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Corporate Environmental Sustainability in Danish SMEs: A Longitudinal Study of Motivators, Initiatives, and Strategic Effects

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ABSTRACT
While industry leaders proactively address environmental issues as an integrated part of corporate strategy, small and medium enterprises (SMEs) often perceive it as a means of cost reduction. The aim of this paper is to track the development of motivators, environmental initiatives, and their perceived effects on competitive advantage among SMEs. For that purpose, we conducted a longitudinal analysis of 4 repeated surveys over a period of 14 years among Danish manufacturing SMEs. Results show that Danish SMEs have increasingly deployed environmental initiatives that are associated with both lower costs and a differentiation dimensions of competitive advantage. The study also shows that over managerial attitudes, strategic intent has been the main driver when adopting such initiatives. Furthermore, we found that despite some differences between small and medium-sized firms in terms of the levels of environmental engagement, the competitive benefits are generally robust regarding firm size. Before concluding, implications for future research and corporate managers are pointed out. Copyright © 2014 John Wiley & Sons, Ltd and ERP Environment

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Keywords: environmental management; managerial attitudes; strategic intent; competitive advantage; small and medium-sized enterprises; longitudinal study

Introduction

THE STUDY OF CORPORATE ENVIRONMENTAL MANAGEMENT HAS BEEN CARRIED OUT FROM A VARIETY OF DISCIPLINES AND is thus scattered across domain-specific scientific outlets. Extant research has determined what motivates companies to respond to environmental issues, the organisational responses and their subsequent results (Sharma & Vredenburg, 1998; Christmann, 2000; González-Benito and González-Benito, 2006; Dahlmann & Brammer, 2011). However, the majority of this research has focused on large enterprises and normally neglected small and medium-sized enterprises (SMEs), which after all make a major contribution to all economies and industrialized nations. In this sense, 'the "smallness"' of the individual SME is not proportional to the collective "grandness" of SMEs' (Morsing & Perrini, 2009, p. 2). Differently put, SMEs' environmental significance deserves

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greater attention (Gadenne *et al.*, 2009) as, for instance, it is estimated that such firms account for roughly 70% of industrial pollution around the globe (Hillary, 2000).

Despite a growing recognition of the role that SMEs play in reducing environmental problems, empirical evidence has traditionally suggested that such firms lack resources and are unaware of their impacts on the environment, potential improvements they could make and the business benefits, which prevents them from investing in environmenal initiatives (Hillary, 2000; Gadenne *et al.*, 2009). Others have pointed to their reactive behaviour, which tends to limit SMEs to first and foremost meeting the regulations and avoiding penalties (Williamson *et al.*, 2006; Revell & Blackburn, 2007). Notable exceptions over the last few years have, however, shown that SMEs can in fact develop proactive approaches to the natural environment (Heras & Arana, 2010; Uhlaner *et al.*, 2012; Granly & Welo, 2014) in alignment with their resources and capabilities (Aragón-Correa *et al.*, 2008). As a positive effect of these approaches, opportunities for cost reduction and business growth have often emerged (Aragón-Correa *et al.*, 2008; Brammer *et al.*, 2012). Thus, the former predominantly reactive stance of SMEs may well be undergoing a more widespread process of changing towards a more strategic perspective. Two explanations may account for such a development: a growing recognition among owner-managers of strategic intent as a motivator for environmental initiatives (Revell *et al.*, 2010; Brammer *et al.*, 2012) and the potential for the translation of their strong environmental values and attitudes into such initiatives (Uhlaner *et al.*, 2012; Williams & Schaefer, 2013). This study provides empirical evidence documenting that such a development seems to be underway.

Most studies of SMEs and their relationship with the natural environment have been carried out in cross-sectional designs. This calls for studies that attempt to track the evolution of such interactions over time in order to etablish whether or not a more profound change is under way. This study specifically takes up this challenge by mapping the development of the adoption of environmental initiatives at the strategic level over nearly a decade and a half (14 years) among Danish manufacturing SMEs. Therefore, the overall research question that has guided this exploratory investigation is as follows: How have the adoption of environmental initiatives at the strategic level, the influence of motivators and the perceived implications of the competitive advantages developed over time among Danish SMEs?

We argue that the adoption of strategic initiatives reflects a proactive behaviour. This has been made possible by a growing awareness of efficiency, focussing of efforts and organisational innovation that are triggered and lead to improved competitiveness (Halila, 2007; Granly & Welo, 2014; Klewitz & Hansen, 2014). Consistent with the growing recognition of the strategic view of environmental issues among SMEs pointed out in the literature, this study explores the development of the influence of internal drivers such as managerial attitudes and strategic intent. The heterogeneity of SMEs regarding the adoption of initiatives and competitive outcomes is approached through the analysis; that is, we distinguish between smaller and larger SMEs.

The paper starts off with a review of the literature on environmental initiatives at the strategic level and their influence on competitive advantage, the motivators as well as the change and development in environmental management. Then, the research design is presented. Next, the results and discussion make it possible to identify potential strategic shifts and/or patterns in the development of environmental management in our empirical setting. Finally, we conclude by addressing the key implications of the study.

Literature Review

Studies on corporate environmental management have tended to focus mainly on environmental initiatives and how they affect the competitive advantage of the firms or industries in question. Less emphasis has been given to the main strategic factors that drive such initiatives. In order to place this study in the current academic discussion, we present the main insights from our review of previous research in the field. We have organized this into three streams: (i) environmental management and competitiveness, (ii) managerial attitudes and strategic intent, and (iii) the development and change of environmental management.

Environmental Management and Competitiveness

The literature predominantly argues for win-win situations in which organisations are able to deploy environmentally responsible actions while maintaining competitive advantage (Hart, 1995; Porter & van der Linde, 1995;

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Shrivastava, 1995; Russo & Fouts, 1997; Sharma & Vredenburg, 1998; Giménez Leal *et al.*, 2003; Heikkurinen, 2010). For instance, the use of environmental technologies may lead to improvements in production efficiency by conserving inputs and minimising costs derived from waste generation (Shrivastava, 1995; Klassen & Whybark, 1999). Conversely, competitive advantage is achieved by means of the development of firms' resources and capabilities associated with the adoption of proactive approaches towards environmental protection (Hart, 1995; Russo & Fouts, 1997; Sharma & Vredenburg, 1998; Aragón-Correa *et al.*, 2008; López-Gamero *et al.*, 2009).

Particular attention has been paid to the consideration of environmental issues in the planning and organisational processes at the strategic level (Judge & Douglas, 1998; Wagner, 2007; 2011). This set of initiatives involves the formalisation of green issues, provided by the structuration of new routine procedures for planning, goal setting, assignment of responsibilities, measurement, evaluation and reporting. Corporate commitment at this level also includes system analysis and management controls such as life-cycle analysis and audits (Hart, 1995; Aragón-Correa & Sharma, 2003; Menguc *et al.*, 2010). The implementation of environmental initiatives at the strategic level allows firms to make forward-thinking decisions to improve performance (Judge & Douglas, 1998; Wagner, 2007; 2011); that is, initiatives at this level are considered to be a fundamental part of a proactive environmental strategy, which the literature points to as a source of competitive advantage for firms (Hart, 1995; Sharma & Vredenburg, 1998; Aragón-Correa & Sharma, 2003; Menguc *et al.*, 2010; Walker & Mercado, 2013).

Competitive advantage that follows from the adoption of environmental initiatives at the strategic level can occur in two ways. First, it can be achieved in the form of differentiation and positioning (Jiang & Bansal, 2003; Heikkurinen, 2010); that is, firms that carry out such initiatives are expected to efficiently deal with the requirements of different stakeholders, which brings visibility, credibility, legitimacy and social approval by the formalised mechanisms used to communicate credible information (Jiang & Bansal, 2003; Heras-Saizarbitoria *et al.*, 2011). Opportunities for differentiation, for example, may arise from demonstrating a systematic management of environmental issues that improve corporate image and strategic position in the market (Giménez Leal *et al.*, 2003; Heikkurinen, 2010; Klewitz & Hansen, 2014). To be differentiated allows the market access to be widened so as to address environmentally sensitive customers and more stringent standards (Judge & Douglas, 1998; Heras-Saizarbitoria *et al.*, 2011; Lo *et al.*, 2012).

Second, from an internal perspective, the adoption of environmental initiatives at the strategic level leads to competitive advantage in terms of lower cost and efficiency (Christmann, 2000; Lo *et al.*, 2012). The development of the policies and procedures for such initiatives points to the 'wasteless' use and consumption of raw materials, energy and water. These initiatives also emphasise the tracking and monitoring of environmental efforts, which promotes awareness due to the provision of necessary information, and at the same time it motivates real improvements (Melnyk *et al.*, 2003). Such improvements take place in product design and production processes in the form of a reduction of inefficient processes and material waste (Christmann, 2000; Lo *et al.*, 2012). Therefore, environmental initiatives at the strategic level pave the way for improved resource productivity and making use of the opportunity costs of pollution (Giménez Leal *et al.*, 2003; Heras-Saizarbitoria *et al.*, 2011). Lower costs are also achieved in the form of a reduced risk of fines and sanctions by regulators as well as the achievement of economies of scale due to wider market access (Lo *et al.*, 2012).

Previous studies have found that SMEs are unable to deploy effective actions in the direction of increased environmental responsibility. It is argued that this is due to their lack of resources and environmental awareness since they are not convinced that there is an actual business case for making progress towards environmental protection (Gesternfeld & Roberts, 2000; Hillary, 2000; Revell & Blackburn, 2007). However, some research also indicates that SMEs are able to introduce proactive environmental responsibility, which becomes 'one of the major determinants of corporate profitability' (Bianchi & Noci, 1998, p. 279). This means that SMEs may deploy innovative, opportunistic, and proactive behaviour that makes them able to develop valuable resources and capabilities for environmental improvement and competitive advantage (Aragón-Correa *et al.*, 2008; Parker *et al.*, 2009).

The implementation of environmental initiatives at the strategic level takes place among SMEs in a different manner from larger firms. Thus, SMEs tend to rely on business networks for the joint use of expertise or financial resources and for realising more benefits (Halila, 2007; Granly & Welo, 2014). Furthermore, tailored managerial systems for environmental initiatives tend to be implemented in SMEs according to their characteristics, internal dynamics and available resources (Heras & Arana, 2010; Granly & Welo, 2014). This suggests the ability of SMEs to strategically use these environmental initiatives to achieve competitive advantage (Hillary, 2004; Brammer

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et al., 2012; Granly & Welo, 2014). Such behaviour can be seen as a kind of organisational environmental innovation as SMEs either create or modify managerial practices, procedures and systems (Halila, 2007, p. 167). That is, smaller firms are able to focus their efforts by the formulation of process-oriented environmental policies that allow noteworthy cost reductions to be achieved (Heras & Arana, 2010; Bagur-Femenias *et al.*, 2013). Environmental initiatives at the strategic level in SMEs affect goals and measurement mechanisms, which raises awareness among the workforce of the improvement of the environmental efficiency of processes (e.g. reduction in consumption levels and residues, better waste sorting and handling; Heras & Arana, 2010; Granly & Welo, 2014). This has consequences for firms' profitability and, therefore, for their competitive advantage (Perez-Sanchez *et al.*, 2003; Halila, 2007).

On the other hand, by carrying out environmental initiatives at the strategic level, SMEs have to become knowledgeable about environmental legislation and regulations, which facilitates compliance with norms (Heras & Arana, 2010) and supports communication efforts (Klewitz & Hansen, 2014). At the same time, these initiatives constitute a first step to promoting product-oriented eco-innovation that moves downstream in the supply chain and allows the meeting of customer needs by SMEs (Granly & Welo, 2014; Klewitz & Hansen, 2014). Therefore, environmental initiatives at the strategic level lead to market success in the form of differentiation, improvement in the external image of the company, customer satisfaction and a stronger position in times of crisis (Heras & Arana, 2010; Bagur-Femenias *et al.*, 2013; Granly & Welo, 2014).

Managerial Attitudes and Strategic Intent

The adoption of environmental initiatives is determined by a variety of motivators including firm internal factors as well as external forces arising from the different stakeholders and institutions (Bansal & Roth, 2000; Banerjee *et al.*, 2003; González-Benito & González-Benito, 2006; Paulraj, 2009). This has also been a topic for academic inquiry in the context of SMEs (Williamson *et al.*, 2006; Parker *et al.*, 2009; Revell *et al.*, 2010; Brammer *et al.*, 2012) focusing on characterising the different patterns of behaviour towards the natural environment amongst such firms (Williamson *et al.*, 2006; Parker *et al.*, 2009; Battisti & Perry, 2011). Even though external drivers such as legislation and demands from customers and suppliers have been widely recognised as crucial drivers of actions towards environmental protection in SMEs, we are particularly focussing on specific internal factors such as managerial attitudes and strategic intent.

Managers' perceptions and interpretations of environmental issues have implications for the adoption of environmental initiatives (Sharma, 2000). According to the theory of planned behaviour (Ajzen, 1991), it is suggested that managers' attitudes influence their preferences for engaging in beyond-compliance activities and achieving pollution prevention (Cordano & Frieze, 2000; Papagiannakis & Lioukas, 2012). The personal values of managers shape their attitudes towards the preservation of the natural environment and their subsequent commitment (Papagiannakis & Lioukas, 2012). Therefore, managerial attitudes are recognised as significantly affecting the formulation of new environmental policies and goals for environmental leadership (Berry & Rondinelli, 1998; Cordano & Frieze, 2000), resource allocation and decision-making to build and deploy organisational capabilities towards environmental initiatives (Bansal & Roth, 2000; Sharma & Sharma, 2011; Colwell & Joshi, 2013), the coordination and encouragement of collaboration among different divisions and departments (González-Benito & González-Benito, 2006) and the conversion of institutional pressures into positive environmental actions (Colwell & Joshi, 2013).

In the case of SMEs, this motivator is more critical since this type of firm tends to be more 'personal and reflect the personal values and commitment of the owners' (Fuller, 2003, p. 319). Regarding environmental issues, it has been suggested that even if SMEs demonstrate pro-environmental attitudes, they often experience 'difficulties translating these ideals, aspirations and values into action' (Tilley, 1999, p. 241), which evidences a gap between what owner-managers intend and what they actually do (Cassells & Lewis, 2011).

However, the literature also recognises that the attitudes and sense of personal responsibility of owner-managers dictate the directions that SMEs follow regarding environmental protection (Cassells & Lewis, 2011; Williams & Schaefer, 2013). That is, managerial attitudes that imply awareness and strong environmental and ethical convictions allow smaller firms to implement sustainability tools and become pioneers of responsible behaviour (Johnson, 2013; Williams & Schaefer, 2013). Recent findings suggest that strongly committed attitudes shown by small business' owner-managers 'encourage an interest in "getting back to the land"'(Battisti & Perry, 2011, p. 182) by carrying out initiatives related to environmental systems, support and conservation (Gadenne *et al.*, 2009).

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However, if environmental issues are perceived as potential opportunities, it invites the development of strategic intent, that is, the conscious and deliberate intention to drive, differentiate and to add a valuable component to environmental actions (Worthington & Patton, 2005). Once firms consider green issues as part of their strategic intent, environmental degradation becomes an argument to determine market imperfections and also a source of opportunities. It allows firms to increase efficiency and productivity, create new markets and reduce information asymmetry (Cohen & Winn, 2007). Therefore, the intention to enhance market position motivates active involvement in previously unrealised environmental innovations (Bansal & Roth, 2000). That reflects the intent to integrate environmental strategies into the entrepreneurial dimension of the firm (Aragón-Correa & Sharma, 2003) as a means to pursue 'choices about products, markets, and ways of competing' (Aragón-Correa, 1998, p. 557).

Regarding the SME context, however, there are diverse insights. On the one hand, SMEs have been found to lack the strategic orientation to exploit opportunities and gain the competitive edge that motivates managerial decisions towards environmental responses (Worthington & Patton, 2005). Williamson *et al.* (2006) have documented that instead of the 'business case' motivation, a narrower 'business performance' criterion focussing primarily on cost reduction and efficiency seems to drive a functional or task-oriented environmental behaviour in SMEs (Williamson *et al.*, 2006). Findings, although not all in agreement, point out that strategic intent to pursue long-term financial benefits and market share/position payoffs are the primary drivers in SMEs of their environmental initiatives, more than regulatory pressures and public concern (Brammer *et al.*, 2012). This points to the growing resonance of the business case for environmental responsibility among SMEs and more confidence in taking it forward (Revell *et al.*, 2010), particularly with their strategic intent to wish to uphold the firm's reputation, win business opportunities and strengthen the market position (Revell *et al.*, 2010; Brammer *et al.*, 2012; Uhlaner *et al.*, 2012). Therefore, there is evidence in favour of advantage-driven SMEs (Parker *et al.*, 2009) that are able to adopt environmental initiatives by recognising not only cost savings but the 'marketing and reputational benefits to be gained' (Battisti & Perry, 2011, p. 177) in response to non-regulatory pressures such as the industry, supply chain and customers who demand environmental improvement and are willing to pay for it (Simpson *et al.*, 2004; Uhlaner *et al.*, 2012).

Change and Development of Corporate Environmental Management

Change here refers to 'self-transformation efforts intended to make companies more environmentally responsible' (Shrivastava & Scott, 1992, p. 12). It comes with many guises: in corporate environmental strategy through the implementation of clean technologies, in organisational structures and management systems, and in values when a firm moves from compliance towards excellence (Roome, 1992). It has been suggested that the business case for environmental management fits into a rational lens perspective of organisational change driven by goals such as the optimisation of performance (Rajagopalan & Spreitzer, 1997). The emphasis on goals regarding green transformation 'aims at improving firm-nature relations [and] simultaneously aims to make firms more competitive and profitable' (Shrivastava & Scott, 1992, p. 12); that is, goals refer to end-states that are translated into decisions about environmental issues, for example, environmental initiatives at the strategic level (Papagiannakis *et al.*, 2013). On the other hand, from the resource-based-view, it is suggested that environmental management evolves due to the accumulation of green resources and capabilities (Hart, 1995; Sharma & Vredenburg, 1998). Together with the achieved goals and outcomes of carrying out environmental initiatives, the capabilities that are gradually developed allow for the upgrading of such goals during a feedback process. As a result, higher levels of environmental conduct and greater integration into the business strategy can be deployed over time (Papagiannakis *et al.*, 2013). The sequential and planned pursuit of goals within the bounds of the rational perspective of organisational change allows managerial attitudes and strategic intent to be considered as key motivators that facilitate the progressive implementation of environmental initiatives at the strategic level. These motivators, in turn, guide the content and process of the formulation of goals that lead to actions towards environmental responsibility.

A number of studies have introduced a variety of different taxonomies for organisational approaches to the natural environment, with stages ranging from a less developed, reactive and passive position to a more advanced and proactive environmental leadership (Hunt & Auster, 1990; Roome, 1992; Hart, 1995; Aragón-Correa *et al.*, 2008). Even though at a certain point in the timeline firms can exhibit a particular approach to the natural environment, it is also plausible that firms progress from one stage to another over time. However, in empirical

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literature few longitudinal studies have been carried out in order to evidence elements of change. Some studies have documented incremental levels of development over time that exhibit more proactive corporate environmental responses explained by institutional pressures and social concerns (Bansal, 2005; Lee & Rhee, 2007; Papagiannakis *et al.*, 2013). Such a development takes place due to feedback processes triggered by capabilities together with environmental outcomes and is also influenced by managerial values and attitudes (Papagiannakis *et al.*, 2013). However, inertial patterns without substantial changes to environmental responsiveness are also evidenced in such longitudinal approaches (Dahlmann & Brammer, 2011). The relationships between environmental management and competitive advantage over time also provide divergent findings, depending on the considered dimensions and measurements for environmental actions. For instance, poor financial performance reflected over time has been found to provide a broader indication of sustainable development (Bansal, 2005). In a similar vein, Gluch *et al.* (2013) found that even though Swedish companies have shown greater maturity and raised the levels of their environmental actions over time, the strengthening of their competitive position in the market is missing. However, when it comes to the adoption of managerial systems such as ISO 14001, these are reflected in improvements in financial performance as time passes (Heras-Saizarbitoria *et al.*, 2011). This provides evidence of an increasing integration of environmental issues into a firm's competitive advantage and business strategy (Papagiannakis *et al.*, 2013).

Studies on the evolution and development of environmental actions in SMEs over time are practically absent. However, in considering the discussion in the previous sections we have noted that, interestingly, in a similar geographic context for SMEs (United Kingdom), firms seem to have experienced a lack of strategic intent to guide their environmental responses in the past (Worthington & Patton, 2005). However, more recent studies of SMEs in the same country indicate that such firms are able to exhibit strategic intent (Battisti & Perry, 2011) as they 'are increasingly willing to accept the idea that future economic growth is predicated on long term environmental protection' (Revell *et al.*, 2010, p. 284). This indeed suggests that SMEs' approach to environmental issues may be subject to positive development over time.

Based on the above discussion we formulated the following hypotheses to be tested:

H1: *The adoption of environmental initiatives at the strategic level among Danish SMEs has increased over time.*

H2a: *The effect of environmental initiatives at the strategic level on competitive advantage in terms of differentiation and positioning among Danish SMEs is positive over time.*

H2b: *The effect of environmental initiatives at the strategic level on competitive advantage in terms of lower costs among Danish SMEs is positive over time.*

H3a: *The effect of managerial attitudes on the adoption of environmental initiatives at the strategic level among Danish SMEs is positive over time.*

H3b: *The effect of strategic intent on the adoption of environmental initiatives at the strategic level among Danish SMEs is positive over time.*

H4a: *The effect of environmental initiatives at the strategic level on competitive advantage in terms of differentiation and positioning among Danish SMEs increases over time.*

H4b: *The effect of environmental initiatives at the strategic level on competitive advantage in terms of lower costs among Danish SMEs increases over time.*

H5a: *The effect of managerial attitudes on the adoption of environmental initiatives at the strategic level among Danish SMEs increases over time.*

H5b: *The effect of strategic intent on the adoption of environmental initiatives at the strategic level among Danish SMEs increases over time.*

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Methodology

Sampling Procedure

Data were collected by repeated questionnaire-based surveys of Danish manufacturing companies (in 1999, 2003, 2007, and 2011). A pre-test of the survey was performed prior to the first survey. In all surveys a sample of some 500 companies with 10 or more employees were randomly drawn from an electronic database. The sample consisted of new companies in every survey year in order to avoid missing information due to closure, mergers and acquisitions among firms. As an initial step, telephone contact with the sampled companies was established to identify the responsible manager for environmental issues or related functions. A questionnaire was then mailed to the selected companies, resulting in a response rate of around 60% in each of the four waves of the survey (in absolute numbers 308, 276, 214, and 289, respectively). Non-response bias analyses showed that there were no common patterns in the non-responding companies.

We retained responses from companies with between 10 and 249 employees, which accounted for above 80% of the responses. Thus, the final sample sizes considered for the subsequent analyses were 261 (1999), 226 (2003), 179 (2007), and 239 (2011). For the following analyses these companies were further split into two groups: small companies (between 10 and 49 employees) and medium-sized companies (between 50 and 249 employees; Eurostat, 2010). We found that small firms predominated over medium-sized firms in all four surveys, accounting for 60–70% of the responding companies.

Measurements

The questionnaire included three questions focusing on environmental initiatives, their impact on competitive advantage, as well as motivators. Representing the different constructs involved in our hypotheses, each of them was developed into a scale of items based on input from the literature.

Ten items measured the extent to which environmental initiatives have been carried out at the strategic level (see Table A1 in the Appendix). Responses were on a five-point ordinal scale ranging from 1 for *not relevant* to 5 for *to a large extent*. Such initiatives referred to the formulation of an environmental strategy, policies and specific goals, performance of audits, certification schemes (ISO 14000), the publication of environmental reports and the assignment of responsibilities among others.

Ten items reflected the impact of the environmental initiatives on the competitive advantage (see Table A2 in the Appendix). Responses were on a five-point ordinal scale ranging from 1 for *very negatively* to 5 for *very positively*. The items measured the impacts on productivity improvement, profits and market opportunities, as well as the product and firm's image.

In order to measure motivators, six items were applied (see Table A3 in the Appendix). Responses were given on a five-point ordinal scale ranging from 1 for *not relevant* to 5 for *very important*. The scale included items that evaluate motivations such as the intention to improve the firm's reputation, prepare strategic positioning and spot new market opportunities, as well as the attitudes and opinions of managers and owners. The items reflected managerial attitudes and strategic intent as part of these motivators.

The same three questions were asked in each of the four years that the survey was carried out. Thus, the analyses of these three questions over time provided the required information to test the formulated hypotheses.

As for firm size, a dummy variable was set equal to 0 for small firms and 1 for medium-sized firms.

Results

Initially, a factor analysis applying a principal component analysis followed by a varimax rotation was carried out on the three questions above in order to determine the underlying structures in the responses to the scale of items. In some cases we made modifications regarding the cut-values of the eigenvalues, which is suggested to be above 1.0

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(Hair *et al.*, 2010), in order to keep the same number of factors. The details about the particular modifications are discussed below.

Next, multiple regression analyses using OLS were applied to determine the effects of environmental initiatives at the strategic level on competitive advantage, and the effects of motivators on the adoption of such initiatives. In particular, each regression analysis consisted of three models: (i) firm size as single predictor, (ii) only the extracted factors as predictors, and (iii) the extracted factors and firm size as predictors. This step-wise procedure was followed in order to establish the best choices in terms of fit. Furthermore, we calculated the variance inflation factor (VIF) after each regression to see whether results were subject to multicollinearity. Values were below the cut-values, indicating that estimations did not raise concerns about multicollinearity. Finally, the analysis of standardised coefficients of the models with the best fit allowed us to examine changes among the effects over time.

Initial Analyses

Concerning environmental initiatives, Table A1 in the Appendix shows the results of the standardized varimax rotation of the items that composed a single factor in all four surveys. For such factors reliabilities were above 0.900 and variance explained was above 60%.

Regarding competitive advantage, the analyses of the surveys from 1999, 2003, and 2007 showed a two-factor structure for the items, but in 2011 they revealed a three-factor structure. Hence, we forced the extraction of only two factors in 2011 in order to be able to make a comparison with the previous surveys on the basis of the same structures. That implied increasing the cut-value of the eigenvalues to 1.4 in 2011. We also obtained high reliabilities in the two factors every year as well as variances explained above 60% (see Table A2 in the Appendix). The first factor was called 'differentiation and positioning' since it involved aspects related to product and firm image, market penetration and opportunities. The second factor was called 'lower cost' since it explicitly included cost reduction, efficiency, productivity and profitability.

Concerning motivators, we found that the survey in 2007 reflected a two-factor structure with eigenvalues above 1.0, whereas in the other surveys the items loaded on a single factor. To ensure the same two-factor structure in each of the four years, we forced the extraction of two factors for 1999, 2003 and 2011 allowing the inclusion of a factor with an eigenvalue below 1.0 in each of these surveys. The obtained eigenvalues were 0.995, 0.903 and 0.919, respectively, which are very close to the conventional cut-value of 1.0. This decision had implications for the amount of variance extracted, which amounted to more than 70% in all cases.

In addition to that, in the sample for 2011, the item corresponding to 'improvement of the firm's general reputation' was a case of cross-loading of the two factors. We kept this item as part of the first factor so that we could keep the same structure among the items in each of the four years. However, to support our decision, we checked the reliability, which still remained acceptable (above 0.700; Hair *et al.*, 2010). We called this first first factor "strategic intent" since it included aspects of the external business environment (positioning, market opportunities and reputation). The second factor was called 'managerial attitudes' since it explicitly involved managers' and owners' perceptions and attitudes (see Table A3 in the Appendix). An overview of the identified variables included in the following analysis can be found in Table 1, which shows the means, standard deviations and correlations of the variables (factors).

Changes Over Time

The trend for each of the variables shows different patterns over time (Figure 1).

As can be seen, the managerial attitudes as motivator and differentiation advantage shows the same tendency with a decrease between 1999 and 2003, then an increase in 2007, and a decrease again in 2011. On the other hand, strategic intent to adopt environmental initiatives shows a decrease in 2003 with respect to 1999, followed by an increase in the years after that, with a significant change in 2011. The adoption of environmental initiatives at the strategic level shows a slowly increasing pattern, with the only major change between 1999 and 2003, but after that the differences are not very marked even though they are statistically significant in the profile analysis. Therefore, regarding the adoption of environmental initiatives at the strategic level, Hypothesis 1 is supported. Finally, lower

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Variables	1999 Mean	1999 S.D	2003 Mean	2003 S.D	Correlations (1999 below the diagonal, 2003 above) 1	2	3	4	5	6
1. Size	0.272	0.446	0.314	0.465		0.459**	0.201**	0.127	0.098	0.159*
2. Env. initiatives at the strategic level	3.625	2.167	4.282	2.674	0.205**		0.521**	0.444**	0.275**	0.343**
3. Differentiation/positioning advantage	5.628	1.237	5.571	1.109	0.060	0.333**		0.632**	0.179**	0.426**
4. Lower cost advantage	5.393	1.197	5.579	1.227	−0.067	0.267**	0.661**		0.065	0.271**
5. Managerial attitudes	7.982	2.350	7.880	2.431	0.040	0.251**	0.059	0.056		0.526**
6. Strategic intent	5.762	2.505	5.742	2.539	−0.018	0.348**	0.382**	0.260**	0.477**	

Variables	2007 Mean	2007 S.D	2011 Mean	2011 S.D	Correlations (2007 below the diagonal, 2011 above) 1	2	3	4	5	6
1. Size	0.352	0.479	0.322	0.468		0.270**	0.148*	0.220**	0.108	0.111
2. Env. initiatives at the strategic level	4.326	2.452	4.467	2.389	0.201**		0.343**	0.361**	0.319**	0.319**
3. Differentiation/positioning advantage	5.811	1.155	5.637	0.997	0.055	0.373**		0.549**	0.298**	0.470**
4. Lower cost advantage	5.853	1.212	5.794	1.151	0.026	0.304**	0.550**		0.294**	0.406**
5. Managerial attitudes	8.209	2.134	8.176	2.062	0.071	0.216**	0.251**	0.252**		0.523**
6. Strategic intent	5.862	2.412	6.261	2.243	0.058	0.408**	0.487**	0.357**	0.459**	

Table 1. Means, standard deviations, and correlations
*p < 0.05; **p < 0.01

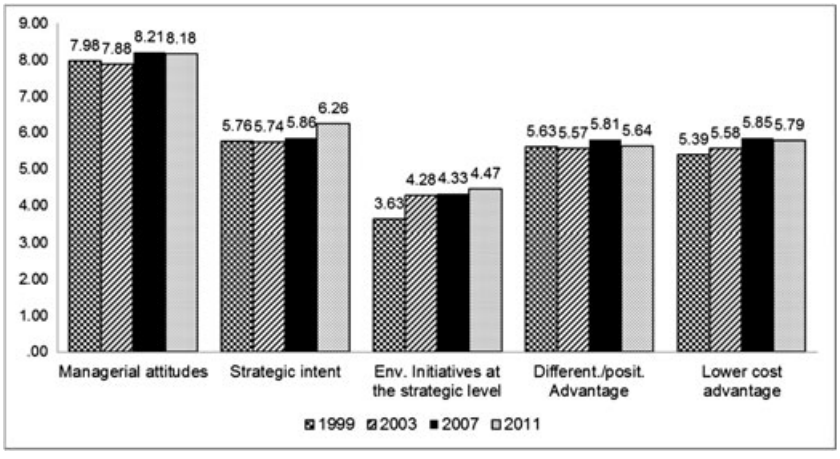

Figure 1. The general trend in the development of managerial attitudes, strategic intent, environmental initiatives at the strategic level as well as differentiation/positioning and lower cost advantage (measured on an index ranging from 0 to 10)

cost advantage has a similar pattern to the adoption of environmental initiatives at the strategic level, with the only difference being that in 2011 there was a decrease with respect to 2007. These differences also remain significant.

Effects on Competitive Advantage

The results of linear regressions exhibited in Tables 2 and 3 below show the effect of environmental initiatives at the strategic level on differentiation/positioning and lower cost advantage. The statistically significant coefficients for all of the models evidence the positive influence of the constructs on both dimensions over time. Thus, both Hypotheses 2a and 2b are supported.

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	1999			2003			2007			2011		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	5.582 (0.000)	4.925 (0.000)	4.926 (0.000)	5.419 (0.000)	4.633 (0.000)	4.632 (0.000)	5.765 (0.000)	5.041 (0.000)	5.050 (0.000)	5.535 (0.000)	4.991 (0.000)	4.979 (0.000)
Firm size	0.168 (0.341)		−0.009 (0.959)	0.479 (0.003)		−0.164 (0.673)	0.133 (0.476)		-0.055 (0.765)	0.314 (0.024)		0.146 (0.292)
Env. initiatives at the strategic level		0.187 (0.000)	0.187 (0.000)		0.210 (0.000)	0.215 (0.000)		0.178 (0.000)	0.180 (0.000)		0.144 (0.000)	0.137 (0.000)
Adjusted R^2	0.000	0.107	0.103	0.036	0.268	0.265	−0.003	0.134	0.129	0.018	0.114	0.115
ΔR^2		0.107	−0.004		0.232	−0.003		0.137	−0.005		0.096	0.001
F	0.908	30.058	14.968	9.139	78.820	39.347	0.476	26.173	13.057	5.177	30.361	15.746
Num. obs	250	243	243	218	214	214	172	164	164	234	229	229

Table 2. Regression analysis: dependent variable – differentiation/positioning advantage
Significances are shown in brackets.

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	1999			2003			2007			2011		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	5.442 (0.000)	4.841 (0.000)	4.881 (0.000)	5.474 (0.000)	4.689 (0.000)	4.683 (0.000)	5.830 (0.000)	5.188 (0.000)	5.210 (0.000)	5.617 (0.000)	5.004 (0.000)	4.974 (0.000)
Firm size	−0.180 (0.293)		−0.351 (0.041)	0.334 (0.060)		−0.196 (0.266)	0.066 (0.736)		−0.147 (0.456)	0.539 (0.001)		0.340 (0.032)
Env. initiatives at the strategic level		0.146 (0.000)	0.161 (0.000)		0.202 (0.000)	0.217 (0.000)		0.153 (0.000)	0.160 (0.000)		0.175 (0.000)	0.158 (0.000)
Adjusted R^2	0.000	0.067	0.080	0.010	0.194	0.195	−0.005	0.087	0.084	0.044	0.127	0.141
ΔR^2		0.067	0.013		0.184	0.001		0.092	−0.003		0.083	0.014
F	1.111	18.224	11.349	3.576	52.888	27.096	0.114	16.543	8.528	11.860	34.242	19.733
Num. obs	247	240	240	221	217	217	173	165	165	235	230	230

Table 3. Regression analysis: dependent variable – lower cost advantage
Significances are shown in brackets.

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When analysing the effect of firm size as the only predictor, we find that the effect on the differentiation/positioning advantage is positive and significant only for 2003 and 2011 in Table 2. However, the models for both these years show the poorest level of fit measured by the coefficient of determination. The firm size is found to have no significant effect on the differentiation/positioning advantage when it appears as an explanatory variable in the models together with environmental initiatives in all of the years. All in all, the results show that generally the best fit is obtained when the firm size is not included in the analysis (Model 2 in Table 2).

On the other hand, the analysis of the impacts on lower costs shows that the overall best fit is obtained when firm size is included together with environmental initiatives as predictors (Model 3 in Table 3). We found that in the beginning (1999), the positive impact on this dimension was higher in small firms compared to medium-sized firms due to the negative coefficient.

In the surveys from 2003 and 2007 such an effect is not significant even though it remains negative. Interestingly, in 2011 there was a radical change since the effect is again significant but positive when looking at Model 3 in that year. As a whole, these results show that firm size does not seem in a unified and determinant way to guarantee benefits of competitive advantage.

Effects of Motivators

The results exhibited in Table 4 show that Model 3 gives the best results in terms of its fit in all of the years. We found that strategic intent is regarded as a significant driver for adopting environmental initiatives in SMEs over time, which allow us to support Hypothesis 3b.

On the other hand, managerial attitudes and opinions in general show different effects. They were positive in 2003, but with higher levels of significance (p-value $<$ 10%) compared with strategic intent. There was no significant effect in 1999 and 2007, but interestingly in 2011 both motivators had the same effect and significance level (p-value $<$ 1%). Therefore, we found partial support for Hypothesis 3a. The effect of firm size is noteworthy in this analysis since it is positive and statistically significant when it is entered as the only explanatory variable and together with the two motivators (Model 1 and Model 3).

Comparison of Effects

To compare the size of the effect of environmental strategic initiatives on the competitive advantage over time as well as the motivators on environmental initiatives, we examined their respective standardised regression coefficients in the three preceding regressions (Table 5). In doing so, we only considered the models that exhibited the overall best levels of fit in the three analyses to determine such coefficients: results for regression Model 2 in Table 2 regarding the impact on the differentiation/positioning advantage; regression Model 3 in Table 3 regarding the impact on lower cost advantage; and regression Model 3 in Table 4 regarding the effects of motivators. The examination of standardised regression coefficients allows direct comparisons of effects to be made without the influence of the different scales.

The results show that the magnitudes of the coefficients related to the effects on competitive advantage do not follow the expected tendency to increase. The highest values occurred in 2003, and then the effects on differentiation/positioning and lower costs had a tendency to decrease. The effect on lower costs slightly increased in 2011 compared with 2007 as an exception to these patterns. Therefore, Hypotheses 4a and 4b are not supported. On the other hand, strategic intent has a greater effect on the deployment of environmental initiatives at the strategic level over time compared with managerial attitudes. However, both Hypotheses 5a and 5b cannot be supported, since the effects of both motivators do not follow any tendency to increase and they maintain a relatively stable pattern.

Discussion

In this study we have examined the development over time of environmental initiatives at the strategic level as well as the relationships with their motivators and outcomes. The development of environmental initiatives reveals the

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	1999			2003			2007			2011		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	3.354	1.255	1.050	3.454	1.592	1.269	3.964	1.620	1.425	4.034	1.103	0.967
	(.000)	(0.008)	(0.024)	(0.000)	(0.007)	(0.016)	(0.000)	(0.020)	(0.039)	(0.000)	(0.076)	(0.110)
Firm Size	0.995		1.034	2.641		2.402	1.032		0.910	1.387		1.180
	(0.001)		(0.000)	(0.000)		(0.000)	(0.008)		(0.011)	(0.000)		(0.000)
Managerial attitudes		0.119	0.103		0.131	0.122		0.047	0.036		0.240	0.226
		(0.059)	(0.092)		(0.110)	(0.097)		(0.604)	(0.687)		(0.005)	(0.006)
Strategic intent		0.248	0.255		0.291	0.226		0.397	0.391		0.225	0.207
		(0.000)	(0.000)		(0.000)	(0.002)		(0.000)	(0.000)		(0.004)	(0.006)
Adjusted R^2	0.038	0.126	0.169	0.207	0.120	0.295	0.035	0.158	0.185	0.069	0.125	0.173
ΔR^2		0.088	0.043		−0.087	0.175		0.123	0.027		0.056	0.048
F	10.851	18.050	17.010	58.233	15.653	31.005	7.147	16.942	13.849	18.175	17.378	17.006
Num. obs	250	238	238	220	216	216	171	171	171	234	230	230

Table 4. Regression analysis: dependent variable – environmental initiatives at the strategic level
Significances are shown in brackets.

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Relationships	1999	2003	2007	2011
Env. initiatives at the strategic level ➔ Differentiation/positioning advantage [a]	0.333 (0.000)	0.521 (0.000)	0.373 (0.000)	0.343 (0.000)
Env. initiatives at the strategic level ➔ Lower cost advantage [b]	0.294 (0.000)	0.479 (0.000)	0.316 (0.000)	0.326 (0.000)
Managerial attitudes ➔ Env. initiatives at the strategic level [c]	0.114 (0.092)	0.112 (0.097)	0.031 (0.687)	0.194 (0.006)
Strategic intent ➔ Env. initiatives at the strategic level [c]	0.293 (0.000)	0.217 (0.002)	0.384 (0.000)	0.194 (0.006)

Table 5. Standardised coefficients from regressions
[a]From Model 2 in Table 2; [b]From Model 3 in Table 3; [c]From Model 3 in Table 4.
Significances are shown in brackets.

incremental and steady internalisation of environmental issues among the surveyed SMEs. This is manifested through the formalisation of environmental policies, goals, responsibilities and measurement mechanisms. Our findings thus support previous research regarding the potential for SMEs to deploy proactive approaches to dealing with the natural environment (Aragón-Correa *et al.*, 2008; Brammer *et al.*, 2012). Thus, contrary to the overall lack of change and widespread inertia exhibited by large firms (Dahlmann & Brammer, 2011), our findings evidence the maturity and integration of environmental efforts into a firm's competitive advantage and strategy, as previous studies have done (Gluch *et al.*, 2013; Papagiannakis *et al.*, 2013).

More specifically, the findings show that the natural environment is indeed recognised as an important competitive important factor. In this sense, responsible behaviour manifested through the adoption of environmental initiatives at the strategic level mainly accounts for the exploration of new market opportunities and the improvement of public image, as supported by previous studies (Heras & Arana, 2010; Bagur-Femenias *et al.*, 2013; Granly & Welo, 2014). Further, to a lesser extent this dimension of firm proactivity allows improvements to be achieved in productivity and profitability. This provides evidence that Danish SMEs, by deploying environmental initiatives to mitigate the environmental impact, are not only improving their image and reputation (Jiang & Bansal, 2003; Bagur-Femenias *et al.*, 2013), but they are also achieving cost reductions because they are focussing their efforts and the formulation of policies towards process efficiency (Heras & Arana, 2010; Granly & Welo, 2014). This potential for benefits also stems from the emphasis on awareness and the clear communication of information about environmental effort (Melnyk *et al.*, 2003; Lo *et al.*, 2012) that characterises the initiatives approached in this study. This sustained environmental behaviour over time thus contrasts with the predominant perception that SMEs are firms that generally do not approach environmental management strategically (Tilley, 1999; Worthington & Patton, 2005). Interestingly, we suggest that the situation among Danish SMEs is consistent with experiences in the broader European context, where the integration of environmental aspects at firm level leads to the increase of market-, image-, and efficiency-related drivers of firm performance (Wagner, 2007; 2011).

There may, however, be good reason to pay attention to specific time spans in our analysis. For example, there was a tendency for a decrease of the effects on the differentiation/positioning advantage over the last three periods, with a substantial drop between 2003 and 2007. This means that even if the benefits in terms of differentiation/positioning are perceived, it has been more challenging for Danish SMEs to explore new markets and improve their image. One explanation may be the increasing adoption of environmental certification programmes as well as standards and eco-labels among the surveyed firms. This implies an internal formalisation of environmental issues and therefore less opportunity to be a first mover in this respect. Another explanation might be that this period showed rapid economic growth, where SMEs may have been sufficiently challenged to just keep pace with the fast growing demand.

It is difficult to predict the future development of lower costs and profitability, due to the alternating behaviour that was observed. However, looking at the two last periods, 2003–2007 and 2007–2011, there is a slightly increasing effect, although the difference remains marginal. That is, such an effect manifests a relative stability, which means that a possible future effect on lower costs could remain close to the same value (approx. 0.3). This supports the ambivalence that still prevails amongst SMEs' owner-managers about the benefits of their environmental efforts (Revell *et al.*, 2010). Given this situation, SMEs need to consider more innovative approaches to this facet of corporate environmental management if they hope to reap the future competitive benefits derived from green management.

The overall non-significant effects of firm size on the differentiation/positioning advantage allow us to state that over time, both small and medium-sized firms have indistinctively perceived this type of benefit from the adoption

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of environmental initiatives at the strategic level. The same does not entirely hold in the case of the lower cost advantage since the analysis revealed that in the beginning, small firms were more likely to perceive such benefits than medium-sized ones. The evidenced heterogeneity among small businesses pointed out in our findings contributes to the ongoing discussion about the role of firm size in the relationship between SMEs and the natural environment (Brammer *et al.*, 2012; Dixon-Fowler *et al.*, 2013).

The identified key drivers of environmental initiatives at the strategic level point towards the prominence of strategic intent as a determinant. This result is consistent with recent findings that prioritise strategic intent over legislation as the driving force of environmental management in the UK (Brammer *et al.*, 2012). At the same time, it challenges the evidenced limitation of the influence of this factor among SMEs in the same country in the past (Worthington & Patton, 2005). In particular, the strategic intent among Danish manufacturing SMEs points to the identification of new market opportunities, the preparation of firms' positioning and the improvement of the firms' reputation. It places them as advantage-driven firms that predominantly understand environmental sustainability as a business opportunity (Parker *et al.*, 2009; Battisti & Perry, 2011). On the other hand, the influence of managerial attitudes remains weaker in comparison to the strategic intent in the time horizon of our analysis, which means that environmental action may not be seen as an extension of owner-managers attitudes, as traditionally believed in SMEs' management (Cassells & Lewis, 2011). We can also suggest that in our empirical context there are still gaps between owner-managers' attitudes and actual actions (Tilley, 1999; Cassells & Lewis, 2011), resulting in minor strategic change (Dahlmann & Brammer, 2011). This can explain the slow pace of the adoption of environmental initiatives at the strategic level. Interestingly, in 2011 both managerial attitudes and strategic intent had the same influence on the adoption of environmental initiatives at the strategic level. This suggests that Danish manufacturing SMEs seem to have reached a point of relative balance between the exerted influences of both motivators. It will therefore be interesting to see if this trend prevails in future surveys.

In contrast to the effects on competitive advantage, firm size has remained a significant factor in determining the adoption of environmental initiatives at the strategic level. Our study was entirely focused on SMEs, but within this category we found differences between the levels of environmental engagement of small businesses and medium-sized businesses (Brammer *et al.*, 2012), given the higher propensity for the latter to adopt environmental initiatives over the former. If future surveys arrive at the same conclusion, it could be argued that firm size matters for the adoption of environmental initiatives at the strategic level, whereas the heterogeneity of size among SMEs does not necessarily guarantee distinctive impacts on competitiveness.

Conclusions, Limitations, and Implications

This study differs from previous research in various ways. First, the study has been executed in Scandinavia, which has long been recognized for having implemented very strict environmental regulation and for being among the leaders in clean technologies. Second, we have adopted a longitudinal research design focused on small and medium-sized enterprises. Thus, it is possible to assess whether the greening process in this particular setting has become deeper and/or more enduring, and is not affected by specific macro-economic or regional political ad hoc circumstances. Third, we have chosen to focus on key strategic dimensions. Extant research has looked at the promotion of environmental proactivity and/or green corporate attitudes and values in a way that is often disconnected from the exerted influence of antecedents and drivers as well as from the effects on competitive outcomes. We believe that by combining the strategic outcomes that follow from managerial environmental attitudes, intent and initiatives in the same study, the basis for understanding the nature and the wider scope of the process of corporate strategic greening is significantly improved. To adequately understand the significance and endurance of the relationship of the firm and the natural environment, we believed it was necessary to investigate how managers' attitudes towards the environment, their strategic intent and the environmental initiatives undertaken by them have changed over time.

Three conclusions can be drawn from this study. First, there has been an increase in the adoption of environmental initiatives over the last 14 years (although at a moderate level). This should be seen in the light of the global business dynamics that have taken place during the period, which have seriously affected SMEs in general (a fast

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global economic growth followed by a global financial crisis). The data nonetheless suggests that the trend is enduring and thus reflective of an increasing internalisation of environmental concerns. Second, the study concludes that SMEs also engage in greening to improve their competitive position. More specifically, the study identified positive effects on their competitive advantage, predominantly on the differentiation and positioning of Danish SMEs in accordance with their strategic intent towards business growth as a consistent key driver of action over managerial attitudes. Third, the noted differences between small and medium-sized enterprises, particularly in terms of levels of environmental engagement, indicate that such firms are heterogeneous as prior research has suggested.

Given the aforementioned findings, it is important to note some limitations of this study. First, our analysis only explores a specific set of environmental initiatives in firms (leaving others out). Second, we did not investigate the influence of institutional and external pressures from the stakeholders to adopt environmental initiatives. Third, even though we analysed manufacturing SMEs, the multi-sectorial characterisation of our samples did not allow us to study particular environmental initiatives and the strategic outcomes of specific industrial activities. Building on these limitations, future studies should investigate specific industrial sectors in order to determine if the arguments derived from this study still hold. Additional suggested avenues for research point to exploring the influences from institutional forces and critical stakeholders over time together with internal motivators such as the ones considered in this study. This in turn sheds light on the establishment of critical drivers that could predict future responses. Alternatively, the development over time of other environmental initiatives on different organisational fronts (i.e. operational, inter-organisational, etc.) could be studied in the context of SMEs.

The study has a number of important research and practical implications. The analysis reveals that it seems to be necessary to use concern about the natural environment as an argument to secure and/or increase the competitiveness of SMEs in the future and achieve a deeper appreciation of the principles of sustainable development, and there is also a need for more innovative and radical approaches. The latter may involve novel means of reporting environmental actions. This will allow the responses of firms to be addressed with comprehensive and validated systems of indicators that include measurements at more systemic levels (industrial sector, supply chain, etc.).

In terms of practical and/or policy implications, there are also some interesting messages to be sent. First, the study has shown that a long-lasting and enduring greening agency is not a privilege that can only be attained by large enterprises and/or innovators in industry. SMEs are perfectly capable of finding ways to utilise the green opportunities for strategic purposes. Second, considering more innovative approaches to future corporate environmental management initiatives will allow the strong footprint of the SMEs strategic intent to be addressed and new market opportunities to be identified. Last, but certainly not least, there is an important message to both environmental regulators and SME managers in regions known for having little environmental concern and only rudimentary environmental regulation. Tough environmental regulation is not working against SMEs competitive position. Rather, strict environmental regulation and environmental competitive advantages seem to mix well within SMEs.

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Appendix: Results from principal component analyses.

	1999	2003	2007	2011
Environmental audit system	0.859	0.896	0.773	0.844
A written environmental policy	0.842	0.867	0.800	0.845
A written environmental strategy	0.837	0.847	0.823	0.784
Regular audits of environmental goals	0.836	0.911	0.894	0.890
Set specific environmental goals	0.823	0.872	0.893	0.859
Assignation of responsibility for carrying out environmental strategy	0.814	0.839	0.847	0.857
Publication of a separate environmental report	0.814	0.827	0.766	0.739
Drawing up environmental accounts/audit	0.796	0.860	0.764	0.721
Quantitative measurement of key environmental indicators	0.735	0.807	0.773	0.731
Certification according to ISO 14000	0.731	0.784	0.743	0.728
Cronbach's alpha	**0.940**	**0.957**	**0.941**	**0.937**
Variance explained	**65.52%**	**72.57%**	**65.05%**	**64.04%**

Table A1. Principal component analysis of environmental initiatives at the strategic level

	1999		**2003**		**2007**		**2011**	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
	Differentiation/ positioning	Lower cost	Differentiation/ positioning	Lower cost	Differentiation/ positioning	Lower cost	Differentiation/ positioning	Lower cost
New market opportunities	**0.847**	0.207	**0.796**	0.350	**0.846**	0.109	**0.716**	0.244
Product image	**0.847**	0.210	**0.834**	0.144	**0.819**	0.183	**0.791**	0.190
Market share	**0.804**	0.349	**0.812**	0.325	**0.774**	0.242	**0.732**	0.184
The firm's image	**0.803**	0.198	**0.847**	0.080	**0.846**	0.221	**0.572**	0.412
Sales	**0.769**	0.385	**0.816**	0.309	**0.833**	0.245	**0.825**	0.076
Cost reductions	0.166	**0.767**	0.185	**0.788**	0.050	**0.827**	0.172	**0.744**
Productivity improvements	0.209	**0.717**	0.462	**0.573**	0.420	**0.614**	0.225	**0.730**
Short-term profit	0.172	**0.698**	0.005	**0.855**	0.061	**0.834**	0.043	**0.760**
Competitiveness	0.506	**0.669**	0.525	**0.650**	0.493	**0.677**	0.419	**0.687**
Long-term profit	0.497	**0.591**	0.418	**0.616**	0.366	**0.726**	0.259	**0.806**
Cronbach's alpha	**0.908**	**0.814**	**0.907**	**0.830**	**0.896**	**0.846**	**0.817**	**0.843**
Variance explained	**67.039%**		**69.011%**		**69.085%**		**60.982%**	

Table A2. Principal component analysis of competitive advantage

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	1999		2003		2007		2011	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
	Strategic intent	Managerial attitudes	Strategic intent	Managerial attitudes	Strategic intent	Managerial attitudes	Strategic intent	Managerial attitudes
Spotting new market opportunities	**0.837**	0.119	**0.850**	0.190	**0.823**	0.157	**0.893**	0.159
Preparation for a strategic positioning	**0.805**	0.242	**0.864**	0.191	**0.816**	0.192	**0.833**	0.257
Improvement of the firm's general reputation	**0.738**	0.261	**0.659**	0.352	**0.773**	0.250	**0.457**	0.552
Owner's attitudes and opinion	0.177	**0.932**	0.214	**0.905**	0.202	**0.914**	0.132	**0.907**
Management's attitudes and opinion	0.290	**0.899**	0.280	**0.880**	0.245	**0.900**	0.249	**0.852**
Chronbach's alpha	**0.758**	**0.882**	**0.775**	**0.847**	**0.768**	**0.844**	**0.737**	**0.814**
Variance explained	**76.531%**		**76.335%**		**76.214%**		**74.477%**	

Table A3. Principal component analysis of motivators

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