

# Organizational determinants for the development of environmental management in the Dutch agri-food industry

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## **Abstract**

This paper aims at investigating the organizational determinants for the development of environmental management (EM) in the Dutch agri-food industry. For sustainability enhancement and public-private policy purposes, it is of vital importance to know how organizational opportunities and barriers relate to the development of EM. The results from a questionnaire survey, focusing on medium-sized and large sized agri-food companies, show that the development of process-oriented EM (focusing on the internal organization of environmental management) depends primarily on external demands (e.g. environmental legislative requirements). In contrast, the development of product-oriented EM (focusing on the governance of supply chain and network) seems to depend largely on various general and environmental organizational characteristics (e.g. corporate culture, influence of the environmental coordinator, internally imposed environmental requirements). Governmental interference seems to stimulate primarily process-oriented EM, whereas product-oriented EM seems largely determined by internal company characteristics.

**Keywords:** Environmental strategy, structure, culture, Dutch agri-food industry

## **1. Introduction**

In the present paper we focus on environmental management (EM) performance (Kolk & Mauser, 2002). EM has become increasingly important to companies, because both governmental and public concerns about environmental pollution have grown rapidly over the past few years (Faucheux & Nicolai, 1998). EM aims at managing organizational responses to environmental pollution activities of companies and as such it is crucial for enhancing environmental sustainability. A main distinction can be made between process- and product-oriented EM (Hagelaar & van der Vorst, 2002; Van Koppen & Hagelaar, 1998). Process-oriented EM focuses at the reduction of environmental pollution by using end-of-pipe technologies that are integrated in the production process (e.g. NO<sub>x</sub> filters) at the level of the single firm or business unit. The scope of product-oriented EM goes beyond this level, by aiming at managing and reducing environmental pollution from a supply-chain and/or network perspective. It includes collaboration between companies to reduce the environmental impact in the supply chain as a whole. Consequently, product and process-oriented EM emphasize on different environmental performance indicators: firm-oriented EM versus chain- and network oriented EM (De Bakker, Fisscher, & Brack, 2002; Rocha &

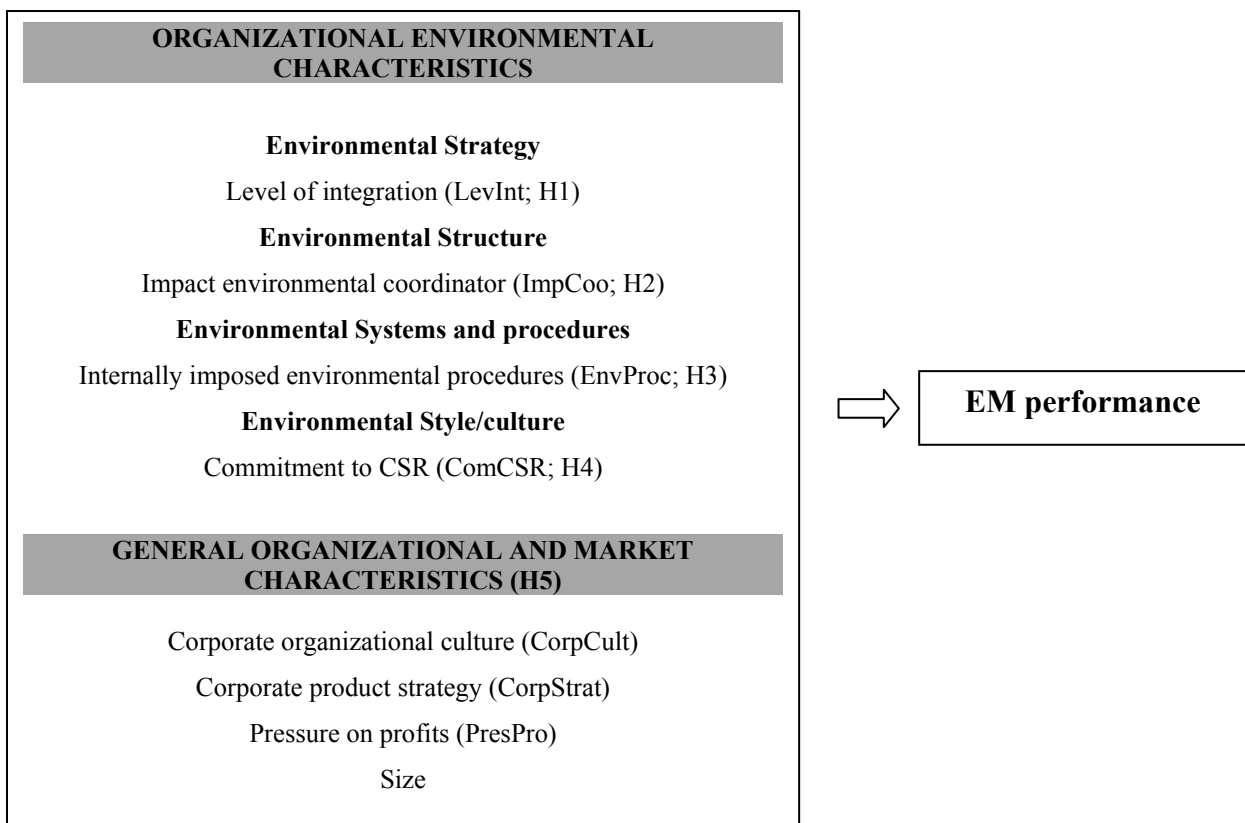
Brezet, 1999). For enhancing environmental friendly developments, it is important to get insight in the influence of organizational specifics on the development of both process and product-oriented EM. Better insight can lead to improved management as well as increased effectiveness of governmental policy. In general, there is a body of knowledge available to categorize EM-system development in a generic way, but little is known about the specifics of organizational EM development. *The aim of this paper is to gain insight into those organizational characteristics of companies, which act as determinants for the development of the EM on both the process-oriented and the product-oriented level.*

The present paper concentrates on the medium (50-250 employees) and large sized (>250 employees) companies in the Dutch agri-food industry. This industry contributes significantly to the total environmental pollution caused by the Dutch industry. For instance, it produced on average 50% of the total waste water, 75% of the air emissions by coolant liquids and it accounted for 10% of the total energy usage over the past few years (Dutilh & Blijswijk, 2004). Despite the severe impact, only limited information is available on the causes and remedies with respect to environmental disturbances in this sector (Mauser, 2001). In general, large compared to the smaller food companies have rather well-developed EM action programs. Many of them participate in EM activities together with other companies by means of voluntary agreements or covenants (Glasbergen, 1999). Examples are the packaging covenant that aims at reducing the amount of used packaging material or the energy covenant that aims at reducing the amount of energy usage. This implies that the Dutch agri-food industry offers an interesting opportunity to analyse the determinants for the development of EM (Bremmers, Omta, & Smit, 2003).

In §2 the hypotheses on the company's organizational characteristics and their association with EM are addressed. The research methodology is discussed in §3. The results are presented in §4 and they are discussed in §5. Finally, §6 provides the managerial and policy recommendations

## **2. Research model and hypotheses**

The research model is based on the McKinsey 7-S-Model (Peters & Waterman, 1982). According to this model, a set of seven organizational characteristics (all starting with an S) can be assessed to analyse an organization and its activities. These characteristics consist of three so-called hard S's and four soft ones. A distinction is made between the following three hard S's: organizational strategy, organizational structure, and implemented systems and procedures. The soft S's are less feasible than the hard ones and consequently much harder to measure. Therefore, the present research includes only one soft S from the McKinsey model, namely the management style (or culture) of the organization. So, in total four organizational characteristics from the McKinsey model are included in the present research model. All these elements are adjusted to the EM problem, because it is expected that the EM performance is dependent on organizational characteristics (Mauser, 2001). Together they represent the organizational environmental characteristics, see figure 1. For each element, a hypothesis is formulated which is discussed in the remainder of this section. The research model includes also organizational and market characteristics that are generic of a kind. These are the corporate culture, corporate product strategy, pressure on profits, and the company's size (see figure 1). Their supposed influence on the EM-level of development is discussed in the last part of this section.



*Figure 1 The research model consisting of environmental and general organizational characteristics, respectively.*

***Level of integration (LevInt; H1)***

Synergy can be found with respect to the managerial approach and/or the contents of EM and various other managerial measures. For instance, EM and employee’s health & safety management could correspond with environmental measures on safe use and storage of chemicals, or reduction of noise, dust, or smell on the plant site. Similarities between EM and food safety & quality management can be found in a shared structural managerial structuration scheme (for instance with respect to regular checks on compliance to internal safety, quality, and environmental requirements). An important suggested advantage of an integrated management approach is cost-effectiveness and improvement of coherence of managerial strategy and created structures (Karapetrovic & Willborn, 1998; Shen & Walker, 2001; Wilkinson & Dale, 1999). This will contribute to a better understanding of the company and consequently to the development of the separate management areas too. Therefore, we propose that the level of integration of EM with other management activities could be an important environmental strategy to develop the level of EM.

*H1: The higher the level of integration of EM with other (quality) management activities, the better the corporate EM performance*

### ***Impact environmental coordinator (ImpCoo; H2)***

An organizational structure refers to the division of organizational activities into distinct tasks and the linkages between these tasks (Mintzberg, 1979). Indirectly, the impact of the environmental coordinator on the corporate environmental policy is related to the environmental structure. For instance, EM tasks will only be addressed occasionally during management meetings if no one within the organization is (formally) responsible for it. EM has to compete with various other business activities (Schaltegger & Synnøstvedt, 2001). In practice, conflicts may easily occur with respect to the EM requirements and the willingness of business departments and managers to act accordingly. In many firms environmental measures that are economically profitable are implemented rather easily (e.g. on energy usage, or waste water production). In contrast, relatively high resistance will exist against environmental measures that are not or only marginally economically profitable (e.g. on noise or smell reduction). Therefore, the impact of the environmental coordinator on the corporate environmental policy seems important.

*H2: The higher the impact of the environmental coordinator on the corporate environmental policy, the better the corporate EM performance*

### ***Environmental procedures (EnvProc; H3)***

The EM performance of the companies in the Dutch agri-food industry is rather poor. Among other reasons, the development of EM is likely to be hampered by internal organizational resistance. This could be due to a lack of economical profitability of EM-activities. Companies are always characterized by more or less internal inertia (Hannan & Freeman, 1984). Developing EM means that existing management routines have to be changed to meet environmental requirements. This can easily result in high internal organizational resistance (Aldrich, 2003; Gersick & Hackman, 1990). How to overcome this? We argue that the implementation of formal and internal EM-requirements could “unfreeze” existing working routines and force people to take care of the environment.

*H3: Internally and formally imposed EM procedures stimulate EM*

### ***Commitment to CSR (ComCSR; H4)***

Culture can be defined as the shared beliefs of an organization (Mintzberg, Ahlstrand, & Lampel, 1998). Three hierarchical levels of organizational culture can be distinguished (Schein, 1985): artefacts, espoused values, and basic underlying assumptions. The artefacts represent the visible organizational structure and daily processes (e.g. dress codes, furnishings). They create the typical image or atmosphere that distinguishes one firm from another. However, they only provide a glance of the organization’s culture, because they are based on underlying espoused values that represent the company’s strategic choices and goals. Subsequently, however, the espoused values are based on the basic underlying assumptions of the company. These assumptions are fundamental for the organization’s culture. They originate largely from (passed) experiences. Cultural values that are nested in the underlying assumptions are taken for granted by the firm and as such they have a permanent character (Schein, 1985). Most of these assumptions are reflected by perceptions, thoughts and feelings of the company’s management team. We propose that EM will benefit from embeddedness in a corporate social responsibility (CSR) culture. Attention by the top management for CSR indicates a positive attitude towards EM, because it indicates a fundamental active managerial attitude on social responsiveness (Carroll, 1979; Wood, 1991).

*H4: Top management attention for corporate social responsibility (CSR) stimulates the development of EM*

**General organizational and market characteristics (H5)**

The environmental organizational characteristics are embedded in and affected by the general organizational and market characteristics. For instance, only if the corporate culture allows for the implementation of CSR-activities, a CSR-culture can develop (Sharma, 2000). Other elements that are taken into account in the research model are the pressure on profit margins and the company's size. It is likely that limited financial resources of (especially smaller) companies affect the attention that they (can) pay to EM (Del Brío & Junquera, 2003). Finally, the corporate product strategy is included. A product strategy that fits both the market demands and the company's capabilities is a main key to competitive advantage (Porter, 1980). It influences the organizational environmental characteristics, as for instance a more flexible production process is likely to allow for more (environmental) changes to the product(s) and the production process itself.

*H5: General organizational and market characteristics are important to enhance the development of EM*

**3. Research methodology**

This section pays attention to the sample population, the construction of the questionnaire and constructs (operationalization), and the method of analysis.

**Population**

The research domain consists of the food processing companies in the Dutch agri-food industry that have at least fifty employees. Based on this selection criterion, the addresses of 417 companies in total were selected and obtained from the Dutch Chambers of Commerce. Table 1 shows the distribution of the companies over the various branches. The category 'other' contains mainly processors of sugar and cacao.

*Table 1 The distribution of the companies ( $\geq 50$  employees) over the various branches of the Dutch food industry for the total ( $N=417$ ) and sample population ( $N=76$ ), respectively.*

Branches	Total (%)	Sample (%)
Meat	20.0	19.7
Fish	3.5	0.0
Vegetables and fruit	8.2	9.2
Fat & oil	4.0	2.6
Dairy	10.8	10.5
Oat	2.8	6.6
Animal concentrates	6.3	3.9
Beverage	6.3	10.5
Bakeries	25.6	28.9
Other	12.4	7.9
TOTAL	100%	100%

From the table it can be concluded that the sample population (N=76) is representative for the total population (N=417) with respect to the included branches ( $\chi > 0.05$ ). All returned and completed questionnaires could be used for analyses (response ratio equals 18.2%).

### ***Construction of the questionnaire and constructs***

In 2005, a survey questionnaire was sent to the companies in the Dutch agri-food sector. The structure of the questionnaire is based on the research model (see figure 1). Concept versions of the questionnaire were evaluated by various informants from different food companies in order to increase the validity (Fowler, 2002). Furthermore, the results of a similar study from 2002 were reviewed to design the present questionnaire (Bremmers et al., 2003). Appendix 1 contains an overview of the questions that are used to measure the different constructs of the research model. All variables except the company's size were measured using 5-point Likert scales (Friedman & Amoo, 1999). Size is measured by means of data on the number of employees, obtained from the Dutch Chambers of Commerce. Similar to the other constructs, these data are translated to a 5-point scale. Next, the content and internal validity of each construct is discussed (see also appendix 1).

### ***Organizational environmental characteristics***

The 'level of integration' -construct (LevInt) consisted of questions on the importance of EM issues in strategic investment decisions and the level of integration of EM in quality and health&safety management, respectively. Though the internal validity of this construct was relatively low ( $\alpha=0.69$ ), it is acceptable for explorative research (Robinson, Shaver, & Wrightsman, 1991). The impact of the environmental coordinator in the company (ImpCoo) is measured by questions on his/her influence on long-term (strategic) and short term (operational) environmental action programs, respectively. The internal validity of this construct was satisfactory ( $\alpha=0.77$ ). Finally, two formative constructs were used: 'environmental procedures' (EnvProc) and 'commitment to CSR' (ComCSR). Unlike reflective constructs, formative constructs consists of indicators that are not interchangeable, because they have each a unique contribution to the construct (Diamantopoulos & Winklhofer, 2001). Firstly, the 'environmental procedures' -construct is calculated as the mean score of the extent till which formally and internally environmental requirements are imposed to the different departments (production, logistics, purchase, etc.). If departments did not exist in a company, these were excluded from the calculation. Secondly, the 'commitment to CSR' -construct is based on three common elements of CSR, including: transparency towards consumers and societal groups, company's involvement in societal activities, and attention paid to the health&safety of employees.

### ***General organizational and market characteristics***

Various questions were asked to the respondents with respect to the general company and market characteristics. Based on a factor analyses on these data (Principal component; Varimax rotation;  $\lambda > 1$ ) the constructs of the general organizational and market characteristics were defined. The 'corporate culture' -construct (CorpCult) is based on the involvement of the board in daily business activities and the attention they pay to the knowledge development of individual employees ( $\alpha=0.74$ ). The 'corporate product strategy' -construct (CorpProd) consists of questions on the company's preference for introducing new products, the technical possibilities to adjust the production process, and the market demand for new products ( $\alpha=0.74$ ). Finally, the 'pressure on profits' -construct (PresProf) includes questions on the pressure on the profit margins and the number of competitors ( $\alpha=0.78$ ).

### *EM performance*

The measurement of the EM-performance is based on the existing EM-models. There exists a broad range of different EM-configurations (Kolk and Mauser, 2002). In general the structure of an EM-system follows the steps in the Deming plan-do-check-act cycle (ISO 14001). We refer to this cycle by discerning four elements (4 C's): commitment, compliance, control, and communication. Commitment is the inclusion in the organisation of an environmental strategy and program. Compliance covers setting environmental standards in concordance with (external) norms. Control refers to the measurement of environmental impacts, registration of environmental data and (external) auditing of environmental performance. Communication contains the feedback of the environmental performance to stakeholders, both internally and externally (Field, 2003). As already mentioned, a distinction can be made between process- and product-oriented EM. EM-performance is therefore measured at both levels. Table 2a and 2b contain the question statements (yes/no) that are selected to measure the EM performance at these levels. So, for each company an EM process (Table 2a) and product (Table 2b) score is calculated, respectively. Each stage of the Deming-cycle is considered equally important. Within each stage, the included questions are rated as equally important too. After rescaling, the EM process and product scores are expressed on a 5-point scale.

*Table 2a* Question statements (yes/no) that are assessed to measure the process oriented EM performance (maximum score equals 5 after rescaling).

Cycle	Elements included in the business strategy and practice	Max. score
Plan	Environmental strategy Environmental action program	1
Do	Environmental audit Environmental education and information of employees Environmental information system/database	1
Check	Environmental information collection on emissions Regular internal measurements of environmental performance	1
Act	Information collection for internal environmental evaluation Regular internal environmental reporting	1
MAXIMUM SCORE=		4*5/4= 5

*Table 2b* Question statements (yes/no) that are assessed to measure the product oriented EM performance (maximum score equals 5 after rescaling).

Cycle	Elements included in the business strategy and practice	Max. score
Plan	Chain oriented environmental strategy	1
Do	Environmental information collection on product (re)design Active collaboration with suppliers on environmental issues Active collaboration with buyers on environmental issues	1
Check	Environmental information collection for information exchange with buyers and suppliers	1
Act	Regular external environmental reporting	1
MAXIMUM SCORE=		4*5/4= 5

### *Method of analysis*

The data are analysed using the statistical package SPSS 12.0.1 (Hair, Anderson, Tatham, & Black, 1998). Explorative measures of analyses are performed, including the calculation of a correlation matrix, cluster analyses, and comparisons between groups. The correlation matrix is based on Spearman's correlation coefficients for non-parametric data. Cluster analysis is

performed in order to compare differences between groups of companies and both their process- and product-oriented EM-performance. For the cluster analyses, the results of hierarchical and non-hierarchical methods were compared in order to define three adequate clusters of companies. The companies are categorized on the axes of EM process and product performance (see table 2a and 2b). The number of clusters is pre-defined according to the following distinction:

- companies with both a low EM process and product score;
- companies with a high EM process and low product score;
- companies with both a high EM process as well as high product score.

The hierarchical method (between-groups linkages; squared Euclidean distance) resulted in a very poor division of the companies over the three clusters (e.g. one cluster consisted of only one company). This is probably caused by the sensitivity of the hierarchical method for outliers in the data, whereas the non-hierarchical method is less sensitive for this (Aldrich, 2003; Mintzberg, 1979). Therefore, the results of the non-hierarchical clustering method (K-means) are stated, using manually defined seed-points in accordance with the already mentioned description of the (pre-defined) cluster groups. Differences between the three cluster groups are analysed using the Mann-Whitney test for non-parametric data.

## 4. Results

### *EM elements that are implemented by the companies*

Table 3 contains the scores on the EM process and product performance per branch (mean  $\pm$  standard deviation; 5-point scale). On average the process-oriented EM-performance score equalled  $2.6 \pm 1.6$ , whereas the product-oriented EM-performance score equalled  $1.2 \pm 1.0$  (N=76).

*Table 3 EM performance per branch (mean  $\pm$  standard deviation) expressed on a 5-point scale.*

Branches	EM process score	EM product score
Beverage (N=8)	$4.2 \pm 1.0$	$2.0 \pm 1.5$
Fat & oil (N=2)	$4.0 \pm 1.5$	$0.8 \pm 0.8$
Grain mill products (N=5)	$4.0 \pm 1.3$	$1.4 \pm 1.2$
Animal concentrates (N=3)	$3.5 \pm 1.7$	$1.3 \pm 1.0$
Vegetables and fruit (N=7)	$3.0 \pm 1.3$	$1.1 \pm 1.1$
Dairy (N=8)	$2.9 \pm 1.2$	$1.5 \pm 1.1$
Other (N=6)	$2.8 \pm 1.7$	$1.5 \pm 1.2$
Meat (N=15)	$2.5 \pm 1.3$	$1.2 \pm 1.1$
Bakeries (N=22)	$1.3 \pm 1.1$	$0.7 \pm 0.6$
TOTAL (N=76)	$2.6 \pm 1.6$	$1.2 \pm 1.0$

From the table it can be seen that especially the beverage, grain mill products, and the fat & oil branches have relatively high scores on the process-oriented EM-performance. With respect to product-oriented EM, again the beverage and grain mill product branches show a relatively high score. However, other branches such as dairy and meat have a relatively high score on the product-oriented EM-performance too. On average, the bakery branch has both the lowest process- and product-oriented EM-score.

### Correlation matrix

The correlation matrix of the elements of the research model is included in table 4 (abbreviations are used, see figure 1). The signs of the correlations are like expected, as only pressure on profits (PresPro) has a negative relationship with other variables (for instance with both the process- and product-oriented EM-performance (EMProcess and EMProd)). A relatively high correlation is found between the product- and process-oriented EM-performance ( $r=0.52$ ;  $P<0.01$ ). Considering the general organizational and market characteristics, only size has a significant and direct relationship with the process-oriented EM-performance ( $P<0.05$ ) and only corporate product strategy (CorpStrat) has a significant and direct relationship with the product-oriented EM-performance ( $P<0.05$ ). Concerning the organizational environmental characteristics, various elements have a significant relationship with both process- and product-oriented EM-performance. ‘The level of integration’ (LevInt), ‘the impact of the environmental coordinator’ (ImpCoo), and ‘imposed internal and formal environmental procedures’ (EnvProc) relate significantly to process-oriented EM-performance ( $P<0.01$ ). All elements of the measured organizational environmental characteristic have a significant correlation with the product-oriented EM-performance (see table 4). Finally, both the ‘corporate culture’ (CorpCult) and ‘corporate product strategy’ (CorpStrat) of the general organizational and market characteristics are significantly correlated with many elements of the environmental organizational characteristics ( $P<0.01$ ).

Table 4 Spearman rank correlations between the elements of the research model (abbreviations are given, see also figure 1;  $N=76$ ).

	EMProcess	EMProduct	CorpCult	CorpStrat	PresPro	Size	LevInt	ImpCoo	EnvProc
EMProduct	0.52**								
CorpCult	0.13	0.15							
CorpStrat	0.08	0.27*	0.41**						
PresPro	-0.13	-0.17	0.09	0.05					
Size	0.29*	0.19	0.04	0.14	-0.07				
LevInt	0.37**	0.28*	0.20	0.11	-0.12	0.05			
ImpCoo	0.49**	0.40**	0.40**	0.15	0.04	0.22	0.27*		
EnvProc	0.33**	0.30**	0.46**	0.32**	-0.06	0.12	0.37**	0.41**	
ComCSR	0.18	0.29*	0.48**	0.39**	0.05	0.02	0.22	0.25*	0.41**

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

### Cluster analyses

Based on the cluster analysis (K-means), three groups of companies are discerned with respect to both their process- and product-oriented EM-performance (see figure 2). The scatter plot indicates that a curved relationship can be found between both types of EM-performance. That is, almost all companies show relatively higher process-oriented EM-levels compared to their product-oriented EM-performance score.

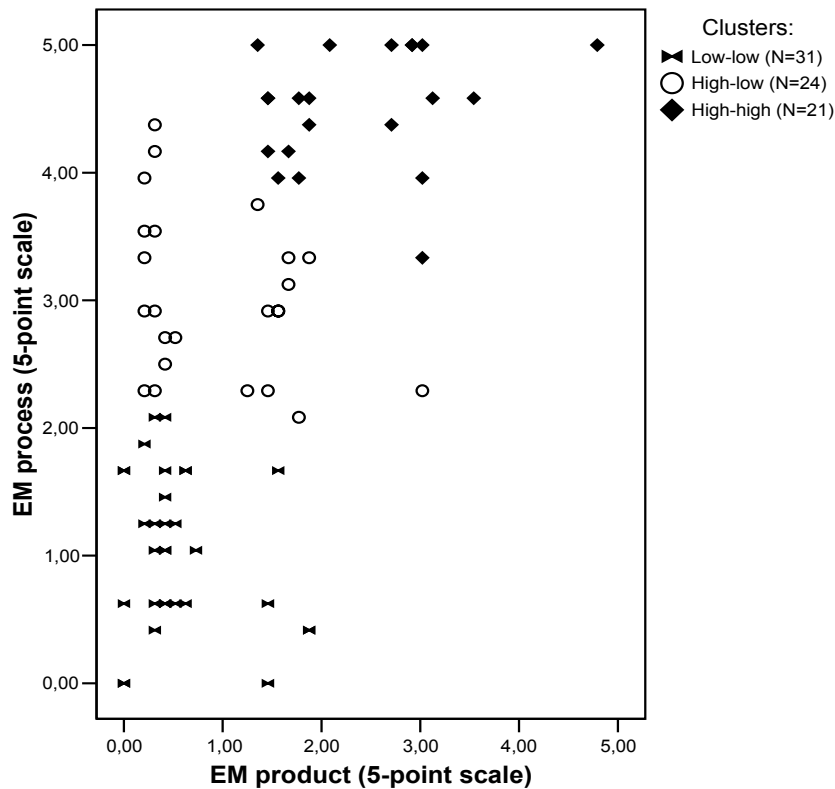


Figure 2 Three groups of companies (N=76) based on non-hierarchical cluster analysis (K-means; pre-defined cluster seed-points) on both the process and product EM performance.

Table 5 includes the mean scores on EM for all three groups of companies. From the table it can be seen that the first and second group of companies (low-low versus high-low) differ mainly on their process-oriented EM-performance, whereas the second and third group (high-low versus high-high) show of course a difference in their product-oriented EM-performance, but also a considerable difference in their process-oriented EM.

Table 5 Mean scores ( $\pm$  standard deviation) on both the process and product EM performance for each of the three groups from the cluster analysis (see figure 2).

Groups	EM process	EM product
Low-low (N=31)	1.04 $\pm$ 0.61	0.55 $\pm$ 0.53
High-low (N=24)	3.02 $\pm$ 0.64	0.94 $\pm$ 0.78
High-High (N=21)	4.51 $\pm$ 0.46	2.39 $\pm$ 0.89

### Comparison between the groups

Comparisons with respect to the companies' characteristics have been made between the cluster groups (see table 6a and 6b). Concerning the companies that have a low versus a high score on the process-oriented EM-performance (low-low versus high-low group), significant differences are found for the corporate product strategy (CorpStrat;  $P < 0.05$ ) and the company's size (Size;  $P < 0.05$ ) only, see table 6a.

*Table 6a Comparison between the low-low versus high-low group (Mann-Whitney U).*

Groups	CorpCult	CorpStrat	PresPro	Size	LevInt	ImpCoo	EnvProc	ComCSR
Low-low (N=31)	30	32	28	24	25	25	27	30
High-low (N=24)	24	22	28	33	30	32	29	25
U-value	285	238*	367	249*	280	270	345	299

\* Difference is significant at the 0.05 level.

Comparing the group of companies that have a low versus a high score on the product-oriented EM-performance (high-low versus high-high group), significant differences are noticed on different company characteristics (see table 6b). Firstly, considering the general organizational and market characteristics, both the corporate culture (CorpCult;  $P < 0.05$ ) and the corporate product strategy (CorpStrat;  $P < 0.01$ ) differed significantly. Secondly, considering the organizational environmental characteristics, almost all variables differed significantly between both groups: ‘Impact of the environmental coordinator (ImpCoo;  $P < 0.01$ ), ‘environmental procedures’ (EnvPro;  $P < 0.05$ ), and ‘commitment to CSR’ (ComCSR;  $P < 0.05$ ).

*Table 6b Comparison between the high-low versus high-high group (Mann-Whitney U).*

Groups	CorpCult	CorpStrat	PresPro	Size	LevInt	ImpCoo	EnvProc	ComCSR
High-low (N=24)	18	16	25	21	18	18	19	18
High-high (N=21)	27	29	20	25	24	29	28	27
U-value	142*	89**	190	202	145	127**	146*	137*

\*\* Difference is significant at the 0.01 level.

\* Difference is significant at the 0.05 level.

#### **4. Conclusions and discussion**

In accordance with the first four hypotheses (H1-H4), all elements of the organizational environmental characteristics have a positive and significant relationship with both the process- and product-oriented EM-performance. Because the elements are highly inter-correlated, it is interesting to explore what type of companies are performing better than others. Considering the process-oriented EM-performance, especially the beverage, fat & oil, and grain mill product branches are showing a high score (see table 3). In contrast, the bakery, but also the meat branch show a poor process-oriented EM-performance score. Why do the companies from these branches differ in their organizational environmental characteristics and their process-oriented EM-performance? In general, the bakeries (but also slaughterhouses) are smaller than the companies from the beverage, fat&oil, and grain mill product branches. Moreover, the companies from the latter branches are frequently supported by a mother company, whereas the smaller bakeries and slaughterhouses are often operating independently. These differences indicate that (formal) environmental structures, environmental strategies, and systems & procedures play a more significant role in the better-performing companies. Larger companies pay more attention to the formal structuring of their organization compared to smaller ones (Cramer, 1998, 2005). For instance, many of the larger companies have an environmental coordinator, whereas in the smaller companies the plant

manager is often (also) responsible for the EM-tasks. Hence, it is likely that a formal environmental configuration is more developed in the larger companies.

Despite the fact that size is an important determinant for the development of EM, it seems not all that matters. In fact, concerning the product-oriented EM-performance, the results show that not only the biggest companies have the highest scores. The beverage companies have the highest performance score (see table 3). However, other and on average smaller companies such as sugar (category “others” in the table) and dairy processors have a relatively high score, as well. All elements of the organizational environmental characteristics have a significant influence on the product-oriented EM-performance. Especially the level of integration of EM with other management areas and the top-management commitment to corporate social responsibility (CSR) activities indicate that a positive corporate attitude stimulates performance. This implicates that the EM-practice has to be embedded in other business activities in order to develop it optimally (Porter, 1980). From this perspective, a CSR-culture in particular might affect the managerial attitude positively and serve as a catalyst for EM-development. For instance, various Dutch breweries as well as many dairy processors are paying relatively much attention to their green corporate image and as a result they are eager to develop their EM.

The results of the cluster analysis on both the process- and product-oriented EM-performance score indicate that EM evolves ‘from process- to product-oriented’. It appears that process-oriented EM is a prerequisite for product-oriented EM. Interestingly, the comparison between groups of companies shows that different organizational characteristics are of importance for this transition process. Concerning the first developmental stage (focused on process-oriented EM), both the company’s size and the corporate product strategy are important determinants. These determinants seem less managerial compared to the other organizational characteristics (impact of coordinator, internally imposed environmental requirements, etc.). For instance, the corporate product strategy is often closely associated with branch-specifics and less with single-company characteristics (Bremmers, Omta, Kemp, & Haverkamp, 2005). In previous research, we found that the environmental legislative demands are an important driver for companies to implement process-oriented EM-measures (Harris & Crane, 2002). Hence, it seems reasonable to conclude that these legislative requirements are more important than the organizational characteristics of companies for the development of their process-oriented EM.

Considering the second developmental stage (focused on product-oriented EM), it is interesting that the corporate culture is an important determinant, next to the corporate product strategy. The corporate culture is measured by the following two questions statements (see appendix 1): ‘the degree that the board is involved in daily business activities’ and ‘the importance the company attaches to the knowledge development of individual employees’. Apparently, a dedicated corporate culture is important for the development of product-oriented EM. It appeared that almost all elements of the organizational environmental characteristics influence this development too (i.e. ‘impact of the environmental coordinator, ‘internally imposed environmental procedures, and ‘commitment to CSR’). From the correlation matrix it follows, that these elements are significantly correlated with the corporate culture (Kagan, Gunningham, & Thornton, 2003; Prakash, 2001; Sharma, 2001). Concluding overall, the results provide support to the last hypothesis (H5) on the importance of general organizational and market characteristics in enhancing EM-development, especially concerning the corporate culture and product strategy.

## **5. Managerial recommendations**

Based on the present results, it can be concluded that the larger firms are performing better compared to the smaller ones, but only concerning process-oriented EM where the government is the main driver. In contrast, product-oriented EM seems mainly driven by company's internal characteristics. This result supports the common notion that the development of EM requires substantial internal organizational commitment in the first place (Cramer, Kim, & Van Dam, 2004). Therefore, we suggest that firms have primarily their own responsibility in enhancing product-oriented EM. In addition, we suggest that the government should be careful with imposing environmental requirements that stress on process-oriented EM only, because it could distract the attention from developing the EM practice towards product-oriented. A corporate social responsibility (CSR) culture seems an important catalyst for this transition process. It might take several years though, before companies have developed their EM optimally. Further research should therefore focus on time-series analysis to provide more details on the association between process- and product-oriented EM, and on how they are influenced by the organizational characteristics of the company.

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## Appendix 1 Operationalization

S.D. = standard deviation

Construct	Included question statements	Mean ± S.D.
Level of integration (LevInt; $\alpha=0.69$ )	EM issues are assessed explicitly during strategic investment decisions	4.10 ± 0.48
	EM is integrated with quality management	3.11 ± 0.53
Impact coordinator (ImpCoo; $\alpha=0.77$ )	EM is integrated with employers health&safety management	3.44 ± 0.51
	The environmental coordinator has a big influence on the strategic corporate environmental goals	3.61 ± 1.00
	The environmental coordinator has a big influence on the environmental activities that are carried out	3.98 ± 0.72
Environmental procedures (EnvProc) <sup>1,2</sup>	Environmental prescriptions for the production department	3.50 ± 1.00
	Logistics & transportation	3.07 ± 0.98
	Purchase	2.59 ± 1.04
	Sale	2.06 ± 0.91
	R&D	2.66 ± 1.07
Commitment to CSR (ComCSR) <sup>1</sup>	Marketing	2.20 ± 0.99
	Our company pays much attention to transparency towards consumers and/or other societal groups	3.48 ± 1.07
	Our company sponsors societal activities regularly	3.16 ± 1.29
Corporate culture (CorpCult; $\alpha=0.74$ )	Our company pays much attention to the health & safety of employees	4.34 ± 0.69
	The board is involved actively in daily business activities	3.89 ± 1.07
Corporate product strategy (CorpStrat; $\alpha=0.74$ )	Our company finds knowledge development of individual employees important	3.84 ± 1.00
	Our company finds it important to be the first to introduce new products	3.51 ± 1.28
	Buyers constantly ask for new products and/or product characteristics	3.40 ± 1.02
Pressure on profits (PresProf; $\alpha=0.78$ )	There are many technical possibilities to change our product and/or product characteristics	3.32 ± 1.07
	Our company experiences high pressure on the financial margins	4.56 ± 0.72
	Our company has to deal with many competitors	4.26 ± 0.99

<sup>1)</sup> Formative constructs

<sup>2)</sup> Expressed on 5-point Likert scale (not at all – very much)

The company's size is measured by means of the number of employees. The following categories are distinguished:

Category	Number of companies	Percentage of total (%)
50 through 100 employees	27	35.5
101 through 150	18	23.7
151 through 200	10	13.2
201 through 250	7	9.2
>250	14	18.4
TOTAL	76	100