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Corporate Environmental Management for the Textile Industry: Toward an Empirical Typology

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Abstract: The increasing attention of stakeholders regarding environmental issues is pushing companies to question their own environmental strategies and to consequently adopt coherent practices. The textile industry appears to be particularly affected because of its heavy impact on the environment. Despite many companies in this industry having developed integrated environmental management systems to make their environmental strategies more effective, the alignment of environmental practices with these strategies is not yet completely evident. This paper aims to fill this gap through a three-step research process. First of all, a reference model built upon an in-depth analysis of the literature provides a summary of the main strategies and practices for corporate environmental management. The model is then used to support an online survey aimed at understanding the level of adoption of environmental management practices in the textile industry. Subsequently, a cluster analysis identifies three different types of companies characterized by three strategic configurations: "committed", "prone", and "subjected" to environmental sustainability. Then, each type of company is characterized in terms of practices. Finally, the achieved results are used to derive some considerations (e.g., engaging with stakeholders, looking back to align practice with strategy, looking forward to become environmental leaders) that companies can consider to move forward in their environmental sustainability journey.

Keywords: corporate environmental management; environmental sustainability; environmental strategy; environmental practices; survey; textile industry

1. Introduction

In recent years, the problem of environmental sustainability has become more and more prominent in the corporate agenda. Companies are today facing not only the requirements of environmental regulation, but also additional demand from stakeholders and society. As a result, many organizations have decided to include environmental considerations in the management of their activities in order to reduce to zero the impact on the natural environment [1]. While past studies have contributed significantly to the literature on environmental issues, much continues to be learned about corporate environmental management [2]. The main questions are whether managers recognize environmental initiatives as an opportunity leading to increased competitiveness and how they incorporate these initiatives into new strategic and operational choices [3], building a comprehensive environmental management system within their organization, in order to link actions to performance. Moreover, the specific industrial context shapes the management systems that exist at the firm level due to its unique combination of regulations and stakeholder pressure [4]. Consequently, there is a need to develop industry-specific research fields to manage green issues that are suitable for the sector's characteristics and technologies [5].

In this context, strong attention has been paid lately to the textile industry as a whole (from yarn to final product manufacturing), which is one of the world's biggest and most polluting sectors [6], as has been demonstrated by several sustainability actions (e.g., the "Roadmap to Zero Discharge of Hazardous Chemicals", "Detox" by Greenpeace, the "Clean Clothes Campaign"). Furthermore, as an essential component of the fashion system, this industry is an important agent of change that reaches far beyond its own realms, thanks to its ability to constantly affect consumer behavior and attitudes. Thus, "greening" the textile industry represents a strong opportunity to "green" not only the fashion system, but also the manufacturing industry and society at large. At the same time, business drivers, such as high price volatility and short-term discretionary rationed access to manufacturing ability and resources, have also encouraged industrial organizations to participate in sustainability [7]. Thus, the principles, strategies, and tools of sustainability have become essential for textile businesses to remain competitive on the market.

Despite the numerous and different environmental management practices adopted, these are rarely incorporated into corporate strategy [8], resulting in a superficial degree of application that is often inefficient and that has little impact on business activities [9]. As a consequence, there is a need to develop a linkage between corporate strategy and environmental management practices to properly support their implementation.

To address this gap, we proposed an empirical study, by means of a survey. with the aim of assessing the alignment between environmental strategy and management practices in the textile industry.

In line with this objective, we developed an integrated corporate environmental management approach for the textile industry by i) establishing a reference model for corporate environmental management, ii) creating an empirical typology of the textile sector's environmental strategy, iii) characterizing each strategic type in terms of environmental practices, and iv) proposing some improvement actions based on considerations from the empirical study.

The context chosen for the study was the Italian textile industry because of its high relevance and contribution to the European textile sector (Italy is the biggest textiles manufacturer in Europe according to Eurostat 2019 data).

The paper is organized as follows. The relevant literature for this study is outlined in Section 2, followed by an identification of research gaps and questions. We define the research methodology by showing a model for corporate environmental management and by explaining the empirical study conducted in the textile industry in Italy. The results of the studies are presented and discussed in the following section, together with the main practical and theoretical implications of this research. Lastly, Section 6 ends the paper with the most appropriate conclusions and directions for future studies.

2. Corporate Environmental Management

Corporate environmental management includes all strategic and operational attempts to minimize the adverse effects of corporate operations on the environment [10]. According to "traditional" corporate management [11], environmental management becomes evident through an integrated approach that includes (i) "environmental strategy", which indicates a competitive orientation toward the environmental pillar of sustainability; and (ii) "environmental management practices", which refers to all the strategic, tactical, and operational activities aimed at protecting the environment [12]. In the following section, each of these elements will be thoroughly analyzed, highlighting literature gaps and the research questions that will be addressed in this paper.

2.1. Environmental Strategy

A big portion of the literature on environmental strategy has analyzed how corporate greening is achieved by outlining typologies of environmental strategies. The first papers date back to the early 1990s, when businesses started to see environmental management as a strategic approach to create competitive advantage [13] by integrating environmental management into the general business strategy. Specifically, Hart (1995) created a typology of environmental strategies, introducing a conceptual

framework consisting of three interconnected strategies that he defined as the "natural-resource-based view" [14]. Such strategies are characterized in terms of environmental driving forces, key resources, and competitive advantage. Hart's natural-resource-based view was further extended by several authors, including Hart & Milstein (2003), who developed the "Sustainable Value Framework" based on a shareholder value construct [15]. Each sustainability strategy included in the framework is described by two dimensions (short- vs long-term results and internal vs external skills, knowledge and capabilities) and then linked to drivers and practices.

Another stream of investigation has drawn on Carroll's three-dimensional conceptual framework of corporate performance [16]. In this area, studies have debated how organizations should be clustered according to their level of environmental proactivity [17], which typically ranges linearly between two extreme roles: environmental passivity, which is representative of firms implementing only minimal mandatory regulatory modifications, and environmental proactivity, which is typical of businesses that voluntarily take measures to reduce their impact on the natural environment.

Environmental proactivity has also been analyzed in combination with other dimensions, including competitive advantage [18], drivers of environmental behavior [19], strategic orientation [20], and policy commitment to environmental issues [21]. Other perspectives have also been considered to classify environmental strategies. For instance, Stead and Stead (1995) defined two different environmental strategic approaches based on a competitive focus [22]. Vastag, Kerekes, and Rondinelli (1996) have suggested four approaches to environmental management to explain how businesses react to their endogenous and exogenous hazards [23], while Orsato (2006) identified four generic competitive environmental strategies based on their competitive focus and on the competitive advantage that could be achieved [24]. Furthermore, Baumgartner and Ebner (2010) developed four strategic profiles based on the maturity level of selected sustainability aspects [25].

In addition to defining typologies and taxonomies of environmental strategies, another significant point in the debate of corporate environmental strategies is the fit between environmental strategy and corporate competitive strategy [25], as well as their integration [26,27]. Moreover, several studies on environmental strategy have evaluated whether a company's pattern of strategic behavior to fulfill environmental objectives is aligned with perceived pressure from stakeholders [28,29], who operate as instigators and recipients of sustainable policy [30].

2.2. Environmental Management Practices

Environmental management practices (EMPs) refer to all of the policies and operations directed at decreasing the company's impact on the environment caused by its business [12]. Despite the fact that many management practices are often combined together as merely "environmental", it is essential to distinguish practices from one another effectively [31]. Sroufe, Narasimhan, Montabon, and Wang (2002) have categorized practices based on their scope, which could be operational, tactical, or strategic and are thus related to distinct goals representing distinct resource obligations and targeting a broad variety of objectives [32]. The authors expressed that executives need to be conscious of holistic environmental concerns, coordinating and incorporating practices across operational, tactical, and strategic levels, for a company to be committed to environmental management. Another perspective, which is based on the resource-based view [33], was taken up by Lucas (2010), who categorized the EMPs along two dimensions: kinds of capital investment and the phase at which they affect the manufacturing process [31]. Colicchia et al. (2013) differentiated between intraorganizational and interorganizational environmental practices: the former relates to practices linked to "in-house" business processes, while the latter refers to initiatives involving collaboration and trust among various members of the supply chain [34].

In general, scholars can be said to have studied the implementation of EMPs by companies, identifying their implementation either within a particular industry or across sectors, considering the particular size of the company, or taking a longitudinal view. EMPs have also been researched with respect to corporate environmental responsiveness [35] and proactivity [36], environmental and

financial performance [37–39], operations performance [40], influencing factors [39], and barriers [41]. Because an exhaustive model for EMPs had been lacking in the literature, Resta et al. (2014) applied a structured literature review in combination with an assessment of best practices to develop an extensive classification framework for environmental sustainability containing 57 practices separated into 6 areas [42]. In a subsequent study, the framework was applied and validated within the textile industry [10].

2.3. Gaps and Research Questions

All of the models, typologies, and taxonomies of environmental strategy described in the background section indicate that there is a restricted amount of recognizable environmental strategies, each involving a varied pattern of distinct determinants. The number of possible strategies, and their features, have varied widely from author to author because these models were created on the basis of only a few (or sometimes single) dimensions to discuss particular strategic elements: thus, they have had a limited focus. Therefore, providing a comprehensive model that captures all the environmental strategic dimensions is fundamental to properly design and develop a sustainability strategy. Currently, such a model is not available in the literature. Furthermore, existing environmental strategy types have been conceptually obtained from theory without much further empirical assistance. Although this approach has acquired significant insights into strategic behavior, if empirical assistance could be added, the validity of any typology would be improved. The overall assumption underlying typology generation, which can be tested through objective strategic behavior empirical analysis, is that there is a restricted amount of observable and recurring configuration sets. To overcome these two primary gaps, this article empirically derives from data an innovative and thorough environmental strategy typology, reducing the need for subjective interpretations by using statistical methodologies.

Therefore, the first research question that will be addressed is:

RQ1: Are there coherent and recurrent patterns of strategic environmental elements that can be considered to be an empirical typology of corporate environmental strategy?

At the environmental management practice level, companies have embraced a variety of environmental management tools, but it is uncertain whether and how such companies have incorporated environmental considerations into their strategy [8], given that the incorporation of environmental management practices often remains more superficial than effective without a true transformation of the business [9]. It could be driven either by efforts to enhance the public image [43] or by a lack of understanding of what it takes to restructure the corporate management approach to improve environmental performance [44]. To this end, there is not much guidance related to recognizing which environmental management practices are most likely to be associated with each environmental strategy type. Therefore, the second research question could be formulated as follows:

RQ2: Is each environmental strategy type characterized by a specific pattern of environmental practices?

In summary, this research tries to empirically discern the patterns (or types) of strategies used in environmental competition and creates a helpful classification of types of environmental strategy that can be linked to practices.

3. Conceptual Model and Research Design

Aiming to analyze the research questions, an explanatory research survey was conducted. Prior to the survey research design, a conceptual model (the "Corporate Environmental Management Model") was established by the authors. The model dimensions and variables were developed from a literature review, in which relevant articles were identified by searching(in business databases, e.g., Scopus and Web of Science) for the following keywords concerning environmental strategy, practices, or both: "corporate environmental management", "environmental strategy", "environmental practices", and "environmental sustainability". To increase reliability and internal validity [45], each article was

read at least by two researchers, who assigned the variables used in each study to the environmental strategy or practice dimension. In the end, the most frequently cited variables were selected to be included in the final model.

Finally, the "Corporate Environmental Management Model" was created and structured into two dimensions, as shown in Figure 1, which assume that each environmental strategy type becomes manifest through a specific set of practices. Each dimension and how the measures were calculated are described in detail in the following sections.

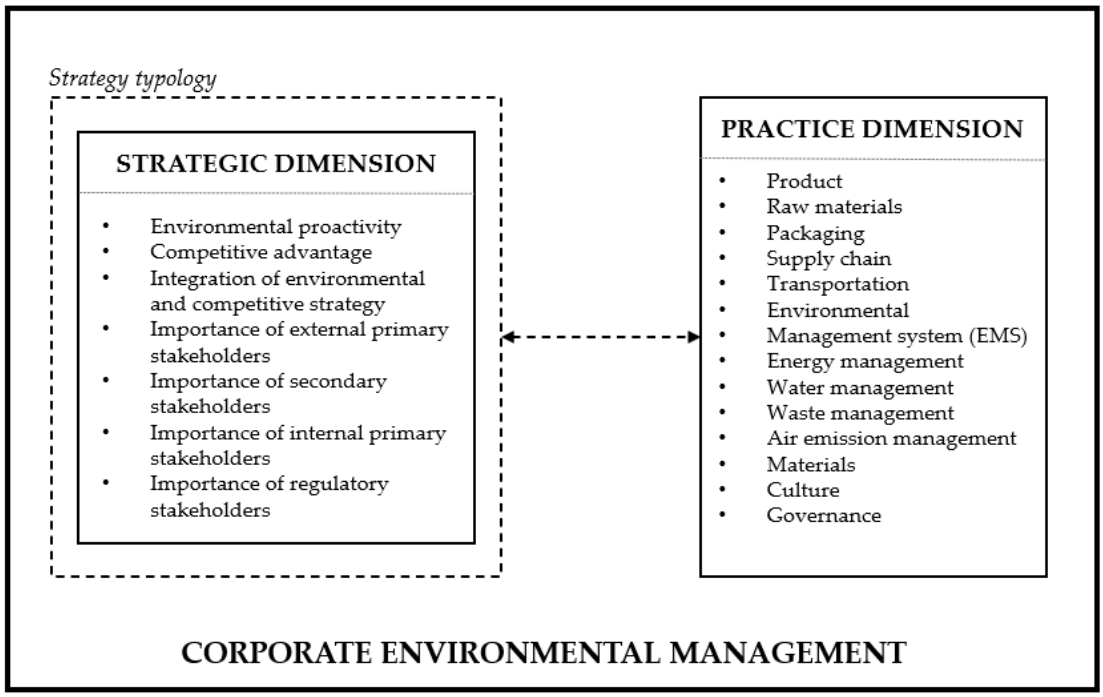

Figure 1. The "Corporate Environmental Management Model".

3.1. Strategic Dimensions

Drawing on the selected literature presented in the "corporate environmental management" section, only the most frequently cited variables were used to build an initial conceptual model to explain the different elements of an environmental strategy: environmental proactivity (*ENVPRO*) and a competitive advantage (*COMPADV*). Moreover, to analyze the relationship between environmental strategy, competitive strategy, and stakeholder pressure, the following items were introduced: (1) the integration of environmental strategy and competitive strategy (*INTSTRAT*) and (2) the importance of stakeholders (divided into four categories: external primary (*STAKE_EXT_PRIM*), secondary (*STAKE_SECO*), internal primary (*STAKE_INT_PRIM*), and regulatory stakeholders (*STAKE_REG*)) [28]). Each category encompassed a list of stakeholders, as is reported in Appendix A. For each stakeholder (*i*), the importance of corporate environmental management was calculated as a dummy variable (0 = "not important"; 1 = "important"). For each category (j), the importance of stakeholders (*STAKE_j*) was calculated by adopting a single-scale index of continuous variation, which allowed for stakeholders' weighted aggregation at the category level multiplied by the category importance level (five-point Likert scale varying from 1 = "very low importance" to 5 = "very high importance"). Then, a category index was computed by using the following formula:

$$STAKE_j = IMP_j * \sum_{i=1}^{n} (w_{STAKE_{ji}} * STAKE_{ji}) \quad (1)$$

where J = the stakeholder category; IMP_J = the importance level of the stakeholder category J (from 1 to 5); $STAKE_{ji}$ = the value of the importance of stakeholder i included in category j (derived from the questionnaire) (0 or 1); w_{STAKE_Ji} = the weight of stakeholder i included in category j; and n = the total number of stakeholders i in category j.

Category importance levels and stakeholders' weights for the textile sector were determined by a panel of 11 experts from both the industry and academia. However, the values of the importance of stakeholders ($STAKE\_J_i$) were collected through a survey. Appendix A shows all of the variables included in the strategic dimension of the research model.

3.2. Practice Dimension

Measures were taken from Resta et al. [42] for environmental management practices and were finalized during a pilot study. Several associations were also consulted both at the national and European level. As shown in Appendix A, consideration was given to 33 measures classified into 13 categories. For each practice (i), the company's use was calculated as a dummy variable (0 = "not used"; 1 = "used"). The intensity of EMPs was calculated for each category (j) with an index built as a single scale of continuous variation from 0 to 1 (where 0 = worst EMP profile and 1 = best EMP profile), which enabled the weighted practice aggregation process at a category level (multiplied by the category significance level (five-point Likert scale, where 1 = "very low importance" and 5 = "very high importance")). Then, the category index was calculated using the following equation:

$$PRACT_j = IMP_j * \sum_{i=1}^{n} (w_{PRACT_{ji}} * PRACT_{ji}) \quad (2)$$

where j = the EMP category; $PRACT\_ji$ = the value of the environmental practice i included in category j (derived from the questionnaire) (0 or 1); IMP_j = the importance level of EMP category j (from 1 to 5); W_{PRACT_Ji} = the weight of practice i included in category j; and n = the total number of variables i in category j. As for stakeholder variables, category importance levels and practice weights for the textile sector were determined by the same panel of experts. However, the values for environmental practices ($PRACT\_{ji}$) were collected through a survey.

3.3. Data Collection and Analysis

Data for this research were gathered through a web survey carried out between June and July 2014. The method was designed according to the guidance provided by Forza (2002) [45]. The study began with a research model and an associated questionnaire design, which was the primary source for data collection. In order to demonstrate viability and identify problems in interpreting questions, a pilot test questionnaire was administered with a set of chosen textile firms. This pilot test allowed us to test questions and scales and to refine some items to improve clarity and to make sure that questions were reflecting the underlying concepts [45]. The final questionnaire included 27 questions and was designed to generate data on environmental strategy and management practices.

The questionnaire was submitted to the complete population of Italian textile firms included in the AIDA database (NACE code: 13) with a publicly available email contact: the population consisted of 1509 companies [12]. NACE (Nomenclature des Activités Économiques dans la Communauté Européenne) is an industry standard classification system used in Europe for classifying business activities. NACE code 13 deals with textiles manufacturing and includes four subsections: 13.1 (preparation and spinning of textile fibers), 13.2 (textile weaving), 13.3 (finishing of textiles), and 13.9 (manufacturing of other textiles).

Each firm was approached through an email addressed to prospective respondents with knowledge about the phenomenon to be measured, and a web questionnaire link was included. Within two weeks, the first contact produced a return of 83 replies (response rate: 6%). After two weeks, follow-up phone

calls led to 324 total usable answers returned to the authors, which corresponded to a response rate of 21.5% [12].

For each company, a single respondent was taken into account. Using a single-respondent approach was not considered a source of bias, since we made sure to find the most appropriate interlocutor. We considered the entrepreneur/company CEO to be the best possible key informant because he/she would certainly be knowledgeable about a firm's strategy and practices. The self-report method is a primary data collection tool in management studies [46]. This is particularly suitable for studies focusing on variables within the area of strategy and operations, because these variables are extremely difficult to measure without the use of self-reports [47].

Table 1 reports the sample breakdown compared to the total population (the Italian textile companies included in the AIDA Database) and reveals a substantial alignment: most of the companies had a micro (38%) or small (46%) size in terms of turnover and were located in the main textile districts (Lombardy, Tuscany, Veneto, and Piedmont). All of the production segments were well represented: 13.1, the preparation and spinning of textile fibers (16%); 13.2, textile weaving (31%); 13.3, the finishing of textiles (27%); and 13.9, the manufacturing of other textiles (26%).

Table 1. Breakdown of the sample and the population.

		Sample	Population
Size	Turnover > 50 million € (large)	15 (5%)	55 (2%)
	50 million € < turnover < 10 mil € (medium)	66 (20%)	376 (14%)
	10 million €< turnover < 2 mil € (small)	149 (46%)	1203 (46%)
	Turnover < 2 mil € (micro)	94 (29%)	983 (38%)
Segment	13.1 - preparation and spinning of textile fibers	52 (16%)	493 (19%)
	13.2 - textile weaving	100 (31%)	799 (31%)
	13.3 - the finishing of textiles	88 (27%)	426 (16%)
	13.9 - the manufacturing of other textiles	84 (26%)	899 (34%)
Geographical Distribution	Northwest (Liguria, Lombardia, Piemonte, Valle d'Aosta)	181 (56%)	1334 (51%)
	Northeast (Emilia-Romagna, Friuli-Venezia Giulia, Trentino-Alto Adige, Veneto)	61 (19%)	366 (14%)
	Center (Lazio, Marche, Toscana, Umbria)	65 (20%)	97 (30%)
	South (Abruzzo, Basilicata, Calabria, Campania, Molise, Puglia)	16 (5%)	131 (5%)
	Islands	1 (0%)	1 (0%)

A cluster analysis was used to group textile companies into homogeneous groups in order to tackle the first research question and to define coherent and recurring patterns of strategic environmental dimensions, which could be viewed as an empirical typology of corporate environmental strategy within the sample. In particular, hierarchical clustering was used for this article. The method of evaluation comprised the following steps:

- **Step 1:** Selecting the variables from the strategic dimension of the "Corporate Environmental Management Model". Since the aim of the cluster analysis was the definition of a typology of environmental strategy, the variables considered in the study were *ENVPRO, COMPADV_DIFF, COMPADV_COST, COMPADV_NO, INTSTRAT, STAKE_EXT_PRIM, STAKE_SECO, STAKE_INT_PRIM*, and *STAKE_REG*, as identified in Appendix A;
- **Step 2:** Applying a cluster analysis to group textile companies into distinct strategic types. The clustering algorithm was to ensure that the firms were as homogeneous as possible within the same cluster and as different as possible when compared to other clusters with respect to the considered variables;

- **Step 3:** Examining whether the recognized clusters could be interpreted. At this point, the clusters were defined and interpreted according to the selected variables (e.g., practices and environmental-driven competitiveness, as described in Appendix A); and
- **Step 4:** Defining differences between clusters.

The software used for statistical calculation and cluster identification was IBM® SPSS® Statistics Version 20.

4. Results

4.1. Cluster Analysis Results: An Environmental Strategy Typology (RQ1)

A hierarchical agglomerative clustering technique was employed in order to form groups, and three types (clusters) were identified. Table 2 presents the profile of the variables for the three-cluster solution.

Appendix B reports the significance test for the differences between the groups. Statistically significant differences were observed for all of the variables, thereby confirming that the three clusters were appropriately classified. A description of the three clusters is provided in the following section.

Cluster #01: Committed to environmental sustainability. This group represented 47 companies (15% of the sample) characterized by a high rate of receptivity to environmental problems, which manifested in a high level of proactivity on average (2.36/3.00) combined with a high integration of corporate strategy with environmental strategy (3.77/5.00) (mostly related to a product differentiation competitive advantage (81% of the companies)). A lot of attention is given to external primary (3.29/4.27) and regulatory (2.59/3.82) stakeholders, medium-low importance is given to internal primary (1.27/4.00) stakeholders, and very low importance is given to secondary stakeholders (0.48/3.42). This group had the biggest average turnover and the greatest vertical integration: indeed, up to four manufacturing segments were covered by 10% of the companies. Overall, a strong strategic commitment to environmental sustainability characterized this cluster.

Cluster #02: Prone to environmental sustainability. There were 113 firms in this group (35% of the sample): they showed reactive behavior with respect to environmental strategy (2.04/3.00) and a medium-high integration of corporate strategy with environmental strategy (3.46/5.00), which was related to both product differentiation (64% of the sample) and a cost reduction competitive advantage (39%). The highest attention is given to external primary stakeholders (4.27/4.27), medium-low importance is given to internal primary stakeholders (1.27/4.00), and basically no importance is given to secondary (0.17/3.42) and regulatory (0.95/3.82) stakeholders. Compared to *Cluster #01*, companies assigned to this group had a smaller size on average (in terms of turnover) and a lower vertical integration: only 6% of the companies covered up to three production segments.

Cluster #03: Subjected to environmental sustainability. This group included 50% of the sample companies. These 164 firms were characterized by low environmental proactivity (1.81/3.00) and a low strategic integration of environmental issues into corporate strategy (2.65/5.00). In addition, 58% of the companies recognized a product differentiation advantage, while 21% declared that no competitive advantages could be obtained from an environmental strategy. Medium attention is given to external primary stakeholders (2.49/4.27), very low importance is given to internal primary (0.65/4.00) and secondary (0.15/3.42) stakeholders, and almost no importance is given to regulatory stakeholders (0.09/3.82). The companies included in this group had the smallest size (in terms of turnover) and the lowest vertical integration, on average: 5% of the companies covered up to two production segments.

Tukey's post hoc test was used to detail the results of the one-way analysis of variance (ANOVA) in verifying that all of the variables' means were significantly different between the groups. The importance of primary internal stakeholders was not statistically differentiated between Cluster #01 and Cluster #02, while secondary stakeholders were not differentiated between Cluster #02 and Cluster #03.

Table 2. Profile of variables for the three-cluster solution.

Variable		Cluster #01	Cluster #02	Cluster #03	Total Average
Environmental proactivity	*ENVPRO*	2.36	2.04	1.81	2.05
Competitive advantage	*COMPADV_DIFF*	0.81	0.64	0.58	0.69
	COMPADV_COST	0.42	0.39	0.24	0.31
	COMPADV_NO	0.15	0.04	0.21	0.15
Integration of environmental and competitive strategy	*INTSTRAT*	3.77	3.46	2.65	3.05
Importance of stakeholders: external primary stakeholders	*STAKE_EXT_PRIM*	3.29	4.27	2.49	3.22
Importance of stakeholders: secondary stakeholders	*STAKE_SECO*	0.48	0.17	0.15	0.18
Importance of stakeholders: internal primary stakeholders	*STAKE_INT_PRIM*	1.27	1.20	0.65	0.91
Importance of stakeholders: regulatory stakeholders	*STAKE_REG*	2.59	0.00	0.09	0.27

4.2. Environmental Practices Analysis (RP2)

On the basis of the implementation level of environmental management practices, the three clusters defined through the cluster analysis were then explored. Table 3 provides the outcomes of the assessment of environmental practices carried out by the clusters recognized. Values nearer to the maximum value (*IMP_j* value) show a strong application of practices belonging to that category, while those close to 0 indicate a low level of execution.

Considering the average for all companies, the Italian textile firms did not present a high level of implementation of environmental practices. High-implementation practices included (i) waste management, specifically waste reduction (48% of the sample) and separate waste collection (89%); (ii) the use of process materials, specifically the use of certified materials (60%); and (iii) the use of sustainable (64%) and certified (51%) raw materials. Practices presenting the worst rate of execution were (i) culture, in particular stakeholder involvement in sustainability initiatives (15%); (ii) air emissions management, such as heat recovery from air emissions (15%); and (iii) governance, including environmental disclosure (9%). The low implementation of air emissions management can be explained by the low level of dangerous air emissions produced by some segments of the textile industry (spinning, weaving, and final product manufacturing), while culture and governance have an intangible nature that is often difficult to understand and control.

Compared to the average of the respondents, companies in Cluster #01 showed a higher adoption for all of the environmental practices except for supply chain and transportation. This could reflect their lower attention to primary external stakeholders, including customers and suppliers. The average implementation of environmental practices decreased moving from the first cluster to the third one, where all the practice categories were underrepresented.

A one-way ANOVA (Appendix B), combined with Tukey's post hoc test, was used to determine if the practices variables' means were significantly different between the groups. The implementation of packaging practices did not vary significantly between the three groups. Moreover, Tukey's post hoc test revealed that only energy and culture were differentiated in the three clusters through their cluster means. The other variables were differentiated in two clusters through their means. In particular, similarities between *Cluster #01* and *Cluster #02* firms occurred in the cases of products, supply, transportation, and materials, while similarities between *Cluster #02* and *Cluster #03* firms were found with regard to raw materials, environmental management system (EMS), water management, waste management, air emissions management, and governance.

Table 3. Average implementation of environmental practices.

		Cluster #01	**Cluster #02**	**Cluster #03**	**Total Average**	**Max. Value**
Product	*PRACT_PROD*	2.10	1.66	1.22	1.46	4.50
Raw materials	*PRACT_RAWM*	2.38	2.26	1.95	2.10	4.40
Packaging	*PRACT_PACK*	1.07	1.04	0.88	0.95	2.70
Supply chain	*PRACT_SUPPLY*	1.76	1.84	0.99	1.37	4.20
Transportation	*PRACT_TRANS*	1.69	1.76	1.40	1.56	3.10
Environmental management system (EMS)	*PRACT_EMS*	1.88	1.24	0.81	1.06	3.50
Energy management	*PRACT_ENER*	2.71	1.90	1.40	1.70	4.40
Water management	*PRACT_WAT*	1.89	1.05	0.93	1.06	3.90
Waste management	*PRACT_WASTE*	2.20	1.85	1.62	1.75	3.80
Air emissions management	*PRACT_AIR*	1.54	0.98	0.75	0.90	3.60
Materials	*PRACT_MAT*	2.30	1.77	1.45	1.64	4.10
Culture	*PRACT_CULT*	2.01	1.35	0.88	1.15	4.20
Governance	*PRACT_GOV*	1.37	0.67	0.43	0.60	4.30

5. Discussion

Concerning the first research question (RQ1), this study identified, through the development of an environmental strategy typology based on a cluster analysis, the existence of three types of textile companies characterized by recurrent patterns of strategic environmental dimensions: *committed to environmental sustainability* (*Cluster #01*), *prone to environmental sustainability* (*Cluster #02*), and *subjected to environmental sustainability* (*Cluster #03*). The analysis then moved from a strategic level to the practice level, thus showing that each cluster displayed different patterns in terms of environmental practice implementation (RQ2). Figure 2 describes each cluster in terms of strategy (i.e., typology) and practice characterization (i.e., pattern). Companies belonging to the *subjected to environmental sustainability* cluster showed the lowest environmental proactivity and the least focused competitive strategy, as well as lower integration between their environmental and competitive strategies. Moving to the *prone to environmental sustainability* and to the *committed to environmental sustainability* clusters, all of the variables describing a strategic position assumed higher values, with *Cluster #01* being the more proactive toward environmental sustainability. Furthermore, in the analyzed data, it emerged how different environmental strategies reflect different patterns in terms of environmental practices. In accordance with low proactivity, *subjected to sustainability* companies (*Cluster #03*) implement very few practices and are limited to the most operative internal areas without applying a specific rationale. Instead, companies *prone to sustainability* (*Cluster #02*) intensify efforts in many of these operative areas and start extending practices externally within the supply chain, thus moving from a myopic vision limited to specific areas toward a more holistic view extended to the whole value chain. This higher involvement from a practical point of view was well reflected in higher proactivity toward environmental sustainability and in higher effort toward cultural elements. Finally, companies that were *committed to sustainability* (*Cluster #01*) further strengthen their efforts toward cultural aspects and introduce environmental practices related to the governance area, which underlines environmental culture maturity and awareness of the importance associated with the internal and external communication of environmental actions.

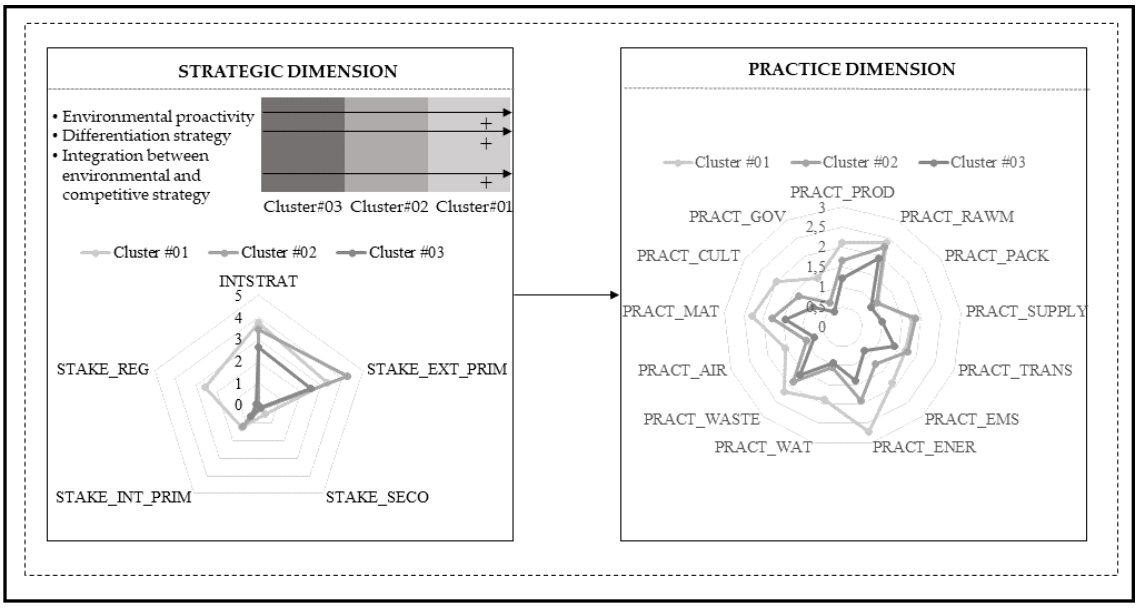

Figure 2. Environmental strategy typology and respective patterns of environmental practices.

However, the ANOVA analysis revealed statistical similarities between the groups.

Regarding the companies belonging to *Cluster #01*, while they strategically commit to sustainability (the highest value for most of the strategic variables), their involvement is not fully translated into

actions, which was observed in their similarities to companies belonging to *Cluster #02* (characterized, on the contrary, by a medium level of strategic commitment toward environmental sustainability) in the following areas: products, supply, transportation, and materials. In particular, the limited implementation of supply and transportation environmental practices could have been due to a lower importance allocated to external secondary stakeholders (i.e., domestic and international suppliers) with respect to firms prone to environmental sustainability. Such behavior was evidence of a missed opportunity to continuously improve the most operative environmental practices, which might have been due to a shifted orientation toward more high-level issues (e.g., culture and governance practices).

Prone to environmental sustainability firms, on the contrary, "struggled in the middle" of the other two clusters; they were not able to clearly define a unique environmental management profile. As demonstrated by the ANOVA analysis, some variables (products, supply, transportation, and materials) for the companies belonging to this cluster were not significantly different from *Cluster #01*; for other variables (raw materials, EMS, water management, waste Management, air emissions management, and governance), they did not differ from *Cluster #03*. The result was a unique strategic pattern characterized by a medium level of commitment to environmental sustainability, which then translated into a hybrid operational profile.

Finally, *Cluster #03* firms were characterized by a substantial aligned environmental management approach: a low strategic commitment to sustainability translated into a low level of implementation of environmental practices. However, their low engagement with stakeholders, as demonstrated by the low importance given to stakeholders, could destroy corporate value in the long term. On the contrary, if a company is able to build and maintain relationships with all its stakeholders, it can last over time [48]. As argued by Post, Preston, and Sauter-Sachs (2002), these relationships are fundamental assets that companies must manage, given that they are the ultimate sources of organizational wealth, they help anticipate and/or prevent unforeseen problems, and they also improve access to vital resources [49].

Therefore, three considerations emerged from the cluster analysis that could potentially be used as actions for improvement to evolve toward environmental sustainability: (i) *engaging with stakeholders*, (ii) *looking back to maintain an environmental advantage*, and (iii) *looking forward to become an environmental leader*.

Engaging with stakeholders: This is the fundamental element that companies should consider to define strategic priorities and related executive agenda coherently with stakeholders' needs and expectations. Because nowadays stakeholders pay increasing attention to environmental issues, this will most likely provide a boost to the environmental commitment of companies. This consideration emerged from the analysis of *Cluster #03*. In fact, differently from *Cluster #01* and *Cluster #02*, these companies reported very low values of "importance of stakeholders" variables. This difference was mirrored in a passive environmental strategy. In practice, stakeholder engagement includes actions that the organization undertakes to involve stakeholders in its projects or activities [50]. Relying on Gap Inc.'s experience, Smith et al. [51] formalized a five-step path to deeper engagement with stakeholders: (i) draw a stakeholder map, listing as many stakeholders as possible and then ranking them by their salience or importance; (ii) identify the material issues, identifying the most important sustainability concerns the company and its stakeholders face; (iii) define objectives based on stakeholder input; (iv) resolve possible issues collaboratively; and (v) embed engagement.

Looking back to maintain an environmental advantage: In order to maintain an environmental advantage, each firm needs to look back to the environmental follower who, being less committed to environmental sustainability in terms of strategy, should do worse in terms of practices. The cluster analysis helped in understanding that sometimes companies belonging to more committed clusters actually do not differentiate themselves, totally or in some areas, in terms of environmental practices. Therefore, companies that have an advantage in terms of strategic commitment to environmental sustainability are in danger of being reached by their followers because of the lack of differentiation. For instance, *prone to environmental sustainability* (*Cluster #02*) companies presented similarities to *subjected to environmental sustainability* (*Cluster #03*) firms in managing raw materials and governance,

despite claiming to be more committed to environmental sustainability. In addition, *committed to environmental sustainability* (*Cluster #01*) companies presented similarities to *prone to environmental sustainability* (*Cluster #02*) firms in managing products, supply, and materials, despite having the highest commitment to environmental sustainability.

This comparison should lead companies belonging to advanced clusters to define their priorities for action, by implementing environmental practices in those areas where there exist similarities to or limited differences with respect to followers.

Looking forward to become environmental leaders: Besides looking back, companies can also look forward in order to learn how more advanced companies (in terms of environmental strategy (environmental leaders)) turn their commitment into action by adopting specific environmental practices. While companies that are *subjected* and *prone to environmental sustainability* can learn from the cluster immediately ahead, companies *committed to environmental sustainability* can take inspiration from other industries, sectors, and businesses that are at the forefront in terms of environmental strategy and practice. Such an approach provides companies an opportunity to change their mindset and move their level of strategic commitment forward. For instance, the introduction of an advanced sustainability governance system requires decision-makers to be able to balance different priorities, thus highlighting the need for adaptive and flexible mechanisms of governance characterized by coordination, commitment, and participation rather than controls imposed through top-down, hierarchical authority [52]. This in turn requires redesigning the structures, processes, and relationships between and within stakeholder groups that control and coordinate access to decision-making and information as well as distribution/access to resources [53]. Companies that embark on this journey can thus become leaders of environmental sustainability, exploiting the actual possibilities of creating a sound and holistic business case for sustainability and consequently observing better financial performance.

6. Conclusions

In this article, a novel integrated model for corporate environmental management, structured into two areas (strategy and practices), was proposed. The model, which was derived from the literature and which is potentially applicable to any sector, was then tailored to the specific characteristics of the textile industry by involving a panel of experts, who were asked to give importance weights to stakeholder and practices categories. A survey was conducted within Italian textile companies, given the high contribution of Italy to the European textile sector. The results of the analysis offer valuable insights about how textile companies deal with environmental sustainability and provide a thorough characterization and definition of the environmental management strategy of these companies. Therefore, since Italy is the biggest textiles manufacturer in Europe (based on Eurostat 2019 data), this paper offers a first step toward an integrated corporate environmental management approach for a more sustainable global textile supply chain.

A cluster analysis was then performed with the aim of creating a typology of environmental strategies and associated practice patterns. Three significantly different groups were identified. Besides a group of rather passive companies (*subjected to environmental sustainability*), the analysis distinguished between an environmentally oriented (*prone to environmental sustainability*) and a fully committed (*committed to environmental sustainability*) group of textile companies within the sample. This typology reflected three distinct strategic approaches to environmental strategy that Italian textile companies are currently pursuing. A thorough assessment of the outcomes of the hierarchical cluster analysis based on significant variables related to practices gave a detailed characterization of the environmental management approach of the three environmental strategic types, revealing substantial misalignments. Additionally, three considerations that emerged from the analysis of the clusters were identified to support textile companies in their sustainability journey: *engaging with stakeholders*, *looking back to maintain an environmental advantage*, and *looking forward to become environmental leaders*.

Integrating various streams from current research focusing solely on a particular element (either environmental strategy or practices), this research offers a major theoretical contribution by creating and validating a model that considers both environmental strategy and practice dimensions and by operationalizing these dimensions. Moreover, the study provides an important contribution by using the model as a basis to develop an empirically based typology that sheds light on current environmental strategic types and associated practices of the Italian textile companies. However, the typology does not make a normative or positivistic categorization, but rather it depends on statistically significant differences between the firms in the sample.

This paper provides evidence of the relevance of making comparisons to peers, looking both to followers (looking back) and leaders (looking forward) to stimulate a transformation toward a fully sustainable textile industry. In particular, firms can use the conceptual model to identify their environmental sustainability position (which cluster they belong to) and plan actions for improvement on the basis of the proposed considerations. Several managerial tools that can be absorbed by drawing inspiration from environmental leaders operating in the same sector or in more advanced ones could support textile companies in their journey. However, an interdisciplinary lens to address the corporate environmental management domain is fundamental to make significant contributions, both academic and managerial. This means that collaborative research and development activities and projects across disciplines are essential to developing new materials, products, technologies, models, frameworks, and theories related to the different aspects and elements of this field. In addition, nonacademic participants such as managers and user groups and all relevant stakeholders (including local communities, public officers, and regulatory bodies) should be involved to strengthen the experiential foundations of the research in order to accomplish the main long-term environmental sustainability goals.

Finally, it is possible to point out some limitations that were connected with this study, which may turn into directions for future studies. First, in this study, only Italian companies were included, so future research could introduce textile companies from other countries in the sample to reach a higher generalizability and to explore how the local culture might affect environmental strategies and practices. Second, it would be interesting to extend the study to the whole fashion system, which, beyond textiles, includes clothing and leather segments: this would help to gain a holistic view of the fashion supply chain. Appling the conceptual model to other sectors different from textiles would allow for exacerbating sectorial trends, thus consolidating the importance of learning from experiences developed in different industries. Moreover, expanding the research by also considering the competitiveness and profitability performance of the companies would contribute to building a business case for environmental sustainability. A final future research avenue consists of enlarging the conceptual model to social sustainability aspects, which might provide evidence about the advantages of the synergetic development of social and environmental pillars.

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Appendix A

Table A1. The "Corporate Environmental Management Model".

The "Corporate Environmental Management Model"				
	Variable	**Item**	**Code**	**Measure**
		Strategic Dimension (STRAT)		
11	Environmental proactivity		*ENVPRO*	Three-point scale (where 1 = passive, 2 = reactive, 3 = proactive)
22	Competitive advantage (COMPADV)	*Differentiation*	*COMPADV_DIFF*	*Dummy variable (0 = no, 1 = yes)*
		Lower cost	*COMPADV_COST*	*Dummy variable (0 = no, 1 = yes)*
		None	*COMPADV_NO*	*Dummy variable (0 = no, 1 = yes)*
33	Integration of environmental and competitive strategies		*INTSTRAT*	Five-point Likert scale (where 1 = no integration and 5 = full integration)
44	Importance of stakeholders: external primary stakeholders		*STAKE_EXT_PRIM*	$STAKE_{EXT_{PRIM}} = IMP_{STAKE_{EXT_{PRIM}}} * \sum w_i * STAKE_{EXT_{PRIMi}}$ Scale: from 0 to 4.27
		Domestic customers	$STAKE\_EXT\_PRIM_1$	*Dummy variable (0 = no, 1 = yes)*
		International customers	$STAKE\_EXT\_PRIM_2$	*Dummy variable (0 = no, 1 = yes)*
		Domestic suppliers	$STAKE\_EXT\_PRIM_3$	*Dummy variable (0 = no, 1 = yes)*
		International suppliers	$STAKE\_EXT\_PRIM_4$	*Dummy variable (0 = no, 1 = yes)*
55	Importance of stakeholders: secondary stakeholders		*STAKE_SECO*	$STAKE_{SECO} = IMP_{STAKE_{SECO}} * \sum w_i * STAKE_{SECOi}$ Scale: from 0 to 3.42
		International rivals	$STAKE\_SECO_1$	*Dummy variable (0 = no, 1 = yes)*
		Domestic rivals	$STAKE\_SECO_2$	*Dummy variable (0 = no, 1 = yes)*
		International agreements	$STAKE\_SECO_3$	*Dummy variable (0 = no, 1 = yes)*
		Environmental NGOs	$STAKE\_SECO_4$	*Dummy variable (0 = no, 1 = yes)*
		Press	$STAKE\_SECO_5$	*Dummy variable (0 = no, 1 = yes)*

Table A1. *Cont.*

The "Corporate Environmental Management Model"				
	Variable	**Item**	**Code**	**Measure**
66	Importance of stakeholders: internal primary stakeholders		*STAKE_INT_PRIM*	$STAKE_{INT_{PRIM}} = IMP_{STAKE_{INT_{PRIM}}} * \sum w_i * STAKE_{INT_{PRIMi}}$ Scale: from 0 to 4.00
		Employees	$STAKE\_INT\_PRIM_1$	*Dummy variable (0 = no, 1 = yes)*
		Shareholders	$STAKE\_INT\_PRIM_2$	*Dummy variable (0 = no, 1 = yes)*
		Financial institution	$STAKE\_INT\_PRIM_3$	*Dummy variable (0 = no, 1 = yes)*
77	Importance of stakeholders: regulatory stakeholders		*STAKE_REG*	$STAKE_{REG} = IMP_{STAKE_{REG}} * \sum w_i * STAKE_{REGi}$ Scale: from 0 to 3.82
		National and regional governments	$STAKE\_REG_1$	*Dummy variable (0 = no, 1 = yes)*
		Local public agencies	$STAKE\_REG_2$	*Dummy variable (0 = no, 1 = yes)*
Practices Dimension (PRACT)				
11	Product		*PRACT_PROD*	$PRACT_{PROD} = IMP_{PRACT_{PROD}} * \sum w_i * PRACT_{PRODi}$ Scale: from 0 to 4.50
		Sustainable design	$PRACT\_PROD_1$	*Dummy variable (0 = no, 1 = yes)*
		Methods for environmental impact assessment (EIA)	$PRACT\_PROD_2$	*Dummy variable (0 = no, 1 = yes)*
		Product certification	$PRACT\_PROD_3$	*Dummy variable (0 = no, 1 = yes)*
22	Raw materials		*PRACT_RAWM*	$PRACT_{RAWM} = IMP_{PRACT_{RAWM}} * \sum w_i * PRACT_{RAWMi}$ Scale: from 0 to 1
		Sustainable raw materials	$PRACT\_RAWM_1$	*Dummy variable (0 = no, 1 = yes)*
		Certified raw materials	$PRACT\_RAWM_2$	*Dummy variable (0 = no, 1 = yes)*
		"Zero-km" raw materials	$PRACT\_RAWM_3$	*Dummy variable (0 = no, 1 = yes)*

Table A1. *Cont.*

The "Corporate Environmental Management Model"				
	Variable	**Item**	**Code**	**Measure**
33	Packaging		$PRACT\_PACK$	$PRACT_{PACK} = IMP_{PRACT_{PACK}} * \sum w_i * PRACT_{PACKi}$ Scale: from 0 to 2.70
		Reusable packaging	$PRACT\_PACK_1$	*Dummy variable (0 = no, 1 = yes)*
		Sustainable packaging materials	$PRACT\_PACK_2$	*Dummy variable (0 = no, 1 = yes)*
		Packaging optimization	$PRACT\_PACK_3$	*Dummy variable (0 = no, 1 = yes)*
44	Supply chain		$PRACT\_SUPPLY$	$PRACT_{SUPPLY} = IMP_{PRACT_{SUPPLY}} * \sum w_i * PRACT_{SUPPLYi}$ Scale: from 0 to 4.20
		Supplier selection considering environmental criteria	$PRACT\_SUPPLY_1$	*Dummy variable (0 = no, 1 = yes)*
		Environmental auditing program for suppliers	$PRACT\_SUPPLY_2$	*Dummy variable (0 = no, 1 = yes)*
		Collaboration with suppliers for improving their environmental performance	$PRACT\_SUPPLY_3$	*Dummy variable (0 = no, 1 = yes)*
55	Transportation		$PRACT\_TRANS$	$PRACT_{TRANS} = IMP_{PRACT_{TRANS}} * \sum w_i * PRACT_{TRANSi}$ Scale: from 0 to 3.10
		Logistics optimization	$PRACT\_TRANS_1$	*Dummy variable (0 = no, 1 = yes)*
		Low-impact vehicles	$PRACT\_TRANS_2$	*Dummy variable (0 = no, 1 = yes)*

Table A1. *Cont.*

The "Corporate Environmental Management Model"				
	Variable	**Item**	**Code**	**Measure**
66	Environmental management system (EMS)		*PRACT_EMS*	$PRACT_{EMS} = IMP_{PRACT_{EMS}} * \sum w_i * PRACT_{EMSi}$ Scale: from 0 to 3.50
		Implementation of an EMS	$PRACT\_EMS_1$	*Dummy variable (0 = no, 1 = yes)*
77	Energy management		*PRACT_ENER*	$PRACT_{ENER} = IMP_{PRACT_{ENER}} * \sum w_i * PRACT_{ENERi}$ Scale: from 0 to 4.40
		High-energy-efficiency equipment	$PRACT\_ENER_1$	*Dummy variable (0 = no, 1 = yes)*
		Renewable energy production	$PRACT\_ENER_2$	*Dummy variable (0 = no, 1 = yes)*
88	Water management		*PRACT_WAT*	$PRACT_{WAT} = IMP_{WAT} * \sum w_i * PRACT_{WATi}$ Scale: from 0 to 3.90
		Technologies for reducing water consumption	$PRACT\_WAT_1$	*Dummy variable (0 = no, 1 = yes)*
		Wastewater treatment before discharging	$PRACT\_WAT_2$	*Dummy variable (0 = no, 1 = yes)*
		Wastewater recycling and reuse	$PRACT\_WAT_3$	*Dummy variable (0 = no, 1 = yes)*
99	Waste management		*PRACT_WASTE*	$PRACT_{WASTE} = IMP_{PRACT_{WASTE}} * \sum w_i * PRACT_{WASTEi}$ Scale: from 0 to 3.80
		Waste reduction	$PRACT\_WASTE_1$	*Dummy variable (0 = no, 1 = yes)*
		Collection and reuse of waste	$PRACT\_WASTE_2$	*Dummy variable (0 = no, 1 = yes)*
		Separate waste collection	$PRACT\_WASTE_3$	*Dummy variable (0 = no, 1 = yes)*

Table A1. *Cont.*

The "Corporate Environmental Management Model"				
	Variable	**Item**	**Code**	**Measure**
110	Air emissions management		$PRACT\_AIR$	$PRACT_{AIR} = IMP_{PRACT_{AIR}} * \sum w_i * PRACT_{AIRi}$ Scale: from 0 to 3.60
		Air emissions reduction	$PRACT\_AIR_1$	*Dummy variable (0 = no, 1 = yes)*
		Heat recovery from exhausted gases	$PRACT\_AIR_2$	*Dummy variable (0 = no, 1 = yes)*
111	Materials		$PRACT\_MAT$	$PRACT_{MAT} = IMP_{PRACT_{MAT}} * \sum w_i * PRACT_{MATi}$ Scale: from 0 to 4.10
		Reduction of material use in company's operations	$PRACT\_MAT_1$	*Dummy variable (0 = no, 1 = yes)*
		Use of sustainable materials in company's operations	$PRACT\_MAT_2$	*Dummy variable (0 = no, 1 = yes)*
		Use of certified materials in company's operations	$PRACT\_MAT_3$	*Dummy variable (0 = no, 1 = yes)*
112	Culture		$PRACT\_CULT$	$PRACT_{CULT} = IMP_{PRACT_{CULT}} * \sum w_i * PRACT_{CULTi}$ Scale: from 0 to 4.20
		Employees' involvement in green initiatives	$PRACT\_CULT_1$	*Dummy variable (0 = no, 1 = yes)*
		Customers' involvement in green initiatives	$PRACT\_CULT_2$	*Dummy variable (0 = no, 1 = yes)*
		Other stakeholders' involvement in green initiatives	$PRACT\_CULT_3$	*Dummy variable (0 = no, 1 = yes)*
113	Governance		$PRACT\_GOV$	$PRACT_{GOV} = IMP_{PRACT_{GOV}} * \sum w_i * PRACT_{GOVi}$ Scale: from 0 to 4.30
		Sustainability disclosure	$PRACT\_GOV_1$	*Dummy variable (0 = no, 1 = yes)*
		Corporate functions for sustainability	$PRACT\_GOV_2$	*Dummy variable (0 = no, 1 = yes)*

Appendix B

Table A2. Test of significance of the differences between groups (one-way ANOVA).

		Sum of Squares	*df*	Mean Square	*F*	Sig.
Strategic Dimension (STRAT)						
ENVPRO	Between groups	14.592	2	7.296	17.990	0.000
	Within groups	121.666	321	0.406		
	Total	136.257	324			
COMPADV_DIFF	Between groups	1.901	2	0.950	3.928	0.021
	Within groups	72.594	321	0.242		
	Total	74.495	324			
COMPADV_COST	Between groups	1.757	2	0.879	4.154	0.017
	Within groups	63.457	321	0.212		
	Total	65.215	324			
COMPADV_NO	Between groups	1.917	2	0.958	8.055	0.000
	Within groups	35.694	321	0.119		
	Total	37.611	324			
INTSTRAT	Between groups	59.179	2	29.590	31.911	0.000
	Within groups	278.174	321	0.927		
	Total	337.353	324			
STAKE_EXT_PRIM	Between groups	213.828	2	106.914	168.277	0.000
	Within groups	190.604	321	0.635		
	Total	404.432	324			
STAKE_SECO	Between groups	2.596	2	1.298	7.886	0.000
	Within groups	49.381	321	0.165		
	Total	51.977	324			

Table A2. *Cont.*

		Sum of Squares	*df*	Mean Square	*F*	Sig.
STAKE_INT_PRIM	Between groups	23.507	2	11.754	14.866	0.000
	Within groups	237.196	321	0.791		
	Total	260.704	324			
STAKE_REG	Between groups	152.734	2	76.367	592.683	0.000
	Within groups	38.655	321	0.129		
	Total	191.389	324			
Practices Dimension (PRACT)						
PRACT_PROD	Between groups	25.043	2	12.522	10.213	0.000
	Within groups	367.822	321	1.226		
	Total	392.865	324			
PRACT_RAWM	Between groups	8.684	2	4.342	3.129	0.045
	Within groups	416.332	321	1.388		
	Total	425.016	324			
PRACT_PACK	Between groups	2.251	2	1.126	2.281	0.104
	Within groups	148.024	321	0.493		
	Total	150.275	324			
PRACT_SUPPLY	Between groups	52.603	2	26.302	25.103	0.000
	Within groups	314.328	321	1.048		
	Total	366.932	324			
PRACT_TRANS	Between groups	9.626	2	4.813	4.804	0.009
	Within groups	300.564	321	1.002		
	Total	310.191	324			

Table A2. *Cont.*

		Sum of Squares	*df*	Mean Square	*F*	Sig.
PRACT_EMS	Between groups	31.466	2	15.733	6.476	0.002
	Within groups	728.843	321	2.429		
	Total	760.309	324			
PRACT_ENER	Between groups	45.513	2	22.756	11.019	0.000
	Within groups	619.529	321	2.065		
	Total	665.042	324			
PRACT_WAT	Between groups	20.627	2	10.313	6.729	0.001
	Within groups	459.811	321	1.533		
	Total	480.437	324			
PRACT_WASTE	Between groups	9.052	2	4.526	6.227	0.002
	Within groups	218.053	321	0.727		
	Total	227.105	324			
PRACT_AIR	Between groups	14.953	2	7.476	5.186	0.006
	Within groups	432.494	321	1.442		
	Total	447.447	324			
PRACT_MAT	Between groups	19.047	2	9.523	7.238	0.001
	Within groups	394.730	321	1.316		
	Total	413.777	324			
PRACT_CULT	Between groups	36.089	2	18.045	13.439	0.000
	Within groups	402.810	321	1.343		
	Total	438.899	324			
PRACT_GOV	Between groups	20.790	2	10.395	9.280	0.000
	Within groups	336.024	321	1.120		
	Total	356.814	324			

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