways in which firms conserve and protect natural resources (Schaltegger et al. 2003, p. 19; Van der Kolk 2000, p. 3).

Given growing global concerns about the depletion of natural resources and reductions in biodiversity (e.g., Hawken et al. 1999; Keijzers 2005; Wilson 2002), finding the best ways of engaging firms in environmental issues is of increasing interest and importance to both academics and practitioners (Dunphy et al. 2007; Elkington 1997; Holliday et al. 2002; Laszlo 2003). Much of the research has been on the regional or national policy levels (e.g., Brand 2010; Feindt and Cowell 2010) and on the prediction of environmental performance in large, listed corporations (e.g., Dyer and Whetten 2006; Russo and Fouts 1997).

However, the growing recognition that SMEs have a significant aggregate influence on the environment (Gadenne et al. 2009; Tilley 2000) has fueled research into environmental management practices among smaller firms (e.g., Fuller and Tian 2006; Gadenne et al. 2009; Hitchens et al. 2003; Jenkins 2004, 2006; Lynch-Wood et al. 2009; Morad 2007; Perrini 2006; Perrini et al. 2007; Petts et al. 1999; Rowe and Enticott 1998; Rowe and Hollingsworth 1996; Sarbutts 2003; Spence et al. 2000; Spence and Schmidpeter 2003; Williamson et al. 2006; Worthington and Patton 2005). Access to resources, the decision-making process, values, norms, and sensitivity to brand reputation and image are just some of the aspects that researchers suggest may differentiate SMEs from large corporations and thus help to explain differences in their environmental practices (see Cambra-Fierro et al. 2008; Williamson et al. 2006). The prevalence of such differences means that one cannot simply scale the practices prescribed for large corporations down to fit the SME context (Jenkins 2004; Williamson et al. 2006).

Despite the extensive research interest in SMEs' environmental behaviors, only a few studies rely on inferential statistics and large random samples of firms (including SMEs) to test hypotheses (e.g., Brand and Dam 2009; Gadenne et al. 2009; Perrini et al. 2007; Russo and Fouts 1997). Such methods can provide validation and generalization of conclusions drawn from research that relies on descriptive statistics and narratives derived from case studies and/or small-scale samples (e.g., Cambra-Fierro et al. 2008; Hitchens et al. 2003; Jamali et al. 2009; Pataki 2009; Rowe and Enticott 1998; Spence et al. 2000; Williamson et al. 2006; Worthington and Patton 2005). By using inferential statistics and a large-scale sample, this article aims to enhance our knowledge of factors that are internal or endogenous to the firm that may influence the environmental management practices of Dutch SMEs. In particular, the following question is addressed:

> Are certain aspects of the organizational context (tangibility of sector, size, family business characteristics, innovation orientation) in Dutch SMEs and/or certain environmental attitudes held by their directors (perceived financial benefits) associated with more active engagement in environmental management practices among these firms?

The theoretical framework and rationale borrows from several sources, including the concept of ecological modernization (EM) (Morad 2007), the resource-based view, and other research on SMEs in the environmental and organization science literatures. It also extends previous environmental management research based on the theory of planned behavior (Ajzen 1991; Cordano and Frieze 2000; Gadenne et al. 2009; Sharma and Sharma 2011) to enhance our understanding of conditions under which SMEs engage in environmental management practices.

In the next section, we provide a more detailed discussion of the dependent variable, environmental management practices, as well as a brief overview of the Dutch context. Thereafter, we briefly summarize the theory of planned behavior in the theoretical framework section, and then present our hypotheses and their rationale. The method section explains our approaches to data collection, measurement and analysis. The remaining four sections cover the results, interpretation of results, limitations of our study and directions for future research, and finally, the conclusions and practical implications.

Background to the Study

"Environmental Management Practices" and Related Concepts

Past research in environmental behavior covers environmental intentions or strategies as well as outcomes. For instance, Russo and Fouts (1997) examine compliance records, expenditures and waste reduction, as well as support for environmental protection organizations, in their study of environmental behavior. Stanwick and Stanwick (1998) use a single measure of environmental performance—pollution reduction. For the purpose of this article, we focus on the environmental behaviors or practices of Dutch SMEs that arguably reflect intentions or strategies related to environmental protection, rather than outcomes.[1] We call them 'environmental management practices'. These practices include active or deliberate strategies aimed at:

- Monitoring of company waste;
- Producing or selling environmentally friendly products; and
- Searching for more environmentally friendly products, services or production methods.

Although this list is far from complete, these practices capture environmentally friendly practices at both the front end (e.g., types of products purchased and sold) and the back end of operations (waste produced) (Keijzers 2002; Nidumolu et al. 2009).

The concept of environmental management practices is distinct but related to such terms as sustainable development, sustainability, corporate social responsibility (CSR), and sustainable entrepreneurship. The term sustainable

[1] The project was entitled "SMEs and Entrepreneurship" and was carried out by EIM Research and Policy on behalf of the Dutch Ministry of Economic Affairs.

development was introduced at the United Nations Conference on the Human Environment in 1972 and gained prominence from its use in a report released by the World Commission on Environment and Development (1987). This report, also known as the "Brundtland Report", defines sustainable development as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" (WCED 1987, p. 43). At the core of this definition are the notions that all natural systems have limits and that to survive, humanity must learn to live within those limits (Hall et al. 2010, p. 440). The concepts of sustainable development, sustainability, and CSR are often used interchangeably (Elkington 1997; Hall et al. 2010; Holliday et al. 2002; Laszlo 2003). One common definition for all three terms reflects the goal of integrating the economic, social and environmental objectives of business. This is sometimes referred to as the "triple bottom line" (Cohen and Winn 2007; Elkington 1997; Schaltegger et al. 2003). Notably, for each of these three terms, the balancing of economic and social objectives with environmental objectives is an important aspect of firm behavior but not the only one.

The concept of environmental management practices can also be compared to the concept of *sustainable entrepreneurship*, which refers to a type of entrepreneurship in which environmental protection is a core objective (Parrish 2010). Environmental management practices can be seen as practical operationalizations of sustainable entrepreneurship.

In summary, while we acknowledge the importance of terms such as sustainability, sustainable development, CSR, and sustainable entrepreneurship, we use the term *environmental management practices* as the most precise label for the dependent variable in our research.

The Dutch Context

The current policy of the European Commission with respect to the environment (and CSR in general) attempts to balance government regulation with *self-regulation*, the latter term referring to voluntary initiatives by firms and industries, which often meet or exceed minimum legal standards (European Commission 2001; Lynch-Wood et al. 2009). In the last decade, European environmental policy has proliferated into a vast array of directives, decisions and regulations that cover all aspects of the environmental impact of commerce: air quality, industrial pollution, waste and water management, resource use, biodiversity, and noise pollution. Although environmental policies among European Union member states have been homogenized to some extent as a result of this process (Holzinger et al. 2008), national differences remain. We illustrate this point by comparing the UK and Dutch contexts.

Studies of SMEs in the UK highlight the fact that government regulation remains a dominant motivator of environmental activities in UK SMEs (Spence et al. 2000; Williamson et al. 2006). Furthermore, these studies clearly indicate that self-regulation among UK SMEs is not likely to work well; UK SMEs appear to have little incentive to improve their environmental performance beyond the minimum legal requirements (Spence et al. 2000; Worthington and Patton 2005). There are various explanations for this finding, including lower per capita UK government investment in the protection of the environment relative to the Netherlands, and the resulting assumption among many SMEs that they will generally be overlooked in enforcement efforts. Furthermore, UK SMEs tend to view environmental management as a cost rather than an activity offering a competitive advantage (e.g., Worthington and Patton 2005).

In contrast, Dutch SMEs show a broad pallet of motives for environmental management. In a study of 1,662 SMEs in the Netherlands, Bertens et al. (2011) find that half of the firms that actively promote sustainability plan to develop more eco-innovative products and services. In addition, more than half of the firms in the sample plan to communicate more about sustainability, while one-quarter plan to issue a sustainability report. These data seem to suggest that Dutch SMEs are strongly marketing-driven in their approach to sustainability, which confirms results obtained a decade earlier by Spence et al. (2000). Dutch SMEs also express strong intrinsic ethical motives with respect to sustainability, as shown by Van de Ven and Graafland (2006). In their study of 111 SMEs in the Netherlands, they conclude that CSR is generally seen as a "moral duty towards society" (Van de Ven and Graafland 2006, p. 6) regardless of firm size. This view stands in stark contrast to findings for SMEs in the UK, which identify primarily business performance, economic opportunities and legal compliance as motives for environmental action (Petts et al. 1999; Williamson et al. 2006).

Another significant characteristic of Dutch SMEs is their extensive involvement in their local communities and with local trade associations with the goal of defining and enforcing environmental protection standards. This collective approach to problem solving and policy development has been referred to in a wider context as the "polder" model and underscores the importance of civil society institutions in the Dutch political economy (see Spence et al. 2000; CPB/Dutch Office for Economic Policy Analysis 1997).

The Dutch situation may prove enlightening for other countries, given its combination of heavy federal regulation and pro-environmental attitudes among SME directors.

Although regulation is of great concern in UK policy discussions (Lynch-Wood and Williamson 2010a, 2010b), there is little evidence in the Dutch context that regulation curtails an interest in adopting more proactive approaches to environmental protection.

EM is based on the assumption that a society can be simultaneously geared toward economic growth and toward solving complex environmental problems (Lynch-Wood and Williamson 2010a, 2010b; Petts et al. 1999; Weale 1992). Furthermore, EM suggests that society can achieve environmental improvements through market-driven innovations (Lynch-Wood and Williamson 2011). The Netherlands provides an interesting testing ground for EM in that the Dutch society combines widespread technological advances, a growth orientation at the policy level based on stimulation of a knowledge economy and social norms that reflect a deep-seated respect for the environment. At the societal level, this combination is consistent with the EM philosophy.

Theoretical Framework

This section presents the hypotheses to be tested and their rationale. To predict engagement in environmental management practices, we focus on different aspects of the firm's organizational context, including firm size, tangibility of sector, family influence, innovation orientation, and perceived (financial) benefits of conserving energy and other natural resources. The rationale and hypotheses are based partly on the resource-based view (firm size), partly on principles of EM (innovation orientation) (Morad 2007) and, for several of the variables, on the theory of planned behavior (tangibility of sector, family influence, perceived financial benefits) (Ajzen 1991; Sharma and Sharma 2011).

The theory of planned behavior has been used extensively to explain individual behavior on the basis of behavioral intentions. These intentions, in turn, are explained by attitudes about the behavior (including perceived consequences of action), subjective norms (or social pressures) and perceived behavioral control (whether the individual perceives that he or she has the necessary opportunities, abilities and resources to act) (Ajzen 1991). Recent research applies the theory of planned behavior to firm behavior, especially in SMEs and family firms, where the decisions of individual directors have a significant effect (Cordano and Frieze 2000; Gadenne et al. 2009; Sharma and Sharma 2011).

Firm Size and Environmental Management Practices

To date, company size dominates the environmental social science literature as an explanation for differences in environmental compliance, suggesting that size can explain differences in firms' capacities to comply with regulations and that larger firms are more likely to be engaged in environmental management practices than smaller firms (Petts et al. 1999; Worthington and Patton 2005; Lepoutre and Heene 2006; Perrini et al. 2007; Williamson et al. 2006; Lynch-Wood et al. 2009: Lynch-Wood and Williamson 2011). There are two typical arguments for this view. First, in line with the resource-based view of the firm, larger firms typically have more stable resources (manpower and finances) and are thus more likely to engage in environmental management practices (Lepoutre and Heene 2006; Mandl et al. 2007). Second, larger companies are more exposed to the public. Thus, their reputations and even their survival might be at stake when irresponsible behavior is exposed (Lynch-Wood et al. 2009).

Given these and other factors, Lynch-Wood and Williamson (2010a, Lynch-Wood and Williamson 2011) suggest that each firm has a *capability profile*: a set of characteristics that defines the firm's potential to comply with environmental regulations, which depends largely on the firm's size, visibility and resources. This profile, in turn, predicts the *compliance orientation* of the firm, which ranges from "noncompliance" to "beyond compliance". Primarily as a result of their size, the majority of SMEs fall into the category of "vulnerable satisfiers"—firms with limited resources but a willingness to comply (Lynch-Wood and Williamson 2010a; Lynch-Wood et al. 2009).

Although most of these size arguments and the available empirical research contrast SMEs with larger firms, we propose that size effects exert an influence on the likelihood of engagement in environmental management practices even *within* the SME size range. This rationale is in line with research on SMEs in other contexts, such as the use of formal human resource management practices (De Kok et al. 2006). Although we would expect the size effect to be less pronounced, as the upper end of the range is sharply attenuated, we still anticipate that the larger SMEs will have more resources, greater visibility and greater pressure from stakeholders than smaller SMEs, and that they will thus be more likely to engage in environmental management practices. Our first hypothesis, therefore, is the following:

Hypothesis 1 The larger the SME, the more likely it is to engage in environmental management practices.

Tangibility of Sector and Environmental Management Practices

To a great extent, a firm's business sector determines its potential usage of natural resources as well as its potential to pollute. In this regard, Brand and Dam (2009) categorize

sectors into three broad categories: tangible products, tangible services and intangible services. They refer to the associated variable as *tangibility of sector*. In this study, we modify these categories somewhat but adopt a similar approach, so that the first category—the tangible products sector—includes agriculture, manufacturing and construction. The tangible services sector includes retail and repair, catering and hospitality, as well as transportation and communication.[2] The intangible services sector includes firms in financial services, business services and other (intangible) services.

Although firms in more tangible sectors can cause more damage to the environment (Brand and Dam 2009), they also have a greater opportunity to differentiate themselves from similar firms by adopting more efficient environmental management practices. Moreover, firms in more tangible sectors are likely to be closely monitored and, thus, be more aware of environmental issues. Finally, they are more likely to be in a position to benefit from the adoption of higher environmental standards and/or be required to adopt such standards (e.g., complete quality certification programs, such as ISO 14001) to satisfy suppliers and customers (Williamson et al. 2006). This logic is consistent with the concept of *perceived behavioral control* (Ajzen 1991). Due to increased resource usage, SMEs operating in more tangible sectors also have more opportunities to act in a more environmentally responsible manner.

In their empirical study of 645 Dutch SMEs, Brand and Dam (2009) confirm the positive relationship between the degree of tangibility and environmentally friendly behavior. For a sample of both small and large Italian firms, Perrini et al. (2007) only partly confirm this finding, reporting a positive effect for manufacturing, but not for construction firms. Nevertheless, given the previous arguments, we propose as our second hypothesis:

Hypothesis 2 The greater the tangibility of the SME's sector, the more likely it will be to engage in environmental management practices.

Family Influence and Environmental Management Practices

The third contextual variable examined in this study is family influence. Whereas Lynch-Wood et al. (2009) argue that stakeholders (including investors and shareholders) of smaller firms exert limited influence on the firm, others argue that family shareholders may exercise significant, positive social pressure on firms to engage in environmentally favorable practices (Mitchell et al. 2011; Sharma and Sharma 2011; Uhlaner et al. 2004). Although Sharma and Sharma (2011) suggest that all three factors derived from the theory of planned behavior (perceived behavioral control, subjective norms and attitudes about the behavior) can be used to explain the family effect, some of their arguments are more applicable in larger firms. Perceived behavioral control is likely to be similar for single owner managers and small groups of family owners. We argue therefore that especially for SMEs the most direct and significant impact of the family is likely to occur via their influence on *subjective norms*, i.e., the social pressure a family may exert on the firm's directors to conform to pro-environmental management practices (Mitchell et al. 2011).

Quantitative research verifies the relationship between family ownership and environmental performance for US listed firms (Berrone et al. 2010; Dyer and Whetten 2006). Such results are consistent with the view expressed by the European Group of Owner-Managed and Family Enterprises (2003a, 2003b) that family businesses—listed or not—are more socially responsible, on average, than non-family businesses, as the former often combine economic objectives with the traditional roles of the family social unit (Donnelley 1964; Litz and Stewart 2000). However, this relationship has not yet been empirically verified for non-listed firms.

There are numerous explanations for why family businesses stress not only monetary but also social goals, including environmental protection. First, family businesses are typically strongly embedded in their local communities (Astrachan 1988; Fuller and Tian 2006; Niehm et al. 2008). This close relationship results from the long-term presence of the business in the community (even across generations), the firm's typical unwillingness to change location (Gnan and Montemerlo 2002; Graafland 2002a; Lansberg 1999; Ward 1987) and the fact that these firms often rely heavily on local society as a resource for business operations. As Niehm et al. (2008) state, "most family businesses live, work, and operate within the same community" (Niehm et al. 2008, p. 333). To illustrate, owners of the Benziger Family Winery in Sonoma County, California decided to adopt biodynamic farming methods as a healthier alternative for family members living nearby (Sharma and Sharma 2011). Berrone et al. (2010) confirm the importance of local embeddedness or "local roots" as both an independent predictor of environmental performance as well as a moderator of effects of family ownership in the prediction of environmental performance in a sample of 194 large, listed US firms.

[2] Contrary to Brand and Dam (2009), we include transportation and communication in the tangible sector category because the majority of SMEs in this category are involved in transportation activities that consume significant amounts of fuel. Even firms in the communication sector typically sell hardware, and thus consume resources and require methods of proper disposal.

A second driver behind the family effect is the potentially close link between company and family wealth and reputation. Environmental friendliness not only builds a good image for the company but it also protects the family's image (Fuller and Tian 2006; Post 1993; Uhlaner et al. 2004). Furthermore, as the family firm often represents the family's main source of income and accumulated wealth, a family may put its future welfare in jeopardy by engaging in socially irresponsible actions (Dyer and Whetten 2006). In addition, anecdotal evidence in a study by Uhlaner et al. (2004) finds that especially businesses branding the family name may act more responsibly toward the environment to avoid sullying the family's personal reputation (Uhlaner et al. 2004).

In sum, as a result of the pressure of family stakeholders, the embeddedness of the family firm in the community and the potentially greater visibility of family firms relative to other small businesses in the community, we propose that relative to other SMEs, family firms are more likely to engage in environmental management practices:

Hypothesis 3 The greater the family influence on the SME, the more likely it will be to engage in environmental management practices.

Innovation Orientation and Environmental Management Practices

Innovation orientation, an aspect of organization strategy, is the fourth organizational context variable, we propose as a possible predictor of engagement in environmental management practices. The rationale for this proposition draws, in part, from the concept of EM and, in part, from the theory of planned behavior.

The traditional view is that economic development naturally runs counter to the conservation of the environment. In this "pastoral" view, only a substantial reduction in economic productivity and economic output, and the resulting drastic reductions in gross domestic product and economic welfare, can lead to environmental gains (Daly 1973; Daly and Cobb 1989; Schor 1998, 2003). EM takes the opposing view, suggesting that pollution and other inefficient uses of resources (i.e., excessive and irresponsible discarding of waste) actually represent costs to a firm, that can be overcome through technological innovation and the development of environmental management practices (Morad 2007). In "reflexive" models of EM, ecological innovation becomes inevitable at a certain point, as it arises from the mounting pressure to use natural resources to fuel economic growth (Mol 1995). Thus, according to EM, the way out of the ecological crisis is further modernization, even though (ironically) modernization causes the problem in the first place (Brand 2010; Lynch-Wood and Williamson 2010b; Mol 2000). In such interpretations of EM, high-tech innovations are seen as crucial and inevitable in treating the environmental crisis (e.g., Brand 2010).

In less reflexive interpretations of EM, market-driven innovations to achieve eco-efficiency may not be necessarily inevitable but may at least be more feasible and thus more likely in a high-technology society. Pataki (2009) provides a helpful illustration at the company level of analysis. Boosted by a strong corporate culture that advocates environmental responsibility, together with sophisticated mastery of technology, a Hungarian chemical manufacturer invented a technical solution for the re-use of mixed plastics waste in its environmental technology business unit.

A second rationale for predicting a positive relationship between innovation orientation and engagement in environmental management practices draws upon the theory of planned behavior (Sharma and Sharma 2011; Ajzen 1991) and other innovation-diffusion models (Rogers 1995). According to such models, attitudes and beliefs about the behavior—especially with respect to possible positive and negative consequences of the behavior, and related perceived values of those outcomes—have a positive influence on the adoption decision. Although nonreflexive models of EM make similar assumptions, the theory of planned behavior provides a more detailed set of mediating variables at the individual and firm level to explain this relationship. In particular, attitudes toward "newness" or innovation more generally may spill over to attitudes with respect to adopting new environmental management practices. Thus, innovation-oriented firms are predicted to be more likely to engage in environmental management practices because they are more *open* to new ideas. In addition, this openness may also be associated with more extensive and accurate information about new practices.

The innovative aspects of environmental management practices and related behavior have been previously identified by other researchers. For example, Masurel points out that "sustainable entrepreneurship cannot be discussed without mentioning innovation, because it has much to do with adopting new production technologies" (Masurel 2007, p. 192). Nidumolu et al. (2009) confirm the relationship, finding in their thirty-company sample that those companies acting responsibly with respect to sustainability also innovate with respect to their products, technologies, processes and overall strategies. In contrast, resistance to change as a factor impeding the adoption of environmental practices—even those that could reduce operational costs—is illustrated in a study of the UK screen-printing sector (Worthington and Patton 2005). SMEs in that industry often resist adopting changes that could be beneficial for the firm and the environment. The changes

investigated included the introduction of water-based inks, and cleaning and recovery equipment to reduce solvent use and to recover chemicals.

In summary, we propose:

Hypothesis 4 The greater the innovation orientation of the SME, the more likely it will be to engage in environmental management practices.

Perceived Financial Benefits and Environmental Management Practices

The final variable that we explore as a potential predictor of environmental management practices is the perceived financial benefits of energy and natural resource conservation. Consistent with the theory of planned behavior, positive attitudes about a behavior are based in part on perceived benefits of that behavior. Financial benefits are especially important to SMEs (Graafland 2002b; Williamson et al. 2006). Williamson et al. (2006) confirm the importance of business performance considerations related to energy conversation, drawing from a detailed analysis of interviews with 31 manufacturing SMEs. Our final hypothesis is thus:

Hypothesis 5 The greater the financial benefits of energy and natural resource conservation perceived by the SME's decision maker (e.g., the director), the more likely the firm will be to engage in environmental management practices.

Method

Sample and Data Collection

The sample for this research was drawn from a representative panel of approximately 2,000 Dutch SMEs (defined as firms with a maximum of 100 employees),[3] participating in a longitudinal study undertaken by a Dutch research institute for the Dutch Ministry of Economic Affairs. The firms were chosen randomly, but stratified by size class and sector. The survey took the form of a telephone interview conducted with a key informant (owner or director). The data used for the present study were collected in two waves (2006 and 2008). After missing data (for computed variables) and the overlap of data across the two waves are taken into account, the final sample used for our analysis includes 689 cases.

Measures

Details about the items used in the study are provided in this section. The exact wording of the items used for each of the variables is given in the Appendix.

Firm Size

Firm size is measured as the number of people employed by the firm in 2006. As a result of the skewed distribution of size in the sample toward smaller firms, a natural logarithm of this variable was created and used in all analyses (Shalit and Sankar 1975).

Tangibility of Sector

To measure tangibility of sector, the companies included in the sample were first grouped into nine sectors. The sector variable was recoded as an ordinal variable according to the degree of tangibility, in a variation of the tangibility variable developed by Brand and Dam (2009). SMEs in financial services, business services and other service sectors were coded as intangible services (1). SMEs in transport and communication, retail and repair, and catering and hospitality were coded as tangible services (2). SMEs in manufacturing, construction and agriculture were coded as tangible products (3).

Family Influence

A multi-dimensional approach is commonly used to measure family influence. For instance, Astrachan et al. (2002), identify three dimensions, including: *Power* (proportion of family representing on ownership, leadership and governance); *Experience* (number of generations that family has been represented as owners, leaders or in governance), and; *Culture* (the extent to which the family influences culture and strategy). In this study, family influence measures aspects of power and culture, as well as the SME director's desire to keep the firm's ownership in the family. Such multi-item scales are particularly suited to SME populations since the vast majority of SMEs are primarily owned by one individual or family, and allow for more differentiation among SMEs (Uhlaner 2005). For the four items used in this study (measured in 2006), scales for individual items vary in length. They are thus first converted to standardized scores before being averaged together. The family influence variable is calculated as the mean of non-missing values for the standardized scores of each of the four items (Cronbach's $\alpha = 0.82$).

[3] Prior to adoption of European Union standards, the Netherlands used the criterion of a maximum of 100 employees to define an SMEs. For that reason, it was used as the criterion to draw the sample for this study.

Innovation Orientation

The innovation orientation variable, measured in 2006, is based on the mean of the non-missing values of standardized scores for three items (Cronbach's $\alpha = 0.64$).

Perceived Financial Benefits

Perceived financial benefits, measured in 2008, is based on the mean of the non-missing values for the unstandardized scores of five items related to perceived financial benefits of energy conservation (Cronbach's $\alpha = 0.76$).

Environmental Management Practices

In order to measure the dependent variable, environmental management practices, respondents were asked whether their firms engage actively or deliberately (coded 3), passively (coded 2), or not at all (coded 1) in each of three activities: monitoring the amount of the company's waste; producing or selling environmentally friendly products; and searching for more environmentally friendly products, services or production methods. A scale was created based on the mean of the non-missing answers to those questions. (Cronbach's $\alpha = 0.57$). The data for this variable were collected in 2008.

Control Variables

Control variables in each multiple regression equation include changes in sales turnover, financial performance, employment between 2006 and 2007, and the number of owners in 2006. The first three variables were included to control for differences in financial and human resources. The number of owners variable was measured is designed to control for differences in family firms due to multiple ownership. Details of each control variable are also included in the Appendix.

Data Analysis

Scale Construction

Variables composed of multiple items (i.e., family influence, innovation orientation, perceived financial benefits, and environmental management practices) were created by first selecting items on the basis of content and face validity, and then including items for all multi-item variables in a principal components factor analysis with Varimax rotation. This final step allows us to test for common method bias, especially when some or all variables are collected at the same time, and is referred to as Harman's single-factor test (Podsakoff and Organ 1986). According to this test, common method bias is less likely when the one "general" factor in a unrotated factor solution accounts for only a minority (preferably less than 30%) of variance (Podsakoff and Organ 1986).

Hypothesis Testing

The hypotheses were tested using ordinary least squares hierarchical multiple regression techniques. The variables were entered into the model in blocks. The first block included only control variables. In various further analyses (not shown), each independent variable was entered alternatively in two different regression analyses—as the second and last block, respectively. The significance of the change in R squared (ΔR^2) in the second block provides an indication of initial support for the hypothesis, with more robust support of a direct effect found for those variables explaining additional significant variance of the dependent variable (ΔR^2) in the final block of the model.

Furthermore, two-way interaction effects were tested for all combinations of the five independent variables. A possible interaction effect between the number of owners and family influence was also tested. In each case, the product of the standardized value of the variable was added to the regression model to test for additional explained variance of the dependent variable.

Multicollinearity

In addition to the scale construction techniques described above, a test for multicollinearity was included for each multiple regression analysis using variance inflation factor (VIF) scores (Hair et al. 2006).

Results

Scale Construction

Table 1 presents the results of the common method bias test for the items that are included in the scales measuring family influence, innovation orientation, perceived financial benefits and environmental management practices. Factor loadings represent the strength of a relationship between a specific variable and the factor and indicate whether the variable should be included in the factor (Hair et al. 2006). Using the cut-off criterion of an eigenvalue greater than or equal to one, the orthogonally rotated factor analysis provides a four-factor solution, including family influence, perceived financial benefits, innovation orientation and environmental management practices. As presented in Table 1, the intended factor loadings of individual items range from 0.46 to 0.88 with all but one

Table 1 Common method bias test: factor loadings from principal component analysis, rotated solution

	Family influence	Perceived financial benefits	Innovation orientation	Environmental management practices
The owners are related to each other	**0.88**	−0.09	0.14	−0.06
The managers are related to each other	**0.84**	0.09	0.04	0.03
The owner will keep firm ownership in the family	**0.67**	−0.08	−0.01	0.02
Family determines strategy of the firm	**0.80**	0.09	0.11	−0.09
Renewal of products, services or processes	0.02	0.04	**0.73**	0.22
Continuous thinking about new products or services that are new to the market	0.12	0.04	**0.72**	−0.03
Intention to invest in new products or services in the next 12 months	0.05	0.07	**0.76**	−0.01
Monitoring the amount of firm's waste	−0.20	0.29	0.09	**0.46**
Producing or selling environmentally friendly products	0.02	0.05	−0.01	**0.82**
Searching for more environmentally friendly products, services or production methods	0.04	0.12	0.10	**0.81**
Firms in my industry can significantly lower their energy costs by taking energy-saving measures	−0.02	**0.62**	−0.00	0.07
Control of my energy costs is becoming increasingly important in my business operations	−0.10	**0.72**	0.01	0.22
I don't find execution of energy regulations very interesting for my business	0.03	**0.75**	0.09	0.14
Taking extra energy-saving measures doesn't benefit my bottom line	0.02	**0.70**	−0.03	0.08
I don't know what extra energy-saving measures I could carry out	0.06	**0.67**	0.14	−0.06
Percentage of variation explained	19.68%	18.50%	10.17%	8.70%

Note Highlighted items are included in the factor

factor loading above the recommended minimum of |0.50| (Hair et al. 2006). Most of the unintended loadings are very low with all unintended loadings ranging from |0.00| to |0.29|. In the unrotated solution, the total solution explains 55.85% of the variance, while the first factor explains only 19.7% of the variance. These findings support the assumption that these variables measure different constructs and reduce the likelihood that common method bias is a problem in this study (Podsakoff and Organ 1986).

Description of the Sample and Bivariate Statistics

Most of the firms in the sample operate in the business services sector (21.0%), retail and repair (18.4%), manufacturing (17.3%), or construction (12.2%). In addition, catering and hospitality, transport and communication, financial services, and other services account for 8.6, 8.0, 9.0, and 5.2% of the sample, respectively, while the agriculture sector accounts for only 0.3% of the sample. The mean size of the firms is 19.54 employees, with a standard deviation of 23.3 employees.

Table 2 reports the distribution of answers for the three items comprising the environmental management practices scale. Just over one-third (36.6%) of the firms actively monitor the amount of waste. About 22% report a deliberate strategy to produce or sell environmentally friendly products. Finally, ~23% report actively searching for more environmentally friendly products, services or production methods.

Table 3 presents the distribution of average scores of the environmental management practice variable for each sector grouping—intangible services, tangible services and tangible products. The tangible products sector contains the largest percentage (40.5%) of SMEs with a score greater than 2. A comparison of the other two groups also shows a fairly large difference between tangible service and intangible service firms, where 22.4 and 14.8%, respectively, have scores greater than 2.

Table 4 reports the bivariate Pearson-correlation coefficients between the variables included in the study as well as descriptive statistics. These statistics provide preliminary tests of the five hypotheses. The pattern of correlation coefficients listed in Table 4 is consistent with Hypotheses 1, 2, 4, and 5. With respect to the dependent variable, the largest (positive) correlation is observed between environmental management practices and perceived financial benefits ($r = 0.34$, $p < 0.001$), followed by positive correlations with tangibility of sector (r =0 .33, $p < 0.001$), firm size ($r = 0.22$, $p < 0.001$) and innovation orientation ($r = 0.17$, $p < 0.001$). Based on bivariate statistics, the relationship between environmental management practices and family business is not significant.

Table 2 Distribution of environmental management practices (%)

Response:	Not at all; not applicable	Yes, passively (not as a deliberate strategy)	Yes, actively (as a deliberate strategy)	Total responses
Does your firm				
Monitor the amount of firm's waste	35.0	28.8	36.2	100
Produce or sell environmentally friendly products	61.7	16.3	22.0	100
Search for more environmentally friendly products, services or production methods	55.4	21.9	22.7	100

Table 3 Tangibility of sector and environmental management practices—respondents scores (%)

Environmental management score	Tangibility of sector score		
	1 (intangible services)	2 (tangible services)	3 (tangible products)
Less than 2	77.0	56.0	40.5
2	8.2	17.4	19.0
Greater than 2	14.8	22.4	40.5
N (689)	243	241	205
%	100	100	100

Multiple Regression Analyses

To provide definitive tests of the hypotheses, we used a series of multiple regression analyses. Table 5 presents the results of the multiple regression analyses predicting environmental management practices by the five independent variables when controlling for changes in sales turnover, financial performance, employment and the number of owners. For all models included in Table 5, the highest VIF score is 1.45 (not shown), which is well below the recommended cut-off of 10.0 (Hair et al. 2006). This suggests that the variables are free from multicollinearity. As the results presented in Table 5 indicate, none of the control variables predicts environmental management practices. The all-variables model (Model 1) explains ~16% of the variance in the prediction of environmental management practices ($F = 15.74$, $p < 0.001$).

As shown in Table 5, significant regression coefficients are found for four of the five independent variables. The results of the tests for interaction effects among the independent variables are generally not significant with the exception of modest effects for tangibility of sector and innovation orientation ($B = 0.05$, SD = 0.021, $p < 0.05$), which only occur when perceived financial benefits are excluded from the model (see Model 2). As shown in Model 3, when perceived financial benefits are included, the interaction term falls to the trend level ($B = 0.04$,

Table 4 Descriptive statistics, reliabilities and bivariate correlations between variables

	1	2	3	4	5	6	7	8	9	10
1. Change in sales turnover	1									
2. Change in financial performance	0.52[c]	1								
3. Change in employment	0.20[c]	0.02	1							
4. Number of owners	−0.01	−0.03	0.02	1						
5. Tangibility of sector	−0.00	−0.02	0.04	0.00	1					
6. Firm size (ln)[d]	0.05	−0.03	0.13[c]	0.21[c]	0.21[c]	1				
7. Family influence[d]	0.07	0.09[a]	−0.04	−0.05	0.12[c]	−0.17[c]	(0.82)			
8. Innovation orientation[e]	0.07	−0.02	0.13[c]	0.14[c]	−0.02	0.25[c]	−0.15[c]	(0.64)		
9. Perceived financial benefits	0.05	0.00	0.07	0.04	0.16[c]	0.20[c]	−0.00	0.09[a]	(0.76)	
10. Environmental management practices	0.05	−0.03	0.06	0.02	0.33[c]	0.22[c]	0.02	0.17[c]	0.34[c]	(0.57)
Mean	2.48	2.43	2.24	1.68	1.95	2.30	0.00	0.00	2.16	1.76
Standard deviation	0.74	0.78	0.64	0.71	0.81	1.19	1.00	1.00	0.75	0.61
Minimum value	1	1	1	1	1	0	−1.59	−1.66	1	1
Maximum value	3	3	3	3	3	4.61	2.68	1.49	4	3

Cronbach's alpha reliability coefficient shown on diagonal for multi-item indices

[a] $p < 0.05$, [b] $p < 0.01$, [c] $p < 0.001$, $N = 689$

[d] Mean and standard deviation are based on natural logarithm. Mean firm size = 19.09 employees (SD = 22.82)

[e] Based on a mean of standardized values

Table 5 Prediction of environmental management practices

Variables	Model 1	Model 2	Model 3	ΔR^2 when variable entered in Model 1	
				After controls	Last in the model
Constant	1.82 (0.126)	1.78 (0.120)	1.82 (0.116)		
Change in sales turnover	0.03 (0.034)	0.04 (0.035)	0.03 (0.034)		
Change in employment	−0.01 (0.033)	0.00 (0.035)	0.01 (0.033)		
Change in financial performance	−0.03 (0.031)	−0.03 (0.032)	−0.03 (0.031)		
Number of owners	−0.03 (0.030)	−0.02 (0.031)	−0.02 (0.030)		
Firm size (ln)	0.05[a] (0.023)	0.07[b] (0.024)	0.05[a] (0.023)	0.04[c]	0.005[a]
Tangibility of sector	0.17[c] (0.022)	0.18[c] (0.022)	0.16[c] (0.022)	0.11[c]	0.07[c]
Family influence	0.01 (0.021)	0.02 (0.022)	0.02 (0.021)	0.00	0.00
Innovation orientation	0.09[c] (0.022)	0.10[c] (0.023)	0.09[c] (0.022)	0.03[c]	0.02[c]
Perceived financial benefits	0.16[c] (0.021)		0.16[c] (0.021)	0.11[c]	0.07[c]
Tangibility of sector × innovation		0.05[a] (0.021)	0.04[#] (0.021)		
R^2	0.16[c]	0.22[c]	0.16[c]		
F (df1, df2)	15.74 (8,680)	21.52 (9,679)	15.74 (9,680)		

Unstandardized regression coefficients are reported, standard deviation is in parentheses

[#] $p < 0.10$, [a] $p < 0.05$, [b] $p < 0.01$, [c] $p < 0.001$, $N = 689$

SD = 0.021, $p < 0.10$). No other two-way interaction terms between independent variables reach the trend level of significance and are thus not shown.

The two columns on the far right of Table 5 report the proportion of variation of the dependent variable, environmental management practices, that is explained by each of the independent variables. The column labeled "after controls" presents these figures when the variables are each added individually in a second block immediately following the control variables, while the column labeled "last variable in the model" gives the figures when the variables are added individually as the last block in Model 1. Tangibility of sector and perceived financial benefits each explain about 11% of variation in the dependent variable when added immediately following controls ($\Delta R^2 = 0.11$, $p < 0.001$) and 7% of the variation when added as a last block in the all-variable model ($\Delta R^2 = 0.07$, $p < 0.001$). Firm size explains 4% of the variation when added immediately after the controls ($\Delta R^2 = 0.04$, $p < 0.001$) but this figure falls to less than 1% when added as the last block in the model ($\Delta R^2 = 0.005$, $p < 0.05$). This drop in variance explained suggests that the size effect is probably indirect—it is mediated by one or more of the other independent variables. Innovation orientation explains 3% of the variation when added after controls ($\Delta R^2 = 0.03$, $p < 0.001$) but still explains 2% when added last in the equation ($\Delta R^2 = 0.02$, $p < 0.001$). Results for innovation orientation suggest that the majority of the effect of innovation orientation is probably direct, in contrast to size, for which most of the effect disappears when added after the other variables.

Interaction Effects of Ownership and Family Influence

The results in Table 5 indicate no main effect of family influence on environmental management practices. However, in further analyses, significant interaction effects between the number of owners and family influence are evident, especially when the number of owners is recoded into two groups: three or more owners, and two owners or less ($\Delta R^2 = 0.007$, $p < 0.011$) (see Table 6). To help understand this effect, Table 6 shows both the multiple regression analysis for the full sample (including the added interaction term of number of owners × family influence), as well as the results of separate regression analyses for each of these two subgroups. For the subgroup of three or more owners ($n = 99$), family influence is especially predictive (in a positive direction) explaining an additional 8% of the variation in the overall model when added after controls and 4% when added last in the model (see Model 3, Table 6). This compares with the 0% variation explained by family influence for those SMEs in the subsample of two owners or less ($n = 590$).

The remaining results are roughly similar for both subgroups with the exception of innovation orientation, where the regression coefficient is not statistically significant in the group with three or more owners. The means for the various variables in the two subgroups are similar (not shown) except for those for the family influence and company size variables. In particular, the company size variable's mean for the group with three or more owners is twice that of the group with only one or two owners (33.5 employees and 17 employees, respectively). Also

Table 6 Interaction effects between ownership and family influence in the prediction of environmental management practices

Variables	Full sample Model 1	One or two owners Model 2	Three or more owners Model 3
Constant	1.78 (0.102)	1.79 (0.112)	1.74 (0.263)
Change in sales turnover	0.03 (0.034)	0.02 (0.037)	0.11 (0.086)
Change in employment	−0.01 (0.033)	0.00 (0.036)	−0.07 (0.096)
Change in financial performance	−0.03 (0.031)	−0.03 (0.034)	−0.06 (0.080)
Firm size (ln)	0.06[a] (0.023)	0.05[a] (0.025)	0.10[a] (0.075)
Tangibility of sector	0.16[c] (0.022)	0.17[c] (0.024)	0.12[c] (0.059)
Family influence	0.01 (0.021)	−0.01 (0.023)	0.14[a] (0.060)
Innovation orientation	0.09[c] (0.022)	0.09[c] (0.023)	0.09 (0.067)
Perceived financial benefits	0.16[c] (0.034)	0.15[c] (0.023)	0.21[c] (0.059)
Number of owners × family influence	0.05[a] (0.034)		
R^2	0.23[c]	0.23[c]	0.29[c]
ΔR^2 family influence entered after controls	0.00	0.00	0.08[b]
ΔR^2 family influence entered last	0.00	0.00	0.04[a]
N	689	590	99
F (df1, df2)	20.37 (8,680)	21.10 (8,581)	15.74 (9,680)

Unstandardized regression coefficients are reported, standard deviation is in parentheses

[#] $p < 0.10$, [a] $p < 0.05$, [b] $p < 0.01$, [c] $p < 0.001$

noteworthy is the fact that the mean for the dependent variable, environmental management practices, is nearly identical for both groups.

Interpretation of Results

The degrees of support for each of the five hypotheses are discussed in this section. Table 7 also provides an overview.

Hypothesis 1 Firm size and environmental management practices.

Hypothesis 1 proposes that larger SMEs are more likely than smaller SMEs to engage in environmental management practices. Although the analysis supports this hypothesis, the results indicate that this effect is indirect. It is most likely mediated by one or more of the other independent variables, including innovation orientation, perceived financial benefits and/or tangibility of sector. In sum, Hypothesis 1 is supported but the effect of size is likely to primarily be indirect and is rather small in absolute terms.

Hypothesis 2 Tangibility of sector and environmental management practices.

Hypothesis 2 postulates that SMEs from more tangible sectors are more likely to introduce environmental management practices than firms from other sectors. The results strongly support this hypothesis. Furthermore, the fact that 7% of the variation in the dependent variable is still explained when tangibility of sector is entered last in the all-variable model suggests that much of its total effect on the dependent variable is direct, i.e. not mediated by other variables in the model. Thus, Hypothesis 2 is supported.

Hypothesis 3 Family influence and environmental management practices.

According to Hypothesis 3, SMEs with a greater family influence are more likely to engage in environmental management practices. The initial results based on the bivariate and multivariate analyses seem to refute this hypothesis. However, the significant interaction effect between number of owners (especially when comparing SMEs with three or more owners to those with one or two owners) and family influence supports the conclusion that family influence has a positive effect on engagement in environmental management practices for SMEs with larger business-owning families. These results, therefore, provide conditional support for Hypothesis 3.

Hypothesis 4 Innovation orientation and environmental management practices.

Hypothesis 4 predicts that more innovatively oriented SMEs are more likely to engage in environmental management practices. Although the effect is statistically significant ($p < 0.001$), a relatively small amount of variation of the dependent variable (between 2 and 3%) is explained. Furthermore, there appears to be a modest interaction effect between tangibility of sector and innovation

Table 7 Summary of hypotheses and results

Hypothesis	Total effect	Additional conclusions
Hypothesis 1: The larger the SME, the more likely it is to engage in environmental management practices	Support	Almost all the total effect is indirect (i.e., mediated by other independent variables)
Hypothesis 2: The greater the tangibility of the SME's sector, the more likely it will be to engage in environmental management practices	Strong support	Interaction with innovation orientation; stronger value of both variables enhances positive effect
Hypothesis 3: The greater the family influence on the SME, the more likely it will be to engage in environmental management practices	Conditional support	Significant interaction: Positive effect for larger owning groups (three or more owners) only
Hypothesis 4: The greater the innovation orientation of the SME, the more likely it will be to engage in environmental management practices	Support	Small but persistent and significant effects suggest that the majority of total effect is direct (i.e., not mediated by other variables). Also, effect is stronger in interaction with more tangible sector
Hypothesis 5: The greater the perceived financial benefits of energy and natural resource conservation, the more likely the firm will be to engage in environmental management practices	Strong support	Robust support, even when entered after other variables, suggesting a strong direct effect on the dependent variable

orientation, such that when both values are higher, there is a small added positive effect (just under 1%) on the dependent variable, which contributes less than 1% of additional explanation to the model. In summary, although Hypothesis 4 is supported, in principle the results offer only tepid support for more reflexive models of EM (i.e., that innovation orientation inevitably leads to eco-efficiency).

Hypothesis 5 Perceived financial benefits and environmental management practices.

Finally, Hypothesis 5 predicts that SMEs reporting stronger perceived financial benefits of conserving energy are more likely to engage in environmental management. The amount of variation explained is comparable to that for tangibility of sector (11% when introduced after controls and 7% in the full model). In summary, Hypothesis 5 appears to be strongly supported. It underscores the predictive value of attitudes toward energy conservation, consistent with the theory of planned behavior.

Control Variables and Environmental Management Practices

Finally, a review of the control variables shows little direct effect from any of the four variables on environmental management practices. However, as mentioned above, the number of owners (especially when split into two groups based on the number of owners) has a significant interaction effect with family influence in predicting the introduction of environmental management practices. In particular, for the subgroup of firms with three or more owners, family influence has a strong positive effect on engagement in environmental management practices.

Limitations of the Study and Directions for Future Research

This study has certain limitations, which give rise to possible directions for future research. First, we recognize that a weaker aspect of this research is the measurement of the dependent variable, especially given the relatively low reliability of the scale and the limited number of items. These items are measured furthermore based on self-reports, which may introduce a positive bias to reporting. Future research on the topic could develop a more complete list of items as well as explore other methods for data collection based on independent and more objective data collection techniques. Other dimensions of environmental management practices could also be explored, especially non-reductionist practices (such as the promotion of biodiversity), locally focused activities (such as sponsoring local environmental preservation projects), and more indirect actions, such as donating money to non-governmental environmental organizations. This may allow for more fine-grained analyses of whether the variables we examine have a similar effect on environmental management practices that are not directly linked to the firm's core operations.

Second, the family influence effects need to be understood more fully. As discussed by De la Cruz Déniz Déniz and Cabrera Suárez (2005), subgroups of family firms may differ substantially in their orientation toward CSR. The number of owners variable used in the present research may be a proxy for other underlying differences, such as whether or not the owners have local roots in the community (see Berrone et al. 2010) or other family characteristics (e.g., later generation, or those whose families are either more socially embedded in the firm or in the

community). Community embeddedness could be measured in a number of ways—as the percentage of sales turnover generated from transactions in local markets; as the percentage of suppliers, employees and customers drawn from the local community; or in terms of whether the owners live in the community in which the firm is located.

Third, although four of the five tested relationships in this study were based on longitudinal data, future research could extend the time horizon beyond 2 years, by collecting panel data repeatedly over time, and test for reverse causality by measuring the dependent variable during all time periods.

Fourth, this study is based on the Dutch context, which is marked by a consensus culture, coupled with both strong popular support and acceptance of strong regulations to protect the environment (Spence et al. 2000). Whether similar independent variables predict greater engagement of environmental management practices in other countries with substantially different cultures (e.g., Anglo-Saxon) would have to be confirmed by further research.

Finally, the theory of planned behavior could be tested more completely in future research to include direct measures of perceived behavioral control, attitudes about perceived consequences other than financial benefits as well as the social norms of the owning group. Especially for behavioral control and social norms, one could then examine whether such variables indeed mediate the relationships between the objective SME characteristics we examined and engagement in environmental management practices.

Conclusions and Practical Implications

This article makes three contributions to our understanding of SME environmental behavior, and particularly in the active engagement in environmental management practices. First of all, while past research primarily emphasizes the effects of firm size on environmental management practices, this study identifies other factors to explain differences among Dutch SMEs. These factors include the tangibility of the sector, perceived financial benefits, innovation orientation, and especially in firms with three or more owners, the degree of family influence.

A second contribution of this research is its clarification of the relative merits of the resource-based view, EM, and the theory of planned behavior in predicting engagement of environmental management practices among SMEs. Weak size effects suggest that the resource-based view is of limited value in differentiating among SMEs. Furthermore, the statistically significant but relatively small effect of innovation orientation provides only weak support for EM predictions. By contrast, consistent with previous research (see Cordano and Frieze 2000) the theory of planned behavior provides a more useful basis for explaining the effects of several factors, including tangibility of sector (contributing to behavioral control), perceived financial benefit (an aspect of attitudes about the behavior), and family influence (suggesting that subjective norms may also be of importance).

Drawing especially on the descriptive statistics of this study, a third contribution of the present research is a refocusing on the "greening" potential of SMEs. Of 689 Dutch SMEs, nearly a quarter report active engagement in searching for more environmentally friendly products, services or production methods. About the same proportion pursues a deliberate strategy to produce or sell environmentally friendly products. This contrasts the impression of rather weak participation in green activities by UK SMEs (e.g., Lynch-Wood and Williamson 2011; Worthington and Patton 2005). These differences may be due in part to cultural and formal institutional differences. As pointed out by Spence et al. (2000), in contrast to their UK peers, Dutch SMEs actively participate in the planning and design of government regulations, in combination with their local business groups and trade associations. The Dutch approach appears to effectively blend self-regulation and governmental regulation, rather than placing them at odds with one another, which is common in UK policy debates (see Lynch-Wood and Williamson 2011).

What are then some of the practical implications of our findings? First, our results are consistent with the interpretation that especially in firms with larger family owning groups (i.e., three or more owners) family shareholders may exert normative pressure to adopt environmentally favorable practices (Mitchell et al. 2011). Such pressure may be derived in turn, from a wish to uphold a positive reputation in the local community. Note that this runs counter to the popular wisdom that SMEs primarily think of their own benefits and ignore pressure from shareholders or the broader community (Lynch-Wood and Williamson 2010a; Lynch-Wood and Williamson 2011). Recognizing that visibility is not only an issue at the international level and for listed firms but also for a significant number of SMEs in the local community, may provide especially regional policy makers with new tools to encourage environmental preservation and eco-efficiency. Programs to enhance the visibility of good versus poor corporate citizens, especially with respect to their environmental impact or "carbon footprint", may provide an especially useful incentive to family owned firms. Local communities could design award programs for best performers and rankings or targeted "shame lists" to publicize the worst offenders.

A second practical implication of the current research derives from the positive and statistically significant yet small relationship between innovation orientation and engagement in environmental management practices. These results suggest that innovation and environmental management practices are not opposing forces. Nevertheless, to date, only some innovative SMEs apply their efforts to more green solutions. This would suggest that innovative SMEs are largely untapped resources given their major contribution to technical innovations in the economy (e.g., Nooteboom 1994). To tap into such sources more effectively, governmental agencies could set up programs to encourage more eco-innovation, such as special research subsidies aimed at encouraging such firms to develop green technology solutions. These could target not only new products or services, but also more efficient production methods to disseminate to other firms. With respect to the association between innovation and greening initiatives, we should add that we are not proposing that innovation be viewed as a condition *sine qua non* for reaching environmental goals. The "pastoral" approach, described earlier in this article , can also reduce levels of consumption, though this is often at the expense of slower economic growth and reduced productivity. Nevertheless, some would argue that such frugality and economic sacrifice may be the better path to sustainability (Jeurissen and Van de Ven 2008; Princen 2000a, b). However, an investigation of the relative merits of this alternative is beyond the scope of this article.

Finally, one of the more obvious implications relates to the finding that perceived business benefits positively predict engagement in environmental management practices. Governmental programs communicating practical (especially financial) benefits could be combined with additional tax incentives and other loan programs to make energy and natural resource conservation modifications more widely affordable to SMEs. Such programs, though costly, may offset other greater long-term costs the society must absorb from waste removal, pollution, and acquisition of higher cost natural resources.

We would caution against using our findings too enthusiastically to group SMEs according to "receptive capacity," that is, the manner in which they are likely to respond to different types of regulation and enforcement (Lynch-Wood and Williamson 2010a, Lynch-Wood and Williamson 2011). Less than 25% of the variation in environmental management practices is explained by the current data set. Furthermore, the results are based on the Dutch context, which has a very different regulatory environment than the UK system, for instance. Nevertheless, results from the current research do suggest that certain programs may be developed to appeal to different subgroups of SMEs according to their sector, innovative potential or family orientation (i.e., subsidy programs to encourage more of the innovative firms to consider greening initiatives, while perhaps appealing more to the family businesses with locally based recognition programs to reward "green" corporate citizens with positive visibility).

In conclusion, it is quite clear one should not write off small firms as significant players in a greener future. There are a number of factors other than size, only a few of which we have identified, which may play a key role in determining the receptive capacity among SMEs. As we begin to understand such factors more fully, environmental policy makers can develop more effective means to encourage SMEs to contribute to a more eco-efficient society.

Appendix

See Table 8.

Table 8 List of variables

Variable	Question	Scale
Independent variables		
Tangibility of sector (measured 2006)	In which sector does your firm operate?	1: Intangible services
	See text for further details	2: Tangible services
		3: Tangible product sector
Company size(ln) (measured 2006)	How many people (including yourself) are currently employed by your firm?	The number filled in and converted to the natural logarithm

Table 8 continued

Variable	Question	Scale
Family influence (measured 2006) ($\alpha = 0.82$)	1. Are the owners of this firm related to each other?	1: No 2: Yes
	2. Are the directors of this firm related to each other?	1: No 2: Yes
	3. How likely is it that the current owner will keep the business in the family?	1: Not at all probable 2: Not so probable 3: Probable 4: Very probably
	4. To what extent do the members of one family determine the general strategy for this firm?	1: Not at all 2: Hardly 3: To some extent 4: To a great extent
Innovation orientation (measured 2006) ($\alpha = 0.64$)	1. Does your firm currently put an emphasis on renewal of its products, services or processes?	1: Yes 0: No
	2. To what extent does the following situation apply to your firm? In our firm we are continuously thinking about new products or services, which can address customer needs arising within the next few years	1: Completely not relevant 2: Hardly 3: Rather 4: Very 5: Completely relevant
	3. Are you going to invest in new products or services in the coming 12 months?	1: No 2: Probably 3: Definitely
Perceived financial benefits (measured 2008) ($\alpha = 0.76$)	Respondents were asked the extent to which they agree about each of the following statements: 1. Firms in my industry can significantly lower their energy costs by taking energy-saving measures 2. Control of my energy costs is becoming increasingly important in my business operations 3. I don't find execution of energy regulations very interesting for my business (reverse coded) 4. Taking extra energy-saving measures doesn't benefit my bottom line (reverse coded) 5. I don't know what extra energy-saving measures I could carry out (reverse coded)	1: Completely disagree 2: Somewhat disagree 3: Somewhat agree 4: Completely agree
Dependent variable		
Environmental management practices (measured 2008) $\alpha = 0.57$	1. Does your firm monitor the amount of waste created by the firm?	1: Not at all 2: Yes, passively 3: Yes, actively
	2. Does your firm produce or sell environmentally friendly products?	1: No 2: Yes, but not as a deliberate strategy 3: Yes, as a deliberate strategy
	3. Does your firm search for more environmentally friendly products, services or production methods?	1: No 2: Yes, but not actively 3: Yes, actively
Control variables		
Change in sales turnover (measured 2008)	Comparing 2007 to 2006, has sales turnover decreased, stayed the same or increased?	1: Decreased 2: Stayed the same 3: Increased

Table 8 continued

Variable	Question	Scale
Change in financial performance (measured 2008)	Comparing 2007 to 2006, has financial performance worsened, stayed the same or improved?	1: Worsened 2: Stayed the same 3: Improved
Change in employment (measured 2008)	Comparing 2007 to 2006, has the number of employees in your company decreased, stayed the same or increased?	1: Decreased 2: Stayed the same 3: Increased
Number of owners (measured 2006)	How many owners does your firm have?	1: One 2: Two 3: More than two

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