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Environmental Management Strategies: Britain and Germany Compared

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ENVIRONMENTAL MANAGEMENT STRATEGIES IN BRITAIN AND GERMANY

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Contents

Executive summary	iii
1 Introduction and objectives	1
1.1 Introduction	1
1.2 Research questions and project objectives	2
1.3 The context of environmental management	2
2 Methodology	9
2.1 Operationalisation of corporate environmental strategy typologies in the survey	11
3 Description of the data sets and survey procedures	12
3.1 Germany	12
3.2 United Kingdom	14
4 Exploratory data analysis	16
4.1 Germany	16
4.2 United Kingdom	21
5 Multivariate analysis of corporate environmental strategies	27
5.1 Environmental shareholder value and operational environmental strategies	27
6 Conclusions	38
References	42
Questionnaires	45
 List of figures	
Figure 1 ISO 14001 certifications and EMAS registrations, by country (June 2001)	4
Figure 2 Influence of several stakeholders on companies	17
Figure 3 Operational environmental protection activities among German firms	18
Figure 4 Managerial environmental protection activities among German firms	19

Figure 5	Total number of operational environmental protection measures and EMS implementation (average number of measures)	19
Figure 6	Total number of environmental management measures and EMS implementation (average number of measures)	20
Figure 7	Obstacles to environmental activities among German firms	21
Figure 8	Influence of several stakeholders on companies in the UK	22
Figure 9	Operational environmental protection activities among UK firms	23
Figure 10	Environmental management activities in UK firms	25
Figure 11	Obstacles for environmental activities among UK firms	26
Figure 12	Influence of country location	31
Figure 13	Influence of sector	33
Figure 14	Influence of firm size	35
Figure 15	Influence of overall business performance	36

List of tables

Table 1	Environmental shareholder value (based on Figge 2001)	10
Table 2	Item battery used by Kirchgeorg (1990)	11
Table 3	No. of companies per firm size and sector in Germany, 31 Dec. 1999	12
Table 4	Breakdown of sample by industry sector and by firm size in Germany	13
Table 5	Sectoral breakdown of UK firm population (no. of firms)	14
Table 6	Breakdown by industry sector and firm size (no. of employees) in UK	15
Table 7	Companies with an EMS and a registered EMS	24
Table 8	Variance explained by factors in environmental shareholder value factor analysis	28
Table 9	Results for environmental shareholder value factor analysis	29
Table 10	Results for environmental strategies factors (Kirchgeorg, 1990)	30
Table 11	ANOVA for analysis of significant sector differences between countries	32
Table 12	ANOVA for analysis of significant strategy differences between sectors	34
Table 13	ANOVA for analysis of significant strategy differences between firm sizes	35
Table 14	ANOVA for significant strategy differences by business performance	37
Table 15	Most and least often adopted environmental routines in the UK and Germany	39
Table 16	Summary of findings regarding influences of explanatory variables	40

Executive summary

This is a comparative study of the environmental management activities and strategies adopted by firms in the United Kingdom and Germany. As well as looking at what firms in the two countries do to manage their impact on the environment, the study asks what influences them to do it, and what prevents them from doing more.

We found that the environmental management routines adopted in each country were broadly similar. In both countries, the commonest routines were an initial environmental review; procedures for ensuring legal compliance; a written environmental policy; and the clear definition of responsibilities. Few firms in either country had implemented more sophisticated approaches such as market research on the potential of green products, product life-cycle analysis, benchmarking or eco-labelling.

At the operational level too, the procedures most frequently adopted in the two countries were similar, with packaging recycling, material recycling and the reduction of energy use at the head of the list. On the other hand, procedures such as the use of waste streams from other firms, the substitution of non-renewable materials, and green product design were equally rare in both countries.

Similar too were the stakeholder drivers of environmental management. In both countries, it was pressures from national legislatures, from the firms' own management and from regulatory agencies and authorities that had most weight in driving environmental management efforts, while the least important drivers were trade unions, banks, accountants, retailers and consumer organisations.

In both countries, cost was the most important factor limiting the extent of environmental management initiatives. In Germany the second most important limiting factor was the lack of legal incentives, while in Britain it was the lack of pressure from the market-place.

We examined the extent to which environmental management in each country focussed on five identified strategic areas. These were:

- Processes
- Products
- Variable costs
- Competition
- Compliance

UK firms scored higher in all these areas than German, though in the last two the differences were not statistically significant. Generally, UK firms had more consistent and explicit strategies than their German counterparts. Perhaps unsurprisingly, there was a tendency in both countries for larger firms to adopt a more strategic approach to environmental management than smaller ones, which tended to concentrate on particular actions at the operational level.

1 Introduction and objectives

1.1 Introduction

For more than two decades the environment, and public, economic, legal, political and organisational pressures to reduce the impact organisations have on it, have been at the forefront of a large diversity of activities in the private sector. This environmental agenda has been shaped by various economic incentives, among them 'green consumers', 'eco-efficiency', environmental competitiveness and the cost savings promised by an integrated managerial approach to the environment. It has also been influenced by calamities and tragedies, such as Bhopal, Seveso, the *Exxon Valdez*, Baia Mare and Brent Spar. As a result, increasingly tight environmental regulations of ever wider scope – much beyond the traditional boundaries of an organisation's legal responsibilities – have been introduced across the industrialised world.

The argument that the private sector needs to respond to and integrate social and societal movements originated in business ethics during the 1960s and 1970s and, with the ascent of the green consumer during the 1980s, transformed towards environmental concerns. It rediscovered its origins in the aftermath of the 1992 Rio Conference on Environment and Development and the resulting emergence of sustainable development as well as of corporate governance and corporate social responsibility (Warhurst 2001; Elkington 1997; Cowell *et al.* 1999; Roome and Park 2000); thus the current debate has much deeper roots than is often assumed. However, for most of this debate, the notion that different strategic approaches are necessary for different organisations has not enjoyed wider attention.

Environmental pressures and incentives, and the way companies respond to these, vary between countries, product markets, by company size and according to the perceived strength of environment as a driving force for change (Roome 1992; Wehrmeyer 1999). The resulting different types of environmental (management) strategies have been defined – up to now – predominantly from a deductive standpoint: strategic behaviour was inferred from other theoretical models of corporate behaviour (Hunt and Auster 1990; Steger 1993). These models were often not based on empirical approaches but were normative and thus largely theoretical (Welford 1996).

While theory has its merits, this research is broadly empirical in outlook. It follows an inductive approach: using sets of organisational routines (here defined as every activity organisations adopt to address the environmental effects of their activities) to define environmental strategies allows researchers to empirically establish which activities actually comprise different strategies. This approach goes beyond deductive typologies and is in line with current insights in environmental strategies as documented in the relevant literature (Clarke and Roome 1999; Prakash 1999; Earl and Clift 1999; Kolk *et al.* 2001; van Berkel 2000; James *et al.* 1997).

1.2 Research questions and project objectives

Even though some environmental management studies, most notably James *et al.* (1997), Gordon (1994) and Peattie and Ringer (1994), have compared companies in the two countries, a clear classification of corporate environmental strategies has not yet been carried out for the UK and Germany. In particular, important research questions have not yet been addressed by previous work:

- (a) What are the observable environmental routines (operationalised by means of firms' operational and managerial environmental activities) of companies in both countries?
- (b) Do these routines form consistent strategy patterns, and can these be classified using existing typologies (such as Kirchgeorg 1990; Schaltegger and Figge 1998)?
- (c) Is the adoption of environmental strategies and the degree to which these are developed predominantly a result of a uniquely national context or part of the sectoral context of environmental routines?
- (d) To what extent is there a unique development path for environmental strategies (i.e. a development path which is independent of sectoral and national influences)?

The objectives of this project are:

- To provide answers to the research questions listed above.
- To provide a detailed statistical analysis resulting in the identification of environmental routines and strategies.
- To study the influence of national and industry contexts on environmental strategies and environmental management activities under the varying economic conditions, regulatory regimes and public pressures in Germany and the UK.
- To develop recommendations, based on findings, to policy-makers, industry and industry representatives.

1.3 The context of environmental management

1.3.1 The context and choice of sectors

The simultaneous improvement of environmental performance towards sustainability and of the economic performance and competitiveness of European firms is a major objective of the EU for the next decade, and indeed, the new millennium. Whilst almost all firms are aware of the need for sustainable development, it is often less clear which strategies are being employed by companies, and which of these are promoting sustainable development most effectively. In a competitive world, it is important for firms to meet customer demand as well as societal expectations. Only when embracing simultaneously the economic, social and environmental challenges of sustainable development will firms be able to retain their licence to operate and their ability to attract the necessary capital and human resources to run their operations successfully – the famous triple bottom line (Elkington 1997).

Manufacturing industry is particularly relevant in the discussion of sustainable development. The choice of manufacturing industry (as the focus of the survey carried out) has therefore been guided by the following considerations:

- Manufacturing industry has comparatively higher environmental impacts than the service sector, and thus *a priori* a higher relevance to the achievement of sustainable development.
- Focusing on manufacturing industry ensures sufficient comparability of sectors despite the diversity of sector characteristics.
- Different sectors within the manufacturing spectrum are likely to be at different stages in their implementation of environmental management, thus research that covers a range of sectors in manufacturing industry provides a spread of environmental management activities and corporate environmental strategies.
- Given that firm size might be an influential factor, diversity in company size is important, as is maintaining a focus on small and medium-sized firms, given the high economic significance of these in both countries.

Although the chosen sectors in the manufacturing industry (NACE codes 15–36) have different relative economic importance in the two countries, what they have in common is that they all contribute to meeting human needs through physical products. To improve environmental performance in these sectors through effective environmental management activities is therefore essential to the achievement of sustainable development and sustainability in the industrial society.

1.3.2 Choice of countries

Since it was necessary to achieve an appropriate spread of regulatory, socio-economic and market-based influences, it was decided to concentrate the analysis on two European countries with relatively distinct environmental regimes, the United Kingdom and Germany. In both countries, the extent of corporate environmental protection has increased significantly over the last decade. The socio-political, regulatory and economic climates of the two countries show significant differences, which has meant that companies in each country have developed management approaches and corporate environmental strategies that are specific to their national circumstances.

For instance, Gordon (1994) acknowledges that, whilst awareness of broader political and social aspects in environmental policy is greater in Britain, the level of analysis and the efficiency of environmental policy-making is often higher in Germany. Peattie and Ringer (1994) report strong enthusiasm for environmental management amongst British companies, and suggest that in organisational terms they are not significantly lagging behind, but may increasingly do so due to weak environmental legislation. Those authors thus implicitly accept the 'Porter hypothesis' that tighter – and efficient – legislation promotes rather than harms competitiveness. James *et al.* (1997) find that specific socio-political dimensions, such as stringency of regulation, the character of existing competitive strategies within firms, or the level and quality of public concern for environmental issues, have led to distinct environmental management types in both countries.

ENVIRONMENTAL MANAGEMENT STRATEGIES IN BRITAIN AND GERMANY

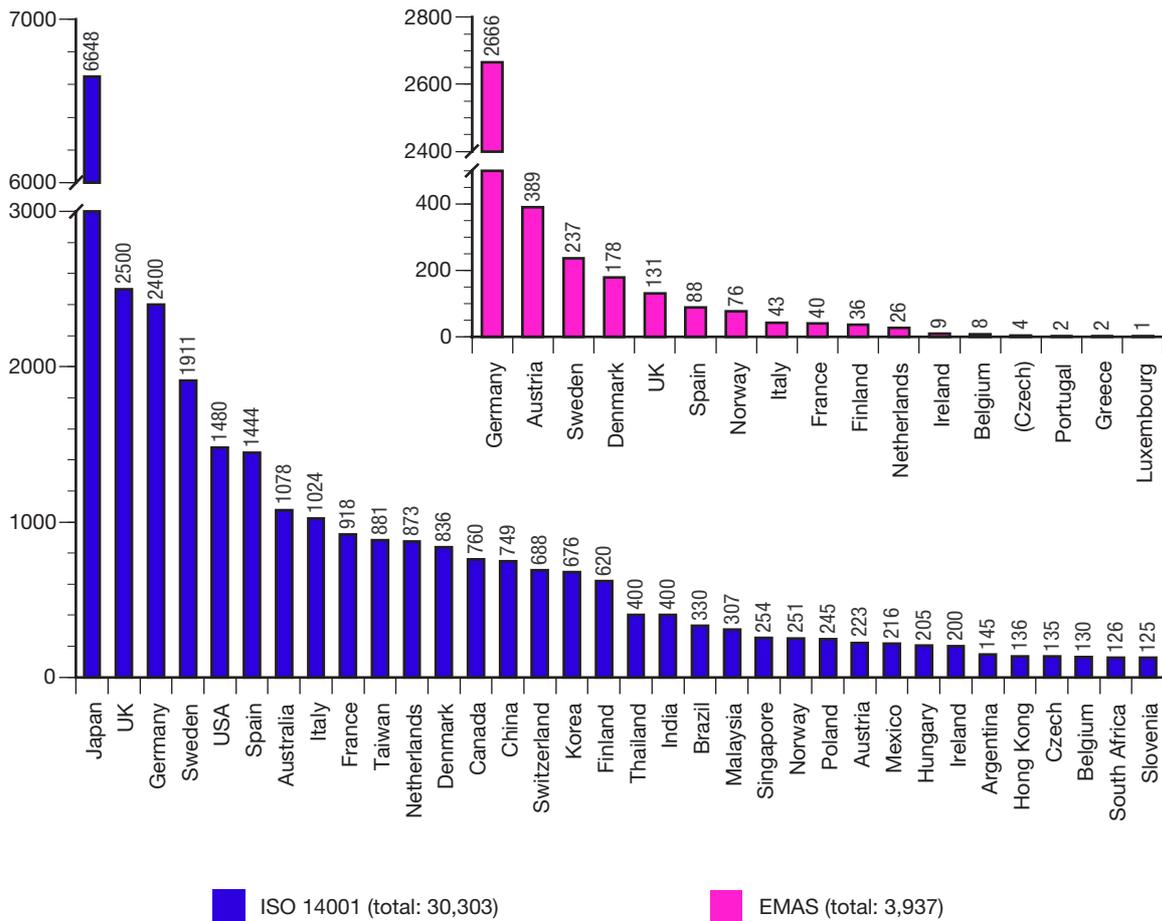


Figure 1
ISO 14001 certifications and EMAS registrations, by country (June 2001)

Given the spread of influences, for the research outlined above a cross-country comparison between the UK and Germany seems eminently suitable. From the existing literature, we know that there are distinct environmental regimes that have allowed different corporate approaches to environmental management as well as corporate environmental strategies to evolve (James *et al.* 1997). We also know that access to environmental and management data is comparatively good in both countries: German and UK firms have published a large number of corporate environmental reports, and the UK's Chemical Release Inventory, in addition to the public nature of statutory emissions data, allows relatively easy access to environmental data in the UK (Wagner and Wehrmeyer 1999).

In Germany, a considerable number of firms, significantly more than in the UK, are registered under the EU Eco-Management and Audit Scheme (EMAS). As can be seen in Figure 1, Germany is the country by far with the most EMAS registrations. Indeed, two-thirds of all registered companies (or sites) are in Germany. By contrast, the UK has the second largest number of ISO 14001 certified companies – about 100 more than Germany. It should be noted that the certification/registration approach to environmental

management systems seems to be far more popular in Germany than it is in the UK, and that ISO 14001 is clearly the favoured standard in the UK.¹

The reason for this imbalance in the take-up of EMAS between countries may be found in the level of regulatory relief granted to the EMAS-registered firms. According to Wätzold *et al.* (2001), EMAS provides additional advantages in Germany (which are not available in the UK) in that public bodies provide more information and subsidies to EMAS participants and in that regulatory relief is exclusively granted to companies registered under EMAS (but not to firms which are certified under ISO 14001).

In Germany, the federal states are responsible for licensing, monitoring and enforcement, and all of them have introduced regulatory relief for EMAS-registered firms.² However, in the UK, no special regulatory relief is offered by regulators to companies adopting one but not the other standard. ISO 14001 and EMAS are treated equally, which is one of the main reasons why UK participation rates in EMAS are low. In addition, there is the perception that ISO 14001, as the globally known and promoted standard, is of more use to exporters, and that, as EMAS is considered to be a tougher standard, many firms have adopted ISO 14001 as a precursor to subsequently adopting EMAS (Hillary 1999). It remains to be seen how many companies actually will adopt both standards. However, the preference of UK firms for ISO 14001 (which is more closely linked to BS 7750) makes it likely that future regulatory relief (if granted equally to both, EMAS and ISO 14001) will mainly increase industry participation in ISO 14001.

In the comparison of EMAS registrations in Germany and the UK, it appears that the figure for Germany is disproportionately high, rather than the UK figure being disproportionately low. This can be argued on grounds that the figures for most other EU countries are much lower than those of the UK. In fact, the UK ranks fifth out of 17, and, excluding Germany and Austria – for which a similar argument may hold to that for Germany – has 15% of all EMAS-registered firms.

The differences in (environmental) management between the two countries have been documented reasonably well. For instance, Gordon (1994) argues that, although the German system appears to be more efficient in delivering policy at local, regional and national levels, and whilst German industry seems to look more deeply at the underlying dimensions of sustainable development, British policy development is more inclusive in terms of recognising non-governmental organisations, and has a more global outlook.³ At the more fundamental level, according to Gordon (1994, p. 12):

¹ It has to be noted however, that a significant proportion of firms have sites that are both certified under ISO and registered under EMAS. Wolter (1999, p. 13) has estimated this proportion at 10% (it is unclear whether this relates to at least one individual site of a firm, or whole firms, or a minimum number of sites of the firm).

² The most comprehensive of these measures is the voluntary agreement between the state government of Bavaria and Bavarian industry. In this agreement, companies guaranteed, for example, that 500 sites would be EMAS-validated in Bavaria by October 2000 (Wätzold *et al.* 2001). The Bavarian state government in turn agreed to provide regulatory relief to EMAS-registered firms with regard to reporting, documentation and control duties for waste, water and pollution control laws.

³ This may be one of the reasons why ISO 14001 is much more popular in the UK.

The challenges posed to both the British and German political systems by the pursuit of sustainable development are so great that it would be overly simplistic to suggest that the German system can cope while the British system cannot. ... So far, political will exists in neither country, and in its absence there are no convincing signs that the German electorate is more ready than the British to change expectations and lifestyles based on unsustainable patterns of economic development.

At the corporate level, there are also large differences between the management styles and foci in both countries. Looking specifically at middle management, Stewart *et al.* (1994) argued that the societal and cultural differences of both countries affect management styles in the workplace. In addition, they suggest that 'German management is more concerned with structure, and British management with the process' (p. 31), mainly because there was a much greater task orientation in German firms, and the notion of management being a separate activity was much more established in the UK. They also discovered the very different career paths of middle managers, and the quite different outlook and expectations of these towards their superiors and subordinates. This spilled over into the perceptions of what make for an efficient manager: 'the ability to be an effective networker and "man (and woman) manager" is much more important in Britain, whereas the ability to provide technical assistance to subordinates is seen as much more important in Germany' (p. 32).

In summary, the existing literature suggests distinct though as yet unspecified environmental regimes in the UK and Germany, as far as environmental awareness, efficiency of environmental policy-making, the stringency of and approach to environmental regulation, and the managerial approach to environmental concerns are concerned. Overall, the distinct environmental regimes make it likely that different corporate approaches to environmental management as well as corporate environmental strategies have evolved in the two countries, i.e. that the country context is a major determinant for corporate environmental strategies.

1.3.3 Corporate environmental strategies

The way companies manage environmental issues has been classified into a number of strategic modes. Using a directional typology, Hunt and Auster (1990) famously suggest a five-stage model, from the environmentally innocent *beginner* to the environmentally committed *proactivist*, which prescribes internal management approaches to environment, health and safety as well as risk. Similar models can be found in Welford (1995), Global Environmental Management Initiative (1992), Roome (1992) and Colby (1991).

A somewhat different approach is taken by Steger (1996), who, in analogy to the Boston Consulting Group's strategic positioning mode, identifies an internal and an external dimension to prescribing a firm's environmental behaviour. However, the majority of such approaches – a fuller review can be found in Wehrmeyer (1999) – are theoretically based (i.e. deductive). They derive the environmental management type from theoretical considerations and provide normative guidance for companies. There is a noted paucity of research that develops such a typology based on empirical data on the environmental management activities that firms undertake (i.e. inductive). The present research aims to fill that gap by grouping firms' corporate environmental strategies based on two existing typologies of routines found in the literature, namely Kirchgeorg (1990) and Schaltegger and Figge (1998). This section concludes with a brief description of their structure.

Based on a review of the literature on different conceptually derived typologies of firms' ecologically oriented behaviour, Kirchgeorg (1990) suggests a number of components contributing to the classification of corporate environmental strategies (CESs) in general. These are (Kirchgeorg 1990, pp. 38–45):

- Whether a CES is more directed towards firm-internal aspects of a firm's operations, or whether it is strongly market-oriented.
- Whether a CES is characterised by passive or active behaviour on behalf of the firm. Active behaviour is further classified as adaptive or innovative. The latter is characterised by the firm contributing, independently of regulatory requirements, to the solution of environmental problems.
- Whether a CES is reactive or proactive (with regard to the time of strategy development and realisation of measures). A reactive behaviour is characterised by the fact that a firm considers environmental issues only if it is actually affected by environmental demands. Conversely, with proactive behaviour, a firm takes into account already 'weak signals' (Ansoff 1987) in order to anticipate environmental issues in its strategy concepts.
- Whether the CES of a firm is developed as an isolated strategy referring only to specific functional areas of the firm, or whether it is aiming at the integration of all functional areas, based on an overarching concept.
- Whether the CES is enacted by a firm individually or in cooperation with other firms – for example, as part of a voluntary or negotiated agreement in a specific sector.

Based on these different classification aspects, Kirchgeorg (1990, p. 46) distinguishes five base strategies for firms to address environmental issues. These are resistance, passivity, retreat, adaptation and innovation. These are distinguished by differing characteristics with regard to the aspects listed above. For example, an 'innovative' base strategy can be characterised by a market orientation, active and innovative behaviour of the firm, a proactive stance, an integrated approach and individual enactment of the CES. These are operationalised by a battery of questions initially used by Kirchgeorg (1990) and adopted unchanged for the present survey.

Regarding environmental management in general, Schaltegger and Figge (2000) argue that the amount of corporate environmental protection in itself neither augments nor reduces shareholder value (or similarly other measures of economic performance). Contrary to the often held view that the extent of environmental protection (and thus the level of environmental performance which is related to it) is (negatively or positively) related to the economic performance of firms, they argue that such a relationship strongly depends on factors internal to the firm. In particular, corporate environmental strategies, the environmental management approaches used, the activities adopted by the firm, as well as the tools utilised are seen as major factors which moderate the relationship between environmental and economic performance at the firm level.

Schaltegger and Figge (1998) link environmental performance and shareholder value by means of theoretically derived value drivers for shareholder value. These value drivers (derived from the original shareholder value concept) are (Schaltegger and Figge 1998, p. 18):

- the level of fixed capital and working capital investments (which jointly determine the expected capital investment);

- the systematic risk, the return of risk-free investments, and the return of the market portfolio (which determine the discount rate);
- sales growth, operating profit margin, income tax rate and value growth duration (which in combination determine the expected cash flow).

Together, the expected capital investment, the discount rate and the expected cash flow determine the expected risk-adjusted return, i.e. the shareholder value. Schaltegger and Figge (1998) then go on to assess the influence of different types of environmental strategy on the value drivers described. For example, if large sums have to be invested by a firm in end-of-pipe pollution abatement, this is likely to reduce free cash flow and thus economic performance, although environmental performance might have improved considerably. Also, growing internalisation of external environmental costs by means of, for example, taxes will bring the objective of cost reduction more and more into line with the ecological goal of reducing environmental burdens. Therefore, internalising environmental costs features in both a strategy of cost leadership as well as one of quality leadership. Figge (2001) expands the environmental shareholder value (ESV) approach to include option value considerations and proposes a battery of questions which was used in the questionnaire of the present survey.

2 Methodology

About 2000 randomly selected manufacturing companies were targeted for a postal survey in Germany, with an equal number of companies from the manufacturing and selected service sectors in the UK. The questionnaire used in this survey was identical in Germany and the UK, except of course for the language used. Great care was taken to ensure full comparability of the questionnaires by means of pre-testing in both countries and subsequent comparison of pre-test results. The full questionnaires can be found in the Appendix.

The questionnaire used in this research asked about specific environmental issues, such as the main environmental effects; the main management and technological actions to address these; and the degree of sophistication and extent of the corporate environmental programme. This is followed by questions on the motives, drivers, benefits and obstacles which influence environmental management.

In any postal survey there is a risk of self-selection bias; in our case, those companies that see themselves as environmentally active may be more likely to reply than other companies. We do not consider this to be a major problem in the current survey since the analysis has revealed considerable variability in firm behaviour, including companies that were environmentally inactive, so that any bias is unlikely to be strong. However, there is an imbalance in the non-response bias between the two surveys: whilst the UK survey did not 'chase' or follow-up individual responses, a number of German companies were asked by telephone whether they could participate in the survey.

From the research literature on corporate strategy is clear that endogenous as well as exogenous factors play an influential part in the shaping of business strategy. This, *ipso facto*, should also apply to environmental strategies, and the present research looks at some explanatory factors such as firm size, country location and sector membership. Doing so will provide answers to the following research questions:

- Is there a link between firm size and strategic CES orientation or environmental management approach (e.g. is it larger firms that more often adopt proactive strategies)?
- Is there a link between country location and strategic orientation or environmental management approach (i.e. are firms in Germany more likely to adopt a proactive CES, than firms in the UK)?
- Is there a link between sector membership and strategic orientation or environmental management approach (e.g. are firms in specific industry sectors, such as the chemicals industry with its long history of environmental awareness, more likely to adopt a proactive CES)?

If the answer to all these questions is no, then there is a strong indication for a universal development path for corporate environmental strategies.

The approach to the data analysis will follow three distinct stages. Initially, the basic features of environmental management in the manufacturing sectors of both countries

are evaluated, using descriptive statistics, such as percentages and frequency distributions. This is followed by principal component analysis/cluster analysis and the corresponding sensitivity analysis, to identify and establish underlying patterns in firm behaviour. This is done by interpreting homogeneous factors/clusters in the numerical dataset, which are then analysed in the third stage for significant differences with regard to explanatory factors, such as membership of a specific industry sector, country location, or firm size. In other words, the first step is to paint a general picture of the companies in both countries, the second step will be used to identify underlying patterns or strategic routines from the data, and the third stage is designed to find out whether these routines relate to country or sector or size, or whether a unique development path is possible.

Table 1
Environmental shareholder value (based on Figge 2001)

Please evaluate the following statements from your **company's point of view**. Please focus on environmental management alone and disregard the influence of other activities on the statements.

	Fully disagree	Disagree	Neutral	Agree	Fully agree
Through eco-products or eco-marketing we can achieve above-average market prices for our current products	<input type="checkbox"/>				
Eco-products or eco-marketing help us to charge above-average market prices for possible future products	<input type="checkbox"/>				
Environmental management helps us to have lower costs for our processes	<input type="checkbox"/>				
Eco-products or eco-marketing help us to sell more of our current products	<input type="checkbox"/>				
Environmental management in our company leads to lower capital investments for our current processes	<input type="checkbox"/>				
Environmental management in our company helps us to utilise better existing equipment	<input type="checkbox"/>				
Environmental management in our company helps us to create a competitive advantage that is difficult to imitate	<input type="checkbox"/>				
Environmental management helps our company to better predict its costs	<input type="checkbox"/>				
Through environmental management the proportion of variable costs in our company is higher	<input type="checkbox"/>				
Through its environmental management our company can defer investments to a later point in time	<input type="checkbox"/>				
Environmental management helps our company to extend the operational life of our production equipment	<input type="checkbox"/>				
Environmental management helps our company to better predict its future investments	<input type="checkbox"/>				
Environmental management helps our company to extend the operational life of our products	<input type="checkbox"/>				

2.1 Operationalisation of corporate environmental strategy typologies in the survey

In addition to general questions on environmental management, the questionnaire administered questions on environmental shareholder value (based on Figge 2001) and the questions on corporate environmental strategy options used by Kirchgeorg (1990) – see Tables 1 and 2.

For the items used in the survey to assess the ESV orientation of a company, factor analysis/principal component analysis will be carried out. The resulting factors/components will be labelled, and the extent to which these factors/components (which are essentially empirically derived typologies for corporate environmental strategies) are consistent with the propositions made by the ESV concept will be examined (Schaltegger & Figge 2000; Figge 2001).

Table 2
Item battery used by Kirchgeorg (1990)

Please specify the extent to which the following motivations are important for your (technical and managerial) environmental activities (please tick only **one** box for **each** of the motivations listed).

	Not at all	A little	Partly	Much	Very much
Immediate adaptation to new environmental legislation	<input type="checkbox"/>				
Increased investment in environmental measures in order to exceed legislative demands	<input type="checkbox"/>				
Trying to be ahead of environmental demands	<input type="checkbox"/>				
Wait until environmental regulation has become concrete	<input type="checkbox"/>				
Orientation towards competitors	<input type="checkbox"/>				
Open up new markets with eco-products	<input type="checkbox"/>				
Take into consideration environmentally conscious consumers	<input type="checkbox"/>				
Resistance to environmental demands	<input type="checkbox"/>				
Withdrawal from affected business areas	<input type="checkbox"/>				
Relocation of production to foreign sites	<input type="checkbox"/>				

3 Description of the data sets and survey procedures

3.1 Germany

The sample for the German survey was based on random sampling from the manufacturing sector in Germany. The German firm population equals the total number of firms in the German manufacturing sector. Their sectoral breakdown, based on the industry NACE code classification, is given in Table 3.

Table 3
Number of companies per firm size and sector in Germany, 31 December 1999

Industry type (NACE codes)	50–99 employees	100–499 employees	500 and more employees
15	1267	1206	100
16	3	12	7
17	328	316	20
18	181	154	13
19	68	70	5
20	320	216	25
21	231	329	43
22	785	626	78
23	20	28	18
24	459	578	171
25	781	730	110
26	583	494	58
27	384	509	134
28	1630	1229	115
29	1610	1740	316
30	62	58	23
31	439	526	139
32	188	239	89
33	534	561	96
34	199	287	158
35	90	115	62
36	476	463	42
Subtotals	10638	10486	1822

Source: Bundesanstalt für Arbeit (German Federal Bureau for Employment); data provided to University of Lüneburg on 8 November 2000.

Table 4
Breakdown of sample by industry sector and by firm size in Germany

Sector	Number of employees					Total
	10-99	100-249	250-499	500+	Not known	
Food and tobacco	4	8	3	5		20
Textiles	2	5	3	4		14
Pulp and paper	1	2			1	4
Publishing and printing	4	3	4	2		13
Energy, oil production and nuclear fuel				1		1
Chemicals and fibres	3	2		3		8
Rubber and plastics	2	2	1	2		7
Non-ferrous mineral production		5	1	2		8
Metal	4	8	6	2		20
Machines and equipment	2	8	3	4	3	20
Electrical and optical equipment	5	4	4	4		17
Transport production	2	1		5		8
Other	5	10	5	6	4	30
Transport services				1		1
Total	34	58	30	41	8	171

Questionnaires were addressed to the environmental manager of the company and were in most cases answered by them. In some cases, quality managers completed the questionnaire. Especially in small firms, it was often the managing director who completed the questionnaire. Of over 2000 questionnaires sent out, 247 questionnaires in total were returned. Only 171 of these were usable, corresponding to an effective response rate of 8.3%. The final sample of the German survey in terms of industry distribution is described in Table 4.

As can be seen, sector coverage is relatively good in food and tobacco products, metal products, machines and equipment, and transport products, whereas it is low in energy and in pulp and paper products. Except for three (timber industry, leather processing and recycling), all target sectors are represented in the questionnaires returned. The largest response came from the food and tobacco industry, the manufacture of metal products and production of machines and equipment. The next best-covered industries are electrical and optical equipment, textiles, and publishing and printing.

With regard to the number of employees, firms with 500 or more employees are over-represented in the sample (2.25% of the total number of firms in this size category in Germany) compared to companies with 100-499 employees (0.84% of all firms) and companies with less than 100 employees (0.32% of all firms). This is, however, consistent with the small firm size bias found in previous surveys on environmental management (Baumast and Dyllick 1998).

Table 5
Sectoral breakdown of UK firm population (no. of firms)

SIC code	Population	Sample	SIC code	Population	Sample
14	2	2	37	2	0
15	85	5	45	99	10
17	36	5	50	64	5
18	15	1	51	218	23
19	9	0	52	48	4
20	21	6	55	60	3
21	34	3	60	46	4
22	93	10	63	26	2
24	43	10	64	10	1
25	64	5	65	34	1
26	25	3	66	21	3
27	27	4	67	21	1
28	84	8	70	26	1
29	109	15	71	21	1
30	17	1	72	31	3
31	38	3	73	11	1
32	39	8	74	207	9
33	28	5	80	51	9
34	21	3	85	50	3
35	17	2	90	8	0
36	55	6	92	33	4
Subtotals	862	105	Subtotals	1087	88

3.2 United Kingdom

Of the 2000 questionnaires sent out in April and May 2001 to a representative subset of British industry, 214 questionnaires came back (corresponding to a response rate of approximately 11%). With regard to firm size, the reply rate from bigger firms was above the average, very similar to that found in the German part of this survey.

The UK firm population from which the representative sample was drawn is based on the number of firms for which the job function 'environmental/recycling manager' exists; 14,694 such firms were identified. Their sectoral breakdown, based on the 1992 SIC industry classification, is shown in Table 5.

The distribution according to industry sectors and by firm size is shown in Table 6.

As can be seen, the main sectors are metal-processing, mechanical engineering, chemicals, paper and printing, electrical engineering, and finance. The distribution according to the

Table 6
Breakdown by industry sector and firm size (number of employees) in the UK

Sector	Number of employees					Total
	10–99	100–249	250–499	500+	Not known	
Food and tobacco	2	3		1		6
Textiles	1	4	1	1		7
Leather	1					1
Wood	2	2	1	1		6
Pulp and paper				3		3
Publishing and printing	3	3	3	5		14
Energy, oil production and nuclear fuel	1	1		1		3
Chemicals and fibres	3	4	5	5	1	18
Rubber and plastics	2	3				5
Non-ferrous mineral production	1	1		2		4
Metal	7	7	4	4	1	23
Machines and equipment	3	2	4	3		12
Electrical and optical equipment	5	3	2	3		13
Transport production	3	3	1	2		9
Other	15	16	4	18	2	55
Wholesale	1			2		3
Hotels and restaurants	1		1			2
Retail trade	1	1		3		5
Computers		4	2	1		7
Financial services	1	5		4		10
Transport services	3	1	1	2		7
Not known				1		1
Total	56	63	29	62	4	214

type of product suggests that 53% of the firms produce final products, 12% produce intermediate products and 26% produce pure services.

The firm size distribution shows that 26% are small firms with less than 100 employees, 29% of the replies came from medium-sized firms (100–249 employees) and the group of large firms (over 249 employees) accounts for 42.5%, which is above the average for most sectors.

A quarter of the responding firms are stock-listed companies, 20% are privately owned firms and 40% are companies with privately held stock. Of the responding firms, 41% are totally independent, whereas almost half of them (49.3%) are fully owned by another enterprise.

4 Exploratory data analysis

4.1 Germany

In the following, the initial results of the current survey with regard to exploratory data analysis are presented. These include the effects that several stakeholders have on the companies, the relevance of different environmental measures and the importance of possible obstacles for their implementation.

4.1.1 Stakeholder influences

With regard to the effect that several stakeholders with environmental demands have on the companies, the five groups of stakeholders with the largest influences are as follows (in order of their degree of influence): national legislation (mean 3.50), the company's management (mean 3.42), the environmental authorities (mean 3.20), European legislation (mean 3.17) and employees (mean 2.92); see Figure 2.

It is obvious that the prevalent influence on operational environmental management still comes above all from (national and European) environmental legislation and its implementation by environmental authorities. This is similar to the results found in previous surveys (Baumast 2000; Freimann and Schwedes 2000; Kirchgeorg 1990). However, the high perceived relevance of top management is noteworthy as it introduces an organisation-specific element to the stakeholders generating higher environmental pressures.

Stakeholders who at present only have a small influence on a company's environmental activities include consumer organisations (mean 1.77), retail companies (mean 1.65), accountants (mean 1.55), banks (mean 1.54) and trade unions (mean 1.53).

A distinction can be drawn between 'influencing' stakeholders (with means between 2.92 and 3.5 corresponding to a medium to strong influence on the company) and 'marginal' stakeholders who influence companies only very slightly (those stakeholders with means between 1.5 and 1.8 in Figure 2). As far as consumer organisations are concerned, the result for Germany is somewhat surprising, since one of their major tasks is to influence companies with regard to environmental issues.

Although some influence from employees can be observed, the relevance of trade unions with regard to environmental demands is relatively small, probably because their activity concentrates on social aspects (participation matters, etc.) of the companies. Apart from (national and European) legislation and environmental (enforcement) authorities, stakeholders outside the company exert only a very small influence on the environmental activities of the companies surveyed in Germany.

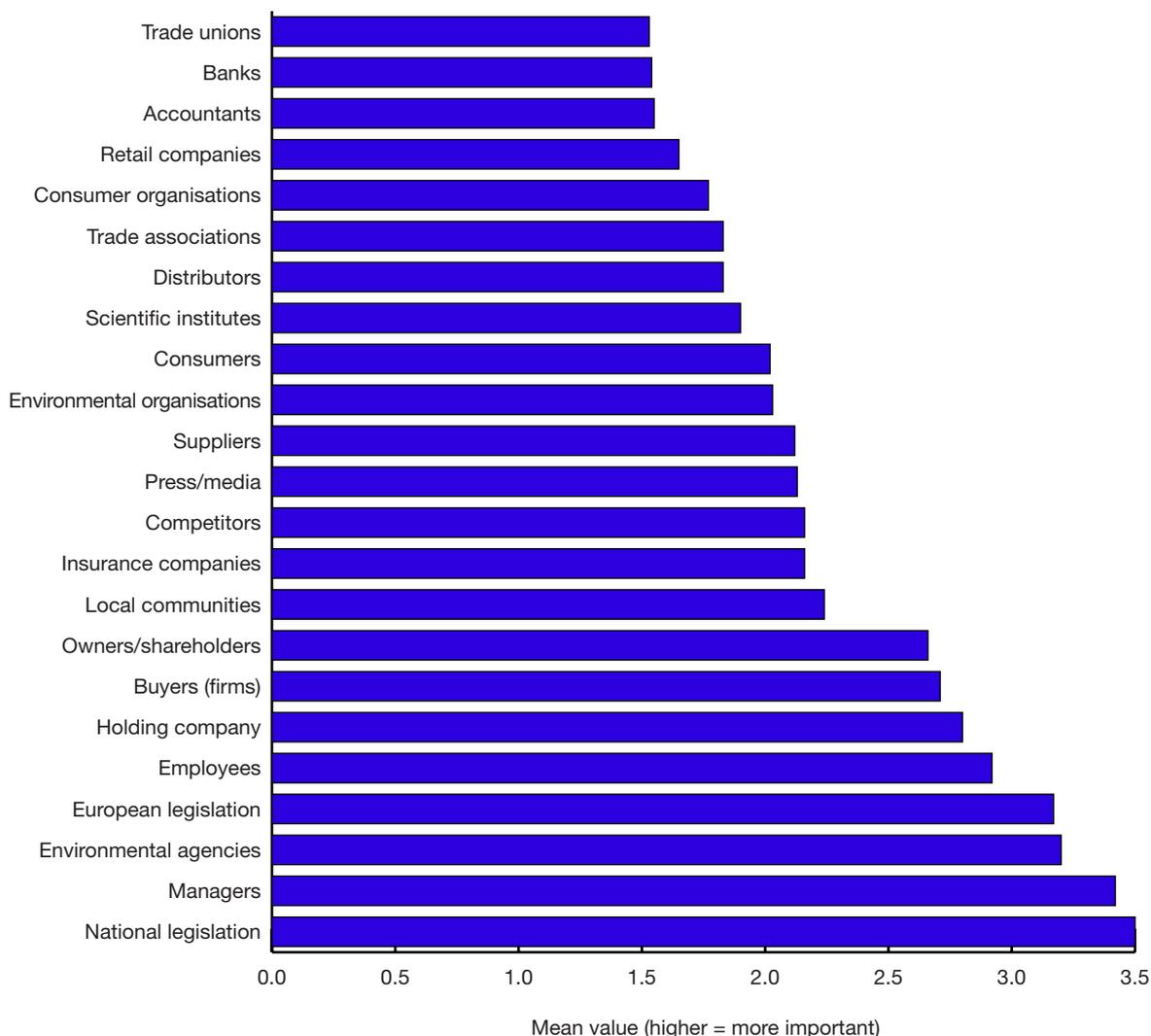


Figure 2
Influence of several stakeholders on companies (scale from 0 = no influence to 5 = very strong influence)

4.1.2 Environmental protection and environmental management measures

With regard to technical/operational environmental protection activities, the survey revealed that the companies most commonly recycle packaging, reduce waste and consume less energy in their production processes (see Figure 3). At the opposite end of the popularity scale, the use of other firms’ by-products, the substitution of non-renewable raw materials and measures for the reduction of the water surface pollution are only rarely adopted.

With regard to the managerial/organisational activities (Figure 4), the survey revealed that benchmarking (the comparison of environmental performance with other firms), eco-balancing and specific market research on the potential of environmentally friendly products are amongst the least commonly found activities. The clear definition of

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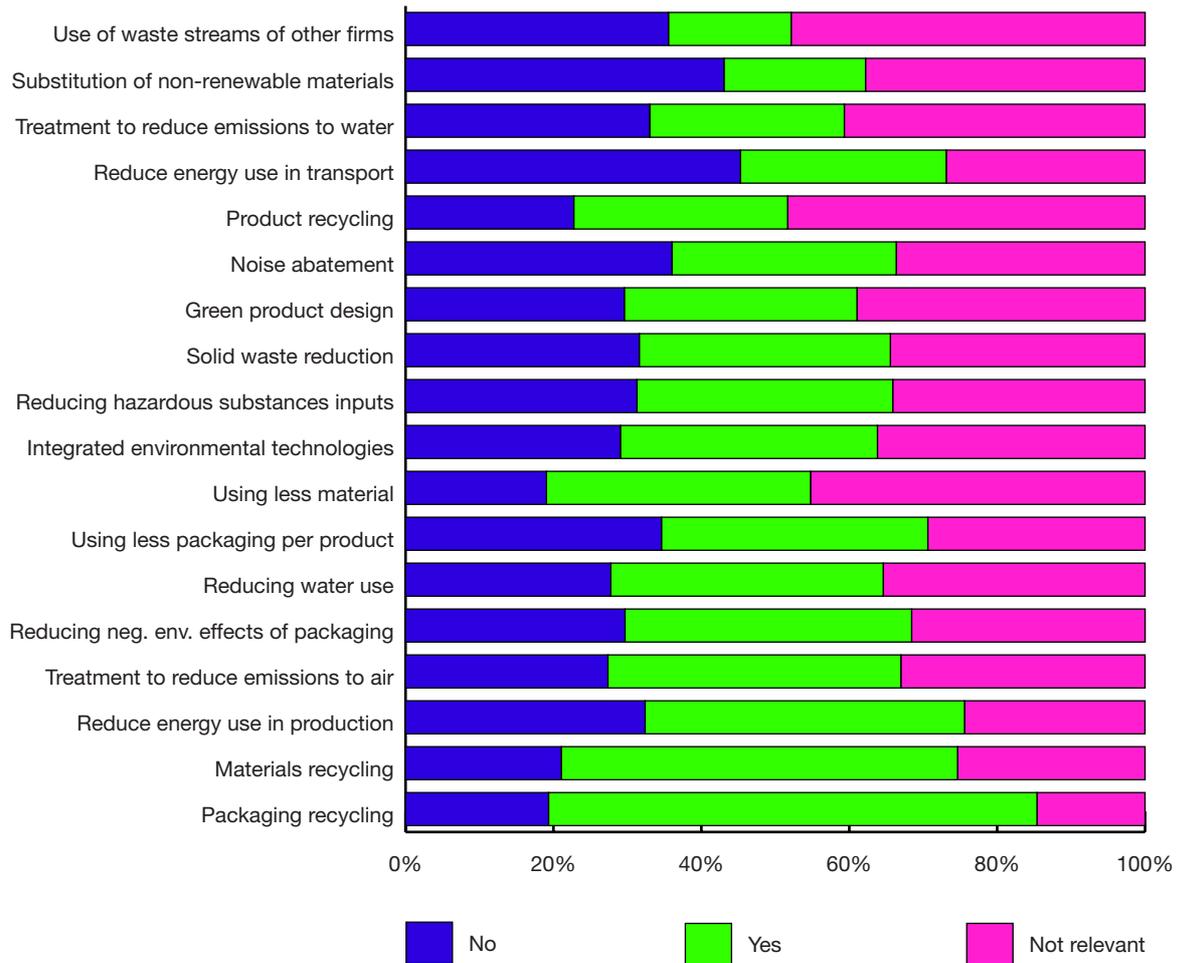


Figure 3
Operational environmental protection activities among German firms

environmentally related responsibilities within the firm, initial environmental reviews, and the introduction of activities to guarantee full legal compliance are the most common managerial activities.

Figures 5 and 6 show the total number of the technological and organisational measures in environmental management implemented by the companies surveyed. As can be seen, the more advanced the implementation of an environmental management system (EMS) is, the higher the total number of the measures. The highest average number measures is implemented by companies which have already fully implemented an EMS. A similar situation can also be found for environmental management activities.

This leads to interesting conclusions. It is clear that firms that have implemented an EMS carry out considerably more environmental management protection activities than those which have implemented no EMS or are in the process of implementation. Equally, those companies that have many different environmental management activities also have an EMS to support and integrate these. This is not the case for operational measures where there is not a significant difference in the number of activities between those that have

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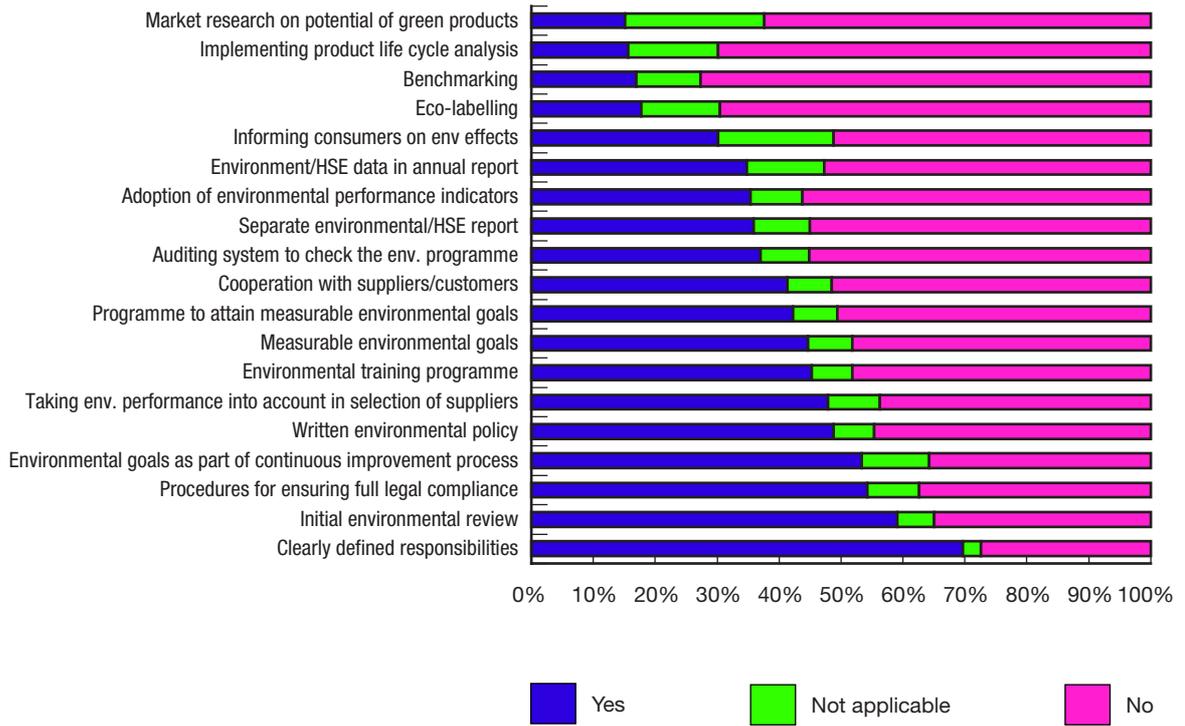


Figure 4
Managerial environmental protection activities among German firms

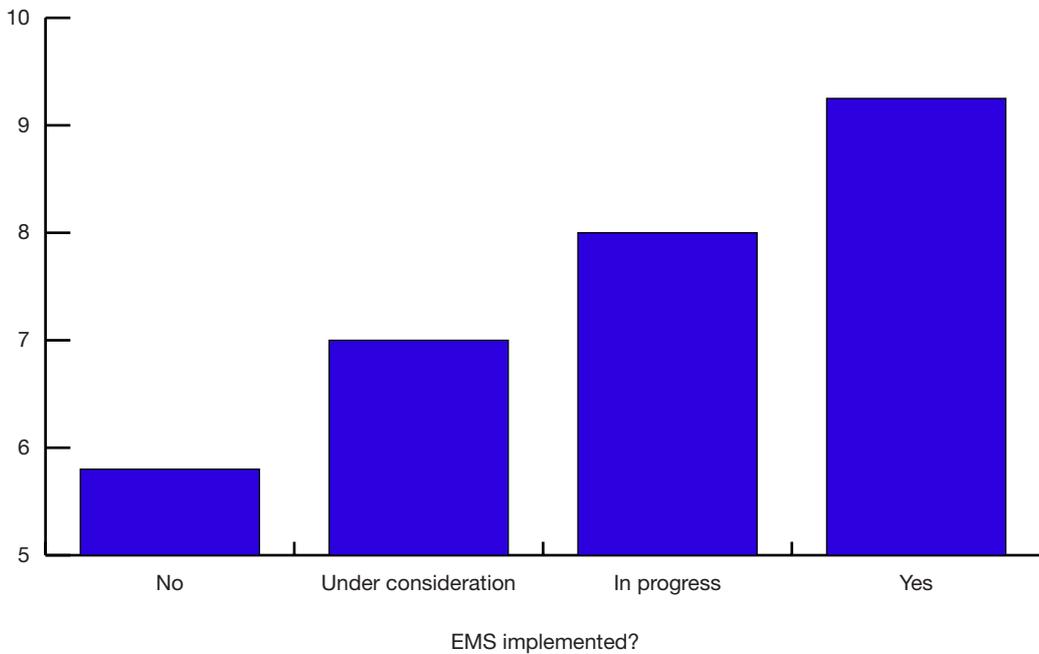


Figure 5
Total number of operational environmental protection measures and EMS implementation (average number of measures)

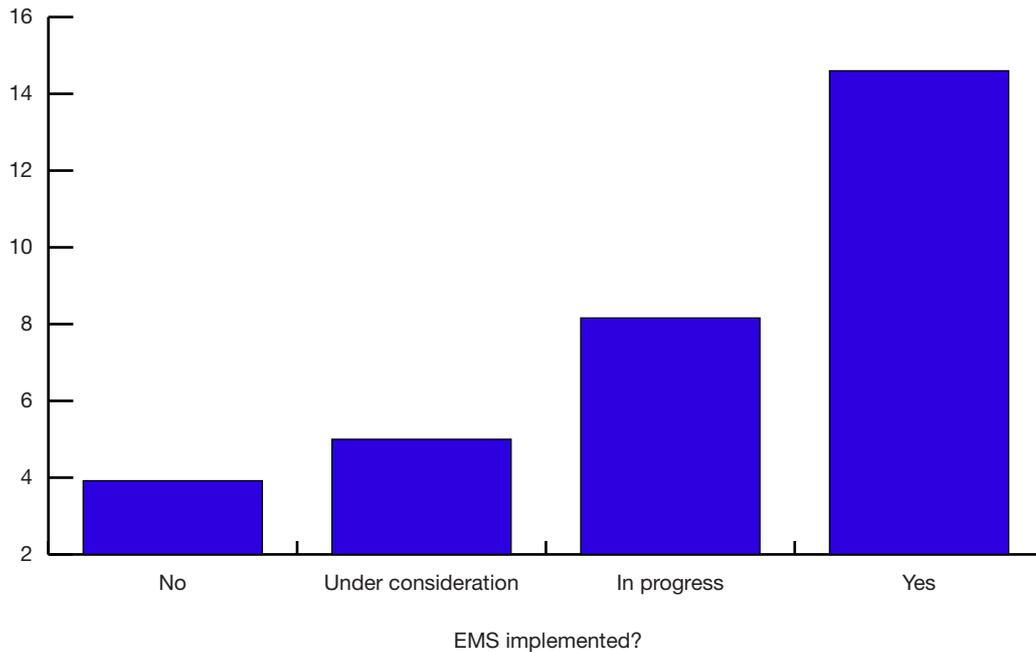


Figure 6
Total number of environmental management measures and EMS implementation (average number of measures)

an EMS and those who do not. It suggests that EMS-oriented firms develop initiatives that support and are compatible with a management systems approach, whereas companies without an EMS remain focused on operational activities. From this, it is unclear whether the EMS 'drives the operational activities out', whether the non-EMS companies see their operational actions as independent of each other, or whether the EMS comes before or after most of the operational activities have been completed.

4.1.3 Obstacles for environmental activities

Figure 7 shows the relative relevance of a number of potential obstacles for environmental activities in companies. In the survey the too high costs of environmental protection and management activities were cited most frequently as the major obstacle, followed by the lack of legal incentives (e.g. deregulation) and lack of competitive advantage from environmental measures.

In the survey the lack of willingness to cooperate within the firm's industrial sector, lack of information with regard to appropriate means and tools, as well as the management lack of support for environmental measures are among the least relevant obstacles.

Overall, it appears that almost all factors have similar weights, in that the distinction between the most important factor and the least is not very large, when seen as an average. This suggests that either there is no clearly identifiable obstacle that is predominant, or that there are sector- or size-specific obstacles hidden in the overall German analysis. The latter was not found to be the case; the former thus poses a challenge to policy-makers.

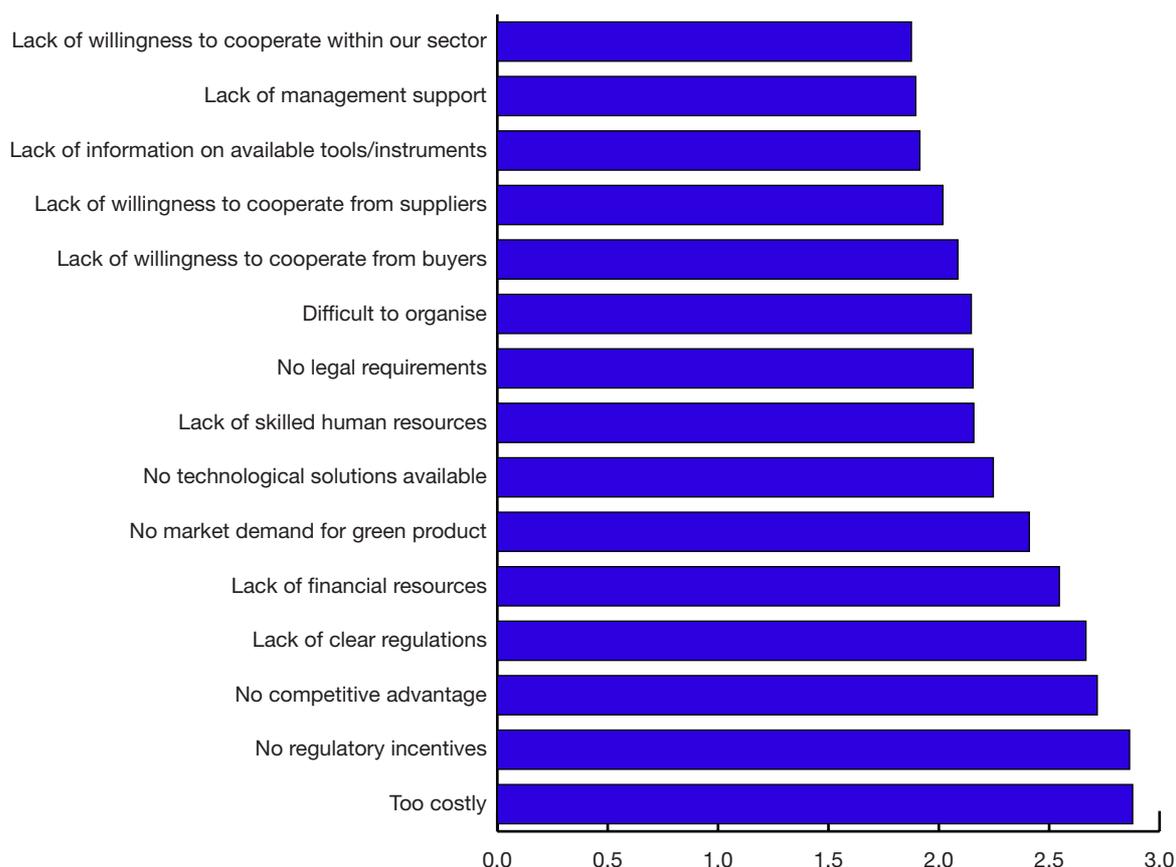


Figure 7
Obstacles to environmental activities among German firms

4.2 United Kingdom

4.2.1 Stakeholder influences

The main influencing groups with regard to environmental protection are summarised in Figure 8. The most important stakeholder influences in the UK were managers inside the company (mean 2.98), who presumably represent a synthesis of different pressures. These were followed by company managements (mean 2.98), national legislators (mean 2.92), the environmental authorities (mean 2.90), European legislation (mean 2.70) and the employees (mean 2.59). Consumers were rather unimportant. In particular, one of the questions in the questionnaire was whether consumers were willing to pay a higher price for environmentally friendly products: 72% gave a negative answer.

The five main stakeholder influences are broadly similar in Germany and the UK, thus indicating a certain country homogeneity with regard to country influences. However, it is also apparent that, for all five main stakeholder groups, the mean influence is higher in Germany than the UK.

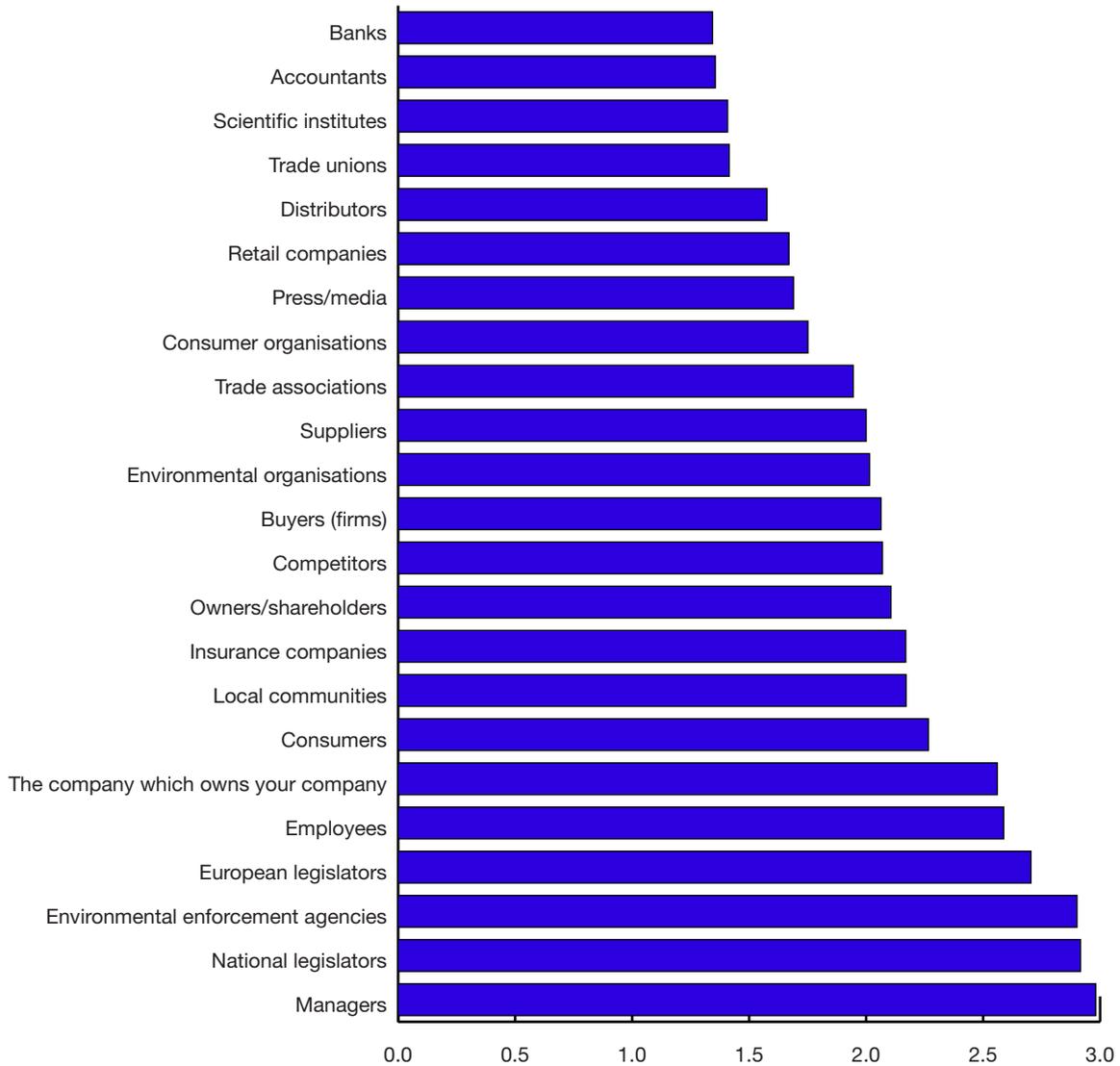


Figure 8
Influence of several stakeholders on companies in the United Kingdom (scale from 0 = no influence to 5 = very strong influence)

Equally, those organisations that are either affecting the financial performance of the organisation or are concerned with social aspects of an organisation or with the organisation generally – banks, accountants, social research organisations and trade unions, are at the bottom of the list of environmentally demanding or relevant stakeholders. This suggests that the link between environmental and social performance – two of the triple bottom lines – are not very clearly linked together.

4.2.2 Environmental protection and environmental management measures

The main environmental protection activities adopted by the firms are the reduction of levels of consumption of non-renewable materials and of water, the reduction of

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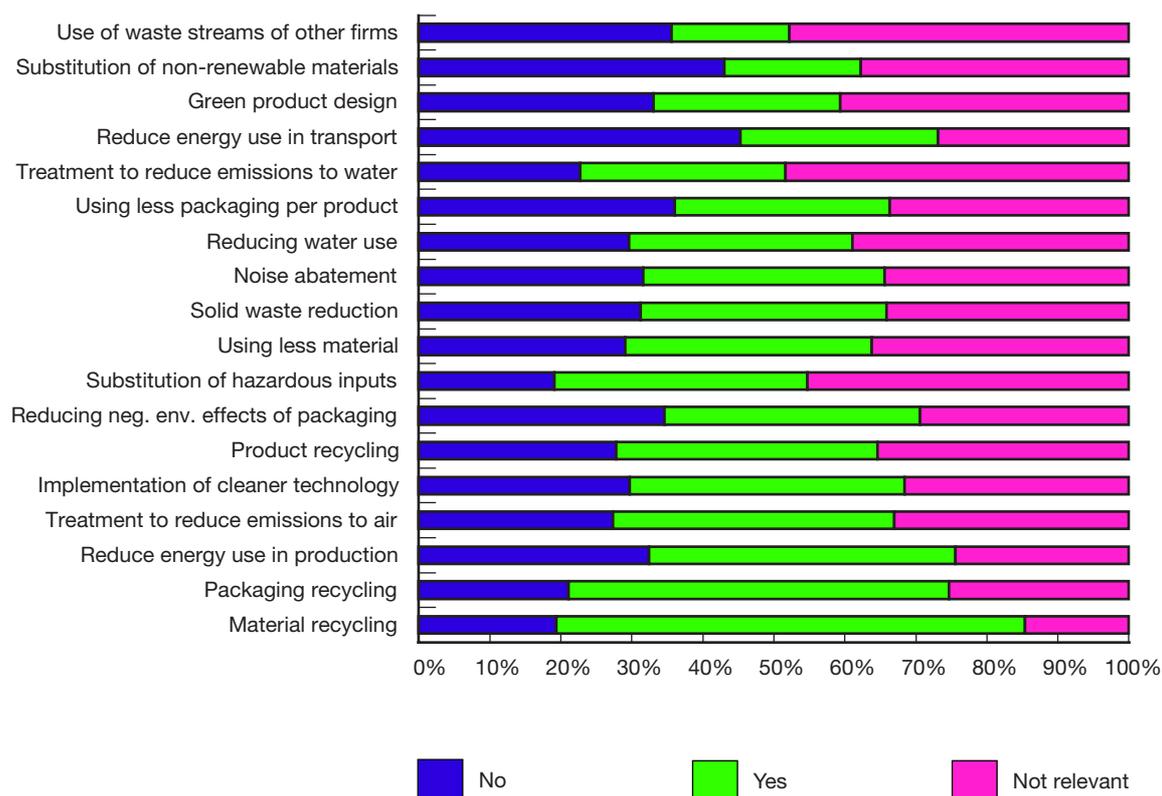


Figure 9
Operational environmental protection activities among UK firms

emissions to water and to air, and the abatement of noise. Interestingly, if these environmental effects were arranged according to their cost relevance and measure complexity, an almost identical sequence would come out. The specific operational environmental measures initiated in the last 3 years are summarised, together with their frequency, in Figure 9.

The three main measures refer to the recycling of materials and to energy-saving measures, followed by process innovations in the production process. Measures which hardly promise any profits or which are based on a different firm or market model, such as industrial ecology, product design or avoidance of material consumption, are in little demand, as can also be inferred from Figure 9.

Nevertheless it is clear from the survey that single operational measures are often adapted within an environmental management framework: although 37% of the firms which gave a response reported to have no formal EMS, 27% do have one, 22% are in process of developing one and 14% are considering the implementation of one. Interestingly, two-thirds of the firms had a quality management system.

The firms which had no management system were mainly small companies. According to Table 7, only 2 firms (28%) have so far registered their EMS, all but two of them with ISO 14001. Of the remaining firms, 23 (20%) were in the process of registration and 16% were considering registration. These findings are consistent with overall figures on EMS registration for the UK.

Table 7
Companies with an EMS and a registered EMS

		Frequency	Percent	Valid percent	Cumulative percent
EMS?					
Valid	No	161	41.8	42.3	42.3
	Consider	37	9.6	9.7	52.0
	Progress	68	17.7	17.8	69.8
	Yes	115	29.9	30.2	100.0
	Total	381	99.0	100.0	
Missing	99.00	2	0.5		
	System	2	0.5		
	Total	4	1.0		
Total		385	100.0		
EMS registered?					
Valid	No	44	11.4	23.9	23.9
	Consider	31	8.1	16.8	40.8
	Progress	26	6.8	14.1	54.9
	Yes	83	21.6	45.1	100.0
	Total	184	47.8	100.0	
Missing	99.00	99	25.7		
	System	102	26.5		
	Total	201	52.2		
Total		385	100.0		

Regarding specific environmental management activities adopted by firms, the most common action was to put in place a system to ensure compliance with all legal requirements, followed by the development of an environmental policy and carrying out an initial environmental review/audit (see Figure 10).

A surprising result is the frequent inclusion of the suppliers (although direct requirements for suppliers are in little demand) and allocation of environmentally related responsibilities to staff inside the firm. These most frequent measures also reflect that the environmental planning processes inside the firm are very much guided by and thus in accordance with ISO 14001. There is little communication outside the firm about environmental protection activities undertaken: more than two-thirds of the firms which gave a response have no environmental reports, while product life-cycle assessment is the least frequently reported environmental management activity adopted by firms. Figure 10 summarises these results.

4.2.3 Obstacles for environmental activities

The impediments to more comprehensive environmental protection were also relatively clear in the UK. The main obstacles were of an economic nature – excessive costs of

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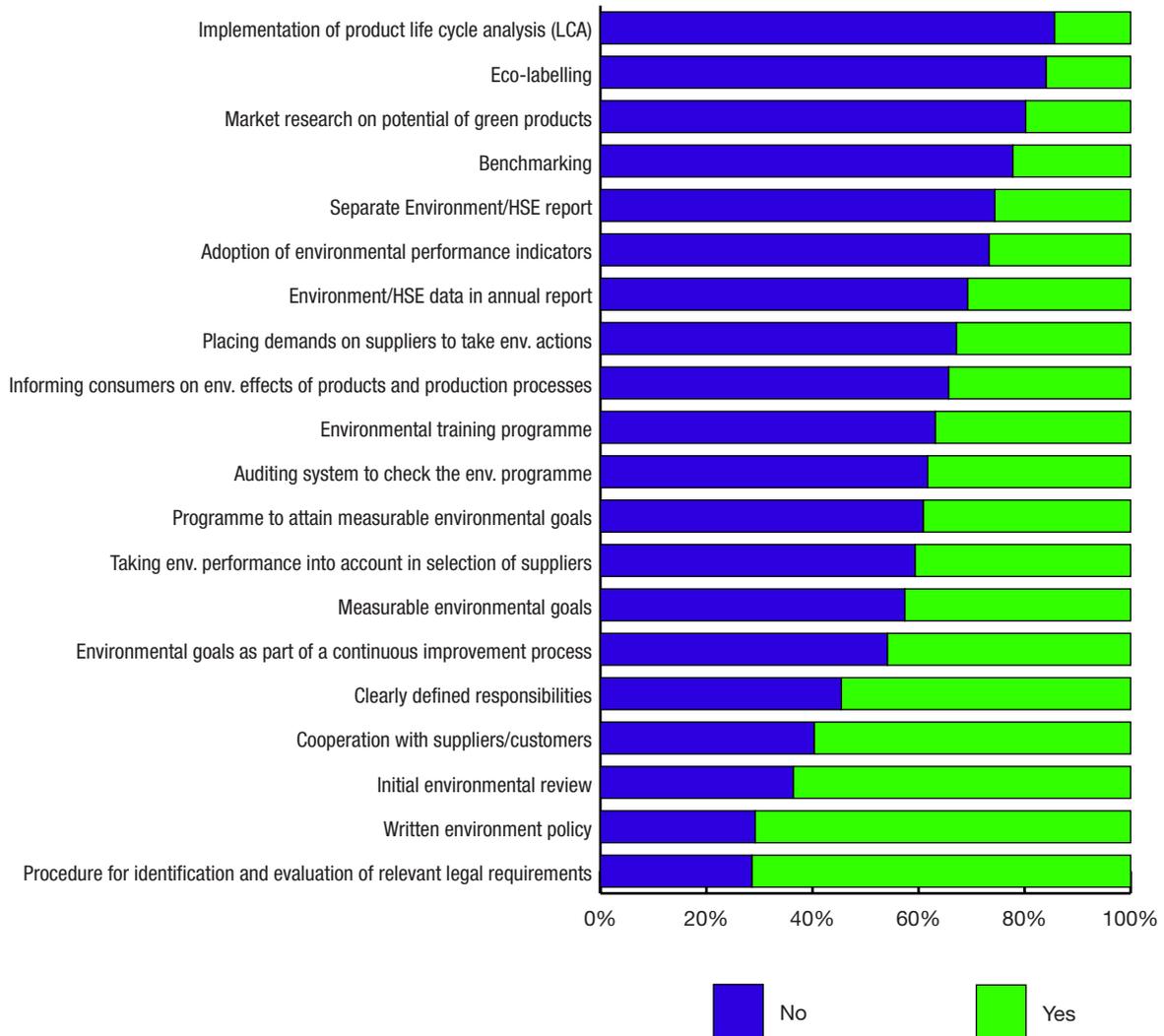


Figure 10
Environmental management activities in UK firms

environmental activities, lack of market pressure, and lack of financial means for environmental activities. This shows that environmental protection is still implicitly considered to be a target subordinate to making profits – environmental measures which are not profitable are normally not implemented. Figure 11 summarises the relevance of a number of potential obstacles for environmental management activities in UK firms.

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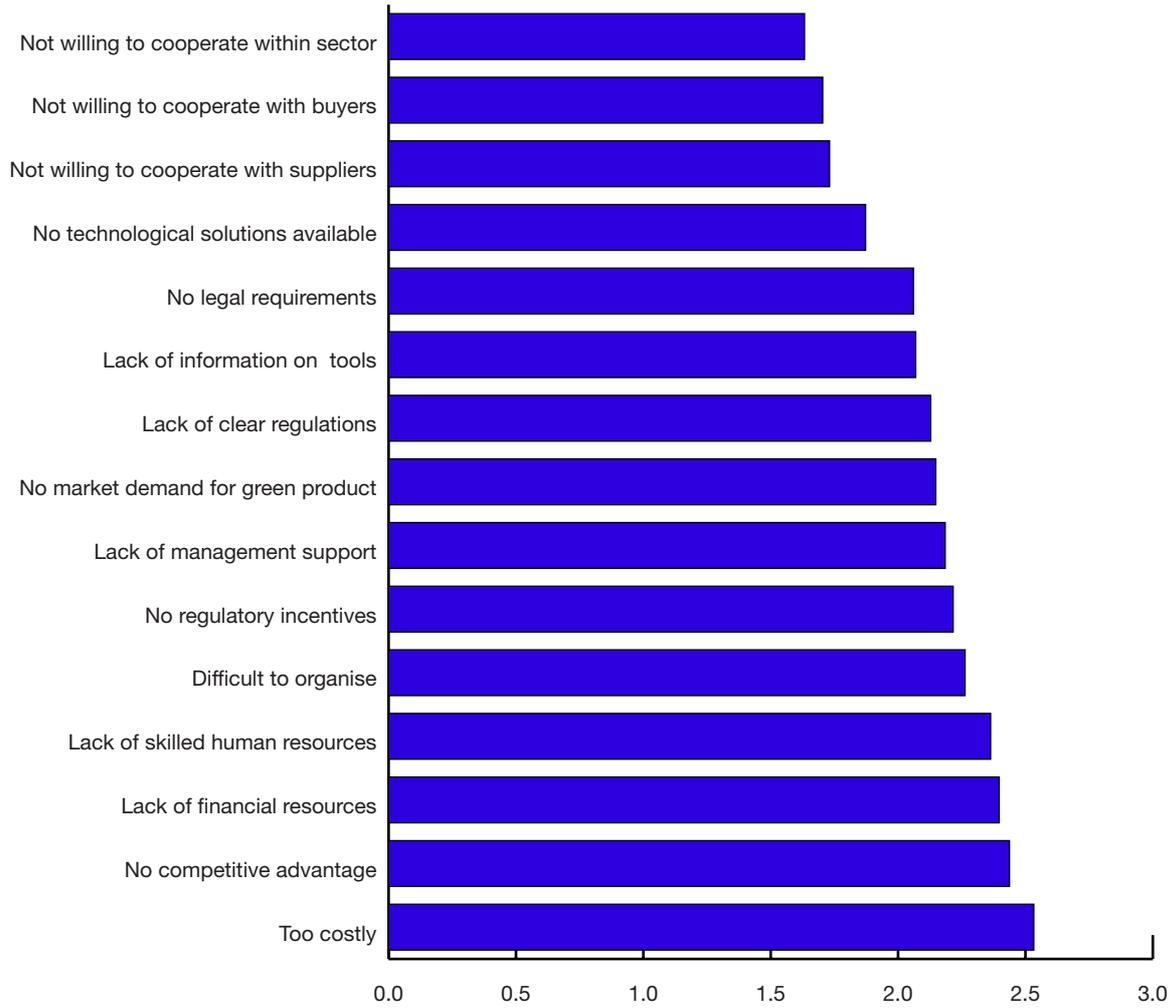


Figure 11
Obstacles for environmental activities among UK firms

5 Multivariate analysis of corporate environmental strategies

5.1 Environmental shareholder value and operational environmental strategies

In the following, the results of a classification of firms on the basis of CES typologies are presented. This is based on the concept of environmental shareholder value (Schaltegger and Figge 1998, 1999) and the classification of environmental strategies developed by Kirchgeorg (1990). With regard to the former, a factor analysis condensed the ESV strategic catalogue into three underlying factors.

The first factor can be interpreted as *better processes and production optimisation* by means of environmental management. This mainly refers to cost reductions, better control of capital-intensive investments and extension of product and process lifetimes. This factor is characterised by high agreement with the following items:

- Environmental management helps our company to better predict its future investments.
- Environmental management helps our company to better predict its costs.
- Environmental management helps our company to extend the operational life of our production equipment.
- Through its environmental management our company can defer investments to a later point in time.
- Environmental management in our company helps us to utilise better existing equipment.
- Environmental management helps our company to extend the operational life of our products.
- Environmental management helps us to have lower costs for our processes.
- Environmental management in our company leads to lower capital investments for our current processes.

The second factor describes a company's *product market and market position improvement* by means of environmental management. It is characterised by high agreement of the responding firms to the following statements:

- Eco-products or eco-marketing help us to charge above-average market prices for possible future products.
- Through eco-products or eco-marketing we can achieve above-average market prices for our current products.
- Eco-products or eco-marketing help us to sell more of our current products.

Table 8
Variance explained by factors in environmental shareholder value factor analysis

Component	Initial eigenvalues			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	6.153	47.334	47.334	4.300	33.074	33.074
2	1.424	10.956	58.290	3.094	23.803	56.877
3	1.118	8.601	66.891	1.302	10.014	66.891
4	0.695	5.350	72.241			
5	0.571	4.393	76.633			
6	0.503	3.870	80.504			
7	0.486	3.740	84.243			
8	0.462	3.553	87.796			
9	0.425	3.273	91.069			
10	0.347	2.670	93.740			
11	0.328	2.523	96.263			
12	0.281	2.162	98.425			
13	0.205	1.575	100.000			

Extraction method: principal component analysis.

- Environmental management in our company helps us to create a competitive advantage that is difficult to imitate.

The third factor consists of only one item, which refers to variable costs. This factor has therefore been termed *variable costs*:

- Through environmental management the proportion of variable costs in our company is higher.

Table 8 provides information about the variance explained by each factor. The variance explained indicates how much of the variability encountered in the total of the initial variables is explained by each factor (Backhaus *et al.* 2000, p. 308). For example, the factor 'market position improvement' (the second factor) explains about 11% of the total variation in the data. Overall, 66.9% of the total variation encountered in the data is explained by the three factors extracted. The selection of factors was found to be robust with respect to the treatment of missing values.

Table 9 reproduces the rotated component matrix of the factor analysis, providing information about the factor loadings (i.e. relative importance) of each item on the different factors.

Likewise, Kirchgeorg (1990, pp. 137ff.) has developed a classification of environmental strategies, for which he has proposed a number of possible behaviours of companies towards environmental policy. The resulting environmental strategies are to be

Table 9
Results for environmental shareholder value factor analysis

Rotated component matrix^a

	Component		
	1	2	3
Environmental management helps our company to better predict its future	0.798	0.147	0.105
Environmental management helps our company to better predict its costs	0.748	0.256	-0.081
Environmental management helps our company to extend production	0.726	0.096	0.346
Through its environmental management our company can defer point in time	0.663	0.107	0.436
Environmental management in our company helps us to utilise equipment	0.655	0.369	0.127
Environmental management helps our company to extend products	0.647	0.376	0.302
Environmental management helps us to have lower costs for our processes	0.645	0.249	-0.447
Environmental management in our company leads to lower capital current processes	0.635	0.393	7.E-02
Eco-products or eco-marketing help us to charge above-average possible future projects	0.120	0.897	0.109
Through eco-products or eco-marketing we can achieve above-average market prices for our current products	0.192	0.882	0.107
Eco-products or eco-marketing help us to sell more of our current products	0.372	0.770	6.E-02
Environmental management in our company helps us to create a competitive advantage that is difficult to initiate	0.504	0.538	-0.044
Through environmental management the proportion of variable costs in our company is higher	0.162	0.163	0.796

Extraction method: principal component analysis

Rotation method: varimax with Kaiser normalization

^aRotation converged in 7 iterations

interpreted as ecological base strategies, i.e. they reflect the fundamental and long-term environmental orientation of a firm. Overall, three factors were identified:

1. Proactive strategy aimed at exceeding compliance, represented by the following statements: try to be ahead of environmental demands; increased investment in environmental measures to exceed legislative demands; and immediate adaptation to new environmental legislation.
2. Market-oriented strategy with adaptive component, represented by the following statements: consider environmentally conscious consumers; open up new markets with eco-products; and orientation towards competitors' actions.
3. Combined resistance and withdrawal strategy, represented by the following statements: withdrawal from affected business areas; relocation of production to foreign sites; and resistance to environmental demands.

Table 10 reproduces the rotated component matrix of the factor analysis, providing information about the factor loadings of each item on the different factors.

Table 10
Results for environmental strategies factors, based on Kirchgeorg (1990)

Rotated component matrix^a

	Component		
	1	2	3
Try to be ahead of environmental demands	0.859	0.125	5.664E-02
Increased investment in environmental measures to exceed legislative demands	0.841	-7.83E-03	6.824E-02
Immediate adaptation to new environmental legislation	0.718	0.170	7.196E-03
Wait until government regulation has become concrete	-0.182	0.723	8.983E-02
Consider environmentally conscious consumers	0.457	0.671	5.504E-02
Open up new markets with eco-products	0.461	0.554	-4.00E-02
Orientation to competitors	0.323	0.533	0.227
Withdrawal from affected business areas	0.136	0.185	0.728
Relocation of production to foreign sites	4.710E-02	-0.175	0.720
Resistance to environmental demands	-8.99E-02	0.298	0.713

Extraction method: principal component analysis

Rotation method: varimax with Kaiser normalization

^aRotation converged in 5 iterations

5.1.1 Statistical significance of the influence of explanatory variables

The influence of explanatory variables on the different factors representing empirically derived CES typologies will in the following be initially analysed based on graphs with 95% confidence interval for the six strategy factors identified across different explanatory variables. In other words, having grouped the various strategic environmental routines into six broad groups, this section assesses to what extent the groups are used in companies from different countries, sectors, sizes or firm success.

This identifies significant relationships of different environmental management approaches and corporate environmental strategies with the explanatory factors firm size, country location and sector membership (initially in the broad categories of service vs. manufacturing sector). From this, the influence of internal and external factors on corporate environmental strategies can be inferred.

It should be noted that at this stage, no differentiation will be made between the ESV and the Kirchgeorg factors. They will be used in conjunction to explain the empirically identified strategies.

5.1.1.1 Country location and strategic orientation

The first aspect of interest is whether there is a link between country location and strategic orientation or environmental management approach (i.e. whether firms in Germany are more likely to adopt a proactive CES than firms in the UK). The analysis of

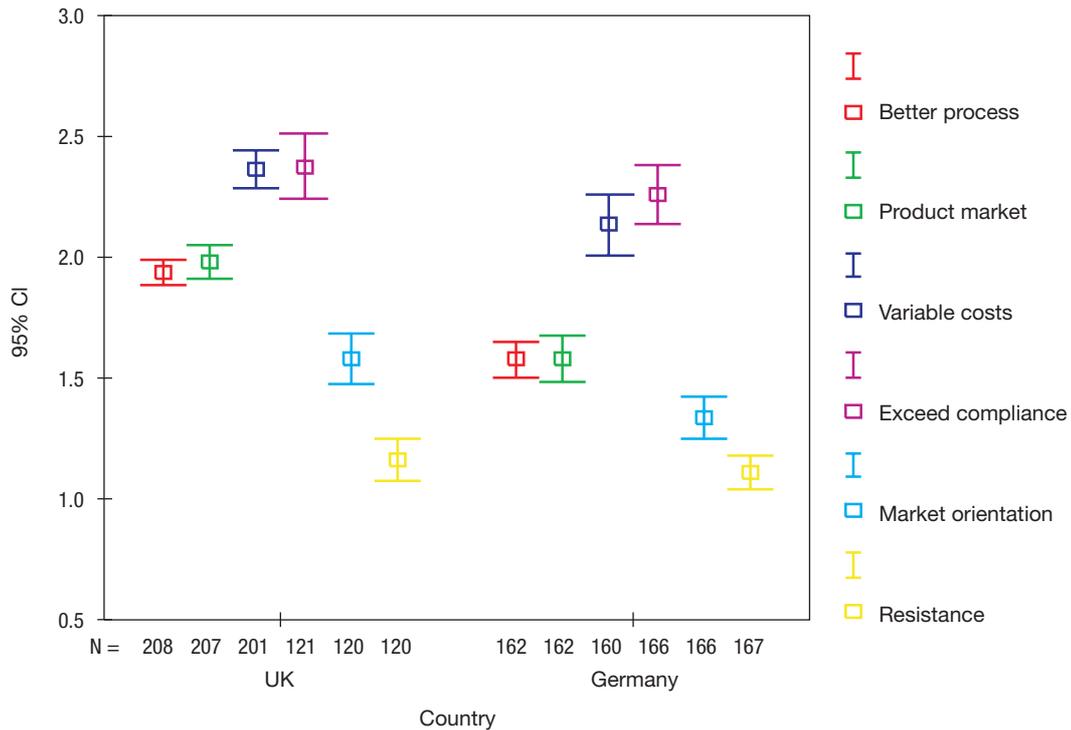


Figure 12
Influence of country location

Figure 12 reveals significant differences between the UK and Germany for the four factors 'better process', 'product market', 'variable costs' and 'market orientation'. There is no difference for the factors 'exceed compliance' and 'resistance'.

For the four factors, UK firms have significantly higher values than German firms. This graphical result is also confirmed by the analysis of variance (ANOVA) reported in Table 11.

When the service sector is excluded from the UK sample, there is also a significant difference between the factors 'exceed compliance' and 'resistance'. This is an unusual finding as one could expect that at least in one strategic factor German firms would score higher than UK firms. There are a number of explanations for this, such as a different strategy mix applying to German or UK companies, or procedural issues with the completion of the questionnaire such as UK companies expressing their preferences more strongly in the survey than German firms, or the fact that the German dataset was produced with follow-up phone calls, thus potentially inviting more undecided and less specified firm strategies into the sample.

However, the most plausible explanation for this is that the mix of environmental routines that comprise the strategy factors has in Germany simply a broader spread than in the UK, and that other factors that have not been covered in the strategic routines – or even in the survey – account for the differences. Such factors may include the ethical or normative

Table 11
ANOVA for analysis of significant sector differences between countries

		Sum of squares	df	Mean square	F	Sig.
Better process	Between groups	11.857	1	11.857	62.826	0.000
	Within groups	69.449	368	0.189		
	Total	81.306	369			
Product market	Between groups	14.457	1	14.457	45.172	0.000
	Within groups	117.456	367	0.320		
	Total	131.913	368			
Variable costs	Between groups	4.710	1	4.710	10.014	0.002
	Within groups	168.856	359	0.470		
	Total	173.566	360			
Exceed compliance	Between groups	0.956	1	0.956	1.639	0.202
	Within groups	166.187	285	0.583		
	Total	167.143	286			
Market orientation	Between groups	4.026	1	4.026	12.649	0.000
	Within groups	90.388	284	0.318		
	Total	94.414	285			
Resistance	Between groups	0.195	1	0.195	0.870	0.352
	Within groups	63.829	285	0.224		
	Total	64.024	286			

basis, so that, for example, German companies may adopt strategies that are not based on economic or business strategy considerations, but may be based on the argument that environmental management is 'the right thing to do'. Gordon's (1994) findings suggest that this may be a reason when he argues that German industry seems to look more deeply at the underlying dimensions of sustainable development.

Equally, other studies of the strategic modes of companies in the two countries suggest that German firms show a stronger role for technology in their strategic choices, which has implications for the environmental strategies as well. Earlier findings from Stewart *et al.* (1994) would support such an explanation. However, no evidence could be found that conclusively proves or disproves these explanations.

5.1.1.2 *Industry sector*

Next to country influences as an explanatory factor for differences in firms' environmental strategies, there is also the question whether there is a link between sector membership and the strategic orientation or environmental management approach of firms – for example, whether firms in specific industry sectors, such as the chemicals industry with its long history of environmental awareness, are significantly more likely to adopt a proactive CES.

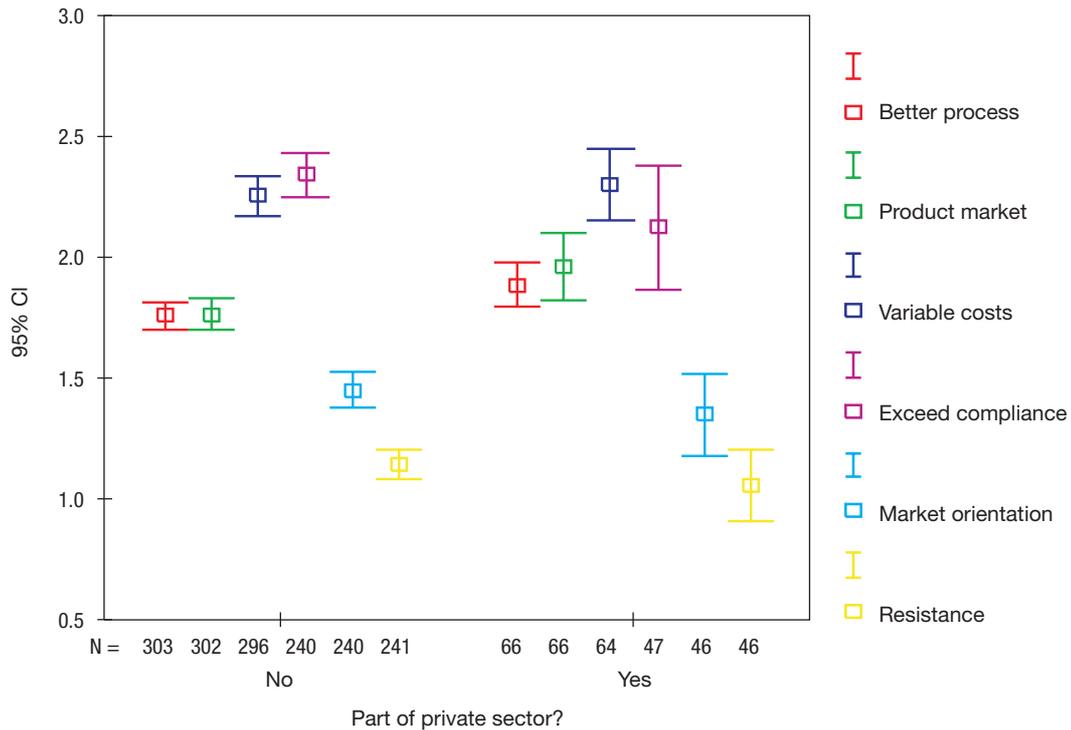


Figure 13
Influence of sector

There is a strong possibility that this is the case between different sectors of the manufacturing industry. However, given that, in the German sample for instance, there are 13 identifiable sectors with a maximum of 20 companies only, a numerical analysis was not made on grounds of the small sample size within the sector.

Instead, a comparison was made between all manufacturing sector companies and the UK service sector companies which were included in the sampling process on grounds that if there was a sector-specific influence, this would be the most obvious case. However, as can be seen from Figure 13, there seems to be no significant difference for four of the CES factors identified between the service and manufacturing sectors. The exceptions are 'better process' and 'product market' orientation of Schaltegger's ESV grouping. These two factors are more significant in the service sector. If the German companies are excluded, no statistical significance could be identified, suggesting that the above differences are a reflection of location, not sector. The graphical findings are supported by the ANOVA reported in Table 12.

5.1.1.3 Firm size

A third important explanatory factor is firm size. The question here is whether there are significant differences in strategic orientation or environmental management approach for different firm sizes. For example, do larger firms adopt proactive CESs significantly more often, or are larger companies geared more to certain strategies? As can be seen

Table 12
ANOVA for analysis of significant strategy differences between sectors

		Sum of squares	df	Mean square	F	Sig.
Better process	Between groups	0.895	1	0.895	4.088	0.044
	Within groups	80.308	367	0.219		
	Total	81.202	368			
Product market	Between groups	2.159	1	2.159	6.098	0.014
	Within groups	129.611	366	0.354		
	Total	131.770	367			
Variable costs	Between groups	0.105	1	0.105	0.218	0.641
	Within groups	173.010	358	0.483		
	Total	173.115	359			
Exceed compliance	Between groups	1.870	1	1.870	3.225	0.074
	Within groups	165.272	285	0.580		
	Total	167.143	286			
Market orientation	Between groups	0.397	1	0.397	1.200	0.274
	Within groups	94.017	284	0.331		
	Total	94.414	285			
Resistance	Between groups	0.283	1	0.283	1.265	0.262
	Within groups	63.741	285	0.224		
	Total	64.024	286			

from Figure 14, for the factor 'exceed compliance', the group of the largest firms (500+ employees) has significantly higher values than the group of smallest firms (10–99 employees). Similarly, for the factor 'better process', the largest group of firms also has significantly higher values than the two groups of smallest firms (10–99 and 100–249 employees). When the service sector is excluded from the UK sample, the results remain the same.

What this means is that, firstly, larger firms more often pursue a 'compliance plus' strategy, and secondly, larger firms are able more often to create positive synergies of their environmental management activities with production in terms of, for example, reducing and better predicting costs and investments. This seems to be very much in line with theoretical reasoning on the differences in environmental management between large and small firms – see Bradford (2000) or Henriques and Sadorsky (1996). However, Berkhout *et al.* (2001) and Tyteca *et al.* (2002) do not find significant firm size influences when using direct assessment methods for environmental management and environmental performance. Combining their results with those here suggests that larger firms are more likely to have a process- and EMS-oriented view of environmental management, whereas smaller firms are more likely to focus on operational improvements. The graphical findings are supported by the ANOVA reported in Table 13.

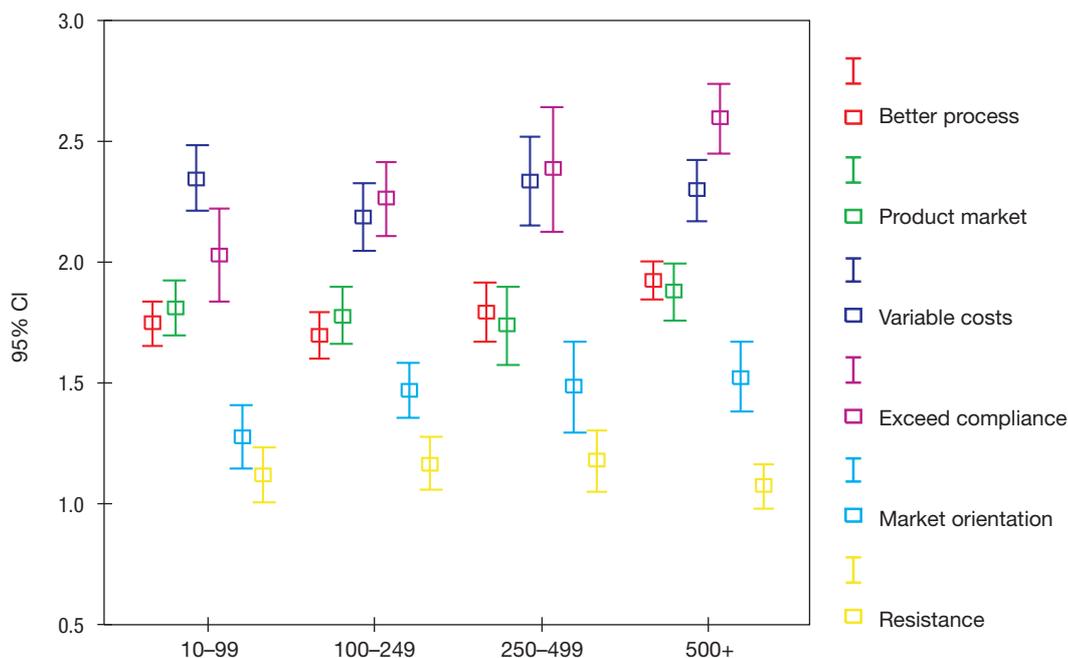


Figure 14
Influence of firm size

Table 13
ANOVA for analysis of significant strategy differences between firm sizes

		Sum of squares	df	Mean square	F	Sig.
Better process	Between groups	3.088	3	1.029	4.878	0.002
	Within groups	76.178	361	0.211		
	Total	79.265	364			
Product market	Between groups	0.863	3	0.288	0.805	0.492
	Within groups	128.621	360	0.357		
	Total	129.484	363			
Variable costs	Between groups	1.552	3	0.517	1.104	0.348
	Within groups	165.498	353	0.469		
	Total	167.050	356			
Exceed compliance	Between groups	11.338	3	3.779	6.793	0.000
	Within groups	153.562	276	0.556		
	Total	164.900	279			
Market orientation	Between groups	2.437	3	0.812	2.473	0.062
	Within groups	90.329	275	0.328		
	Total	92.766	278			
Resistance	Between groups	0.459	3	0.153	0.675	0.568
	Within groups	62.564	276	0.227		
	Total	63.023	279			

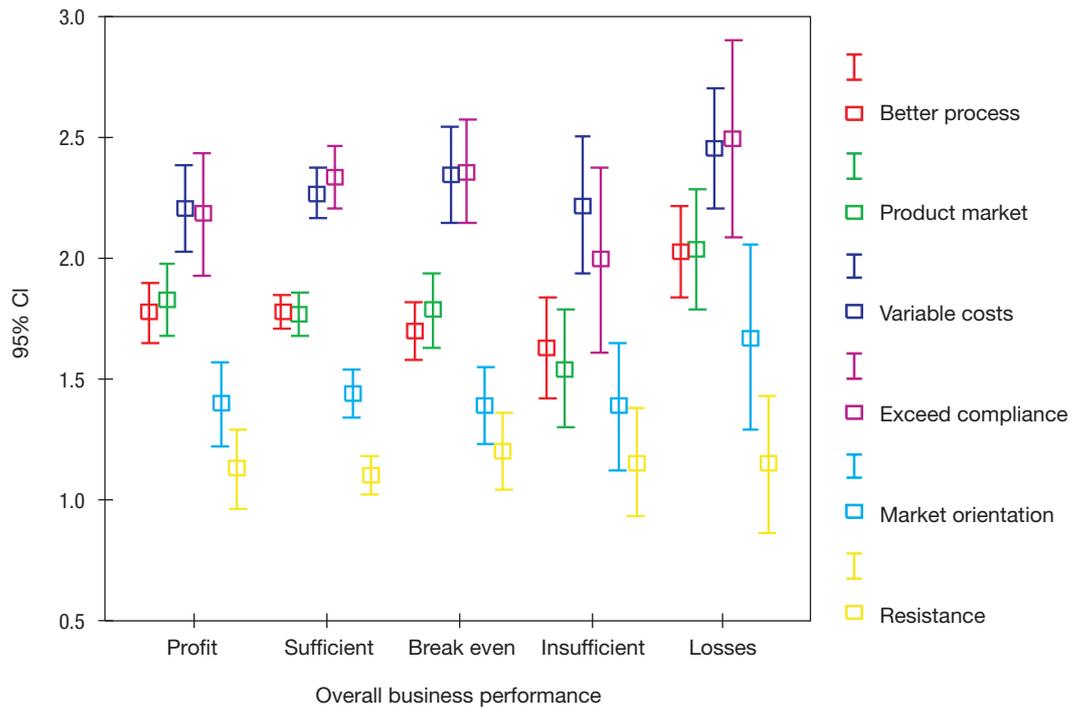


Figure 15
Influence of overall business performance

5.1.1.4 Business performance

Finally, it is interesting to analyse possible differences in strategy orientation depending on the overall business performance of firms (as measured by their profitability). This is quite a contested field as strategies that empirically support better environmental management and better business performance are very much in demand. As can be seen from Figure 15, a significant difference is found for the factor ‘better process’ between those firms that are performing poorly (‘insufficient to cover costs’) and firms performing very (unsustainably) poorly (‘so low as to produce large losses’). Also, a significant difference is found for the factor ‘product market’ between the same kind of firms. In both cases factors are significantly higher for really bad performers. No other significant differences were identified for any other factor for the different categories of overall business performance. When the service sector is excluded from the UK sample, there is no significant difference between any of the factors. The graphical findings are supported by the ANOVA reported in Table 14.

Table 14
ANOVA for significant strategy differences by business performance

		Sum of squares	df	Mean square	F	Sig.
Better process	Between groups	2.621	5	0.524	2.390	0.038
	Within groups	73.052	333	0.219		
	Total	75.674	338			
Product market	Between groups	4.605	5	0.921	2.639	0.023
	Within groups	115.879	332	0.349		
	Total	120.485	337			
Variable costs	Between groups	1.419	5	0.284	0.602	0.698
	Within groups	154.539	328	0.471		
	Total	155.958	333			
Exceed compliance	Between groups	3.725	5	0.745	1.299	0.265
	Within groups	144.480	252	0.573		
	Total	148.205	257			
Market orientation	Between groups	1.126	5	0.225	0.676	0.642
	Within groups	83.600	251	0.333		
	Total	84.726	256			
Resistance	Between groups	0.434	5	0.087	0.365	0.872
	Within groups	59.601	251	0.237		
	Total	60.035	256			

6 Conclusions

The research reported here has been concerned with answering the following research questions:

1. What are the observable environmental routines (operationalised by means of firms' operational and managerial environmental activities) of companies in both countries?
2. Do these routines form consistent strategy patterns, and can these be classified using existing typologies, such as Kirchgeorg (1990) or Schaltegger and Figge (1998)?
3. Is the adoption of environmental strategies and the degree to which these are developed predominantly a result of a uniquely national context or part of the sectoral context?
4. To what extent is there a unique development path for environmental strategies (i.e. a development path which is independent of sectoral and national influences)?

Stakeholder pressures, as the trigger factor for the adoption of environmental routines were found to be very similar in the UK and Germany. In both countries, national legislation, the company's management and environmental authorities/agencies were the three stakeholder groups found to make the greatest demands with regard to the environment. These were followed (in both countries) by European legislation (which often translates into new national legislation) and employees' demands. Trade unions, banks, accountants, retail companies and, curiously, consumer organisations emerged from the survey as the least important stakeholders.

The findings in Section 5 also reveal relatively large similarities between Germany and the UK with regard to observable environmental routines, the major stakeholders influencing adoption of such routines and obstacles to the adoption of routines. Table 15 summarises the operational and managerial routines most and least often adopted in the two countries. The most often and least often adopted management routines are also very similar. Since major stakeholder pressures are related to legislation, it is not surprising to find as the most often adopted operational routines those which are directly linked to environmental regulations. From the least often adopted routines it is also clear that novel paradigms such as industrial ecology have not yet been implemented much on an operational level.

With regard to the obstacles to adopting environmental activities, the costs of such activities were seen as too high and were identified in both countries as the most important obstacle. This is followed in Germany by the lack of legal incentives (particularly deregulation), whereas in the UK the second strongest obstacle is the lack of market pressures. The third most important obstacle in Germany is the lack of competitive advantage from adopting environmental routines, whereas in the UK it was the unavailability of financial resources for environmental activities within the firm.

Overall the findings with regard to environmental routines indicate that although there is considerable homogeneity with regard to stakeholder pressures and routines adopted,

Table 15
Most and least often adopted environmental routines in the UK and Germany

	Germany	UK
<i>Most often adopted operational routines</i>	<ul style="list-style-type: none"> • Packaging recycling • Material recycling • Reduction of energy use in production 	<ul style="list-style-type: none"> • Material recycling • Packaging recycling • Reduction of energy use in production
<i>Least often adopted operational routines</i>	<ul style="list-style-type: none"> • Use of waste streams of other companies • Substitution of non-renewable materials • Reduction of surface water pollution 	<ul style="list-style-type: none"> • Use of waste streams of other firms • Substitution of non-renewable materials • Green product design
<i>Most often adopted management routines</i>	<ul style="list-style-type: none"> • Clearly defined responsibilities • Initial environmental review • Procedures for ensuring full legal compliance 	<ul style="list-style-type: none"> • Procedures ensuring full legal compliance • Written environmental policy • Initial environmental review
<i>Least often adopted management routines</i>	<ul style="list-style-type: none"> • Market research on potential of green products • Implementing product life-cycle analysis • Benchmarking 	<ul style="list-style-type: none"> • Implementing product life-cycle analysis • Eco-labelling • Market research on the potential of green products

there is much less similarity for the obstacles to adopting environmental routines. This makes it possible that – if they can be identified – corporate environmental strategies can still differ between countries, as in fact they were found to do.

By way of a more general conclusion, we suggest therefore that outside factors, such as stakeholder pressures, are surprisingly homogeneous and similar between the two countries, and across manufacturing and service sector as well as across firm size. However, the way organisations in both countries address these pressures through initial and gradually more systematic environmental routines that can be aggregated to empirically identified environmental strategies is, in contrast, quite different between the two countries. To put it bluntly, *that* companies face pressures to continuously improve their environmental performance is externally defined, *how* they decide to do it depends on factors and circumstances internal to the organisation. This suggests that the environmental agenda is global; innovative ways to address it can show large national variations. Therefore, it is suggested to the academic and business community that national differences should be taken into account when defining and identifying corporate environmental strategies.

Firms' approaches to environmental management were classified using the concept of 'environmental shareholder value' and the strategic options developed by Kirchgeorg (1990) as the basis for deriving types of corporate environmental strategies. The results reported in the second half of Section 6 indicate substantial differences in CES approaches between country, sector, and firm size. These differences are summarised below.

The factor 'better process' is more significant in UK firms than in German firms, more significant in the service sector than in the manufacturing sector, more significant in UK manufacturing sector than in German manufacturing sector, less significant in companies with 10–249 employees than in those with 500+ employees, and less significant for bad profitability performers (insufficient to cover costs) than for those really bad performers (so low as to produce large losses).

The factor 'product market' is more significant in UK firms than in German firms, more significant in the service sector than in the manufacturing sector, more significant in UK manufacturing sector than in German manufacturing sector and less significant for bad profitability performers (insufficient to cover costs) than for those really bad performers (so low as to produce large losses).

The factors 'variable costs' and 'market orientation' are more significant in UK firms than in German firms, and more significant in UK manufacturing sector than in German manufacturing sector. The factor 'exceed compliance' is more significant in UK firms than in German firms, more significant in UK manufacturing sector than in German manufacturing sector, and less significant in companies with 10–99 employees than in those with 500+ employees. The factor 'resistance' is more significant in UK manufacturing sector than in German manufacturing sector.

Differences in CES approaches are only found to a small degree with regard to profitability, however. Table 16 summarises these findings. According to Table 16 a considerable influence exists for the variable 'country location', however for the remaining variables ('sector membership', 'firm size' and 'profitability'), there seems to be no significant influence for most of the factors. The exceptions are 'better processes' and 'product market' where significant influence appears to be concentrated. Regarding firm size, differences were found only for a smaller number of corporate environmental strategy types ('better processes' and 'exceed compliance'), and these were differences between the largest and the two smallest groups of firms. This supports the view that larger firms are more proactive – or at least more systematic – in terms of the corporate environmental strategy approaches they adopt. Overall these findings provide strong evidence of national influences on the type of corporate environmental strategies firms adopt.

Table 16
Summary of findings regarding influences of explanatory variables

Explanatory variable	Country location	Sector membership (manufacturing/services)	Firm size	Profitability
Better process (ESV1)	×	×	×	×
Product market (ESV2)	×	×		×
Variable costs (ESV3)	×			
Exceed compliance (K1)			×	
Market orientation (K2)	×			
Resistance (K3)				

×: a significant influence exists (UK sample includes service sector).

Table 16 also suggests that in a comparison between the environmental shareholder value categories as defined by Schaltegger, and those of Kirchgeorg (1990), the empirical strategic modes based on the former allow the identification of more significant differences than using Kirchgeorg as a basis. It seems idiosyncratic that both (German) classification schemes are the basis of strategic modes which show UK firms to be scoring higher than German firms on adherence to the strategies. It nonetheless shows not only the dependence of empirical results on the initial assumptions, here the strategic dimensions as given by both authors, but also that Kirchgeorg's classification scheme yields less insight into the strategic modes, at least in the way we have applied both strategy models.

This does not make one model worse than the other. In a way, both have been found wanting, with regard to at least two aspects: the extent to which strategy is national (and thus dependent on societal, cultural and ethical norms) and the extent to which technology drives environmental management in the firm.

Given, however, that at the operational level there is quite strong homogeneity between the two countries, it seems that the difference is mainly in the degree to which different environmental activities are adopted, and not so much in the type of activities adopted or whether these activities are embedded in a coherent management framework. The implication of these findings is that national environmental policy-making needs to take into account sectoral differences when aiming to encourage adoption of more proactive environmental strategies in firms, whereas European environmental policy-making needs to enable countries to tailor legislation as much as possible or as necessary to their specific national context.

It can also be concluded that firm size differences seem to be of comparably lesser influence on environmental policy-making. However, the research reported here also indicates that influences of firm size may be captured differently by different measures of environmental performance. Such measures can either be effort- or outcome-based, and can also be based on self-assessment of firms (i.e. direct) or based on independent, third-party assessment (i.e. indirect). The choice of measures may influence results (see Berkhout *et al.* 2001), and consequently measures need to be chosen carefully and appropriately (Wehrmeyer 1995; Wehrmeyer and Tyteca 1998).

With regard to the possible existence of a unique development path, this seems to be quite likely for the most reactive strategy type, 'resistance and withdrawal', since no country, sector or firm size influences could be identified for this type.

Overall, the research reported here indicates that it is unlikely that corporate environmental strategies follow a unique development path, but are strongly shaped by national and sectoral contexts. Given that, so far, deductive CES typologies are not taking such contexts into account much, but claim to be universally applicable, further research seems to be necessary to establish to what degree this claim can be upheld. CES typologies need also be tested empirically in order to ascertain an appropriate match between the theory and practice of environmental management. Therefore broad surveys spanning several countries – such as those reported in Baumast (2000), Belz and Strannegard (1997) and Terrvik *et al.* (1994) – should be continued and linked more strongly with theoretical research on corporate environmental strategies.

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Questionnaires

For the German questionnaire please click [here](#).

For the UK questionnaire please click [here](#).