LARGER AND GREENER: DISENTANGLING THE INDUSTRY EFFECT ON PROACTIVE ENVIRONMENTAL STRATEGY IN THE ITALIAN CONTEXT

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Abstract

This research aims to investigate the influence of the industrial context on the implementation of proactive environmental strategies in listed firms, by verifying how the industry environmental impact affects the development of proactive environmental strategies (PES). Prior research on PES identified firm size as one of the most relevant and universally accepted antecedent, but recently a new stream of research has underlined the importance of the industry context. Due to the difficulties of studying environmental issues in SMEs, extant research on the role of the environmental impact of industries on PES within SMEs is lacking. For this reason, this study investigates the influence of the industrial context on PES in SMEs, to verify how it affects PES. Beginning from the assumption that more resources imply a higher engagement in proactive environmental strategies (PES), this study verifies, through the industry-context perspective, that in environmentally critical industries, SMEs can be more proactive than large corporations. The results indicate that the adoption of PES is principally subject to the industry effect and that belonging to an industry characterised by a significant environmental impact fosters the adoption of a more proactive approach to environmental issues. The relation is confirmed for both SMEs and large firms, not only within the two categories but also transversely. Thus, this research shows that SMEs working in environmentally critical industries show significant degrees of interest, motivation, and implementation of environmental management issues. This highlights that SMEs in environmentally critical industries place relative importance on managerial implications, risk management, and compliance, are less interested in external appraisal or initiatives that require huge investments.

Keywords: Environmental Management, Industry, Environmental Impact, SMEs, Proactive Environmental Strategy

1. INTRODUCTION

In the past decades, the impact of firms' activities on the natural environment has emerged as a rising challenge for businesses, so that recently academics began focusing on the development of proactive environmental strategies (PES), defined as systematic patterns of voluntary environmental policies and practices, going beyond regulatory requirements (Aragón-Correa et al., 2008). Prior research on PES identified firm size as one of the most relevant and universally accepted antecedents (Brammer & Pavelin, 2006; Baumann-Pauly, Wickert, Spence, & Scherer, 2013), but many studies have underlined

that also the industry context shapes significantly the environmental proactivity of firms (Schmitz et al., 2017; Campbell, 2007). Due to the difficulties of studying environmental issues in SMEs (Perrini et al., 2007), it is possible to affirm that research on the role of the environmental impact of industries on PES within SMEs is lacking (Brammer, Hoejmose, & Marchant, 2012) or overlooked. For this reason, this study investigates the influence of the industrial context on PES in SMEs, to verify how it affects environmental proactivity.

Both academics and practitioners have discussed the reasons that led a growing number of firms to implement environmental policies and practices (Pedersen & Gwozdz, 2014; Lampikoski et al., 2014; Bansal & Roth, 2000). Initially, previous studies discussed the importance of compliance with new environmental laws (Revell & Blackburn, 2007), but subsequently, the discussion was centered on the development of PES. Generally, extant research indicated that the larger the firm, the higher the involvement of the firm in environmental issues (Brammer & Pavelin, 2006; (Brammer & Pavelin, 2006; Baumann-Pauly, Wickert, Spence, & Scherer, 2013). Beyond size, the range of the antecedents of environmental proactivity (Vishwakarma et al., 2018; Liu et al., 2010) includes institutional pressures (Darnall, 2009), investment opportunities (Sjöström & Welford, 2009), top managers' attitudes (Sharma, 2003), and potential financial returns (Wagner, 2005; Wood, 2010).

Recently, the recognition that the context where firms operate has an influence on how decision-makers perceive the environment, interpret it, and react to it (Hartmann & Vachon, 2018) highlighted that the industry context can shape environmental proactivity (Schmitz et al., 2017; Campbell, 2007), in particular with regard to the environmental impact of the firm's industry. Previous studies indicated that PES varies significantly among industries with a high environmental impact (the so-called environmentally critical industries) and industries with a low environmental impact (the so-called environmentally non-critical industries) (Galani et al., 2012; Perrini et al., 2007).

Thus far, extant research has focused mostly on large corporations (Hart & Dowell, 2011; McWilliams & Siegel, 2001). Given the vital role of small and medium enterprises (SMEs) in economic development (Baumann-Pauly, Wickert, Spence, & Scherer, 2013), recently, research has analysed how such organisations implement PES (Lewis et al., 2015; Tyler et al., 2018), thereby indicating how the behaviour of SMEs differs from that of larger firms. Initially, previous studies attempted to apply the framework used for large firms to SMEs. However, subsequently, the unique characteristics of SMEs have justified the need for a more specific approach for them (Lewis et al., 2015; Morsing & Perrini, 2009).

About firm size, previous research demonstrated that resources within SMEs are also valuable, as environmental proactivity is higher in medium-sized businesses than in small ones (Brammer, Hoejmose, & Marchant, 2012). The importance of the industry context regarding environmental proactivity also appears to be valid within SMEs (Tyler et al., 2018; Lewis et al., 2015; Williams & Schaefer, 2013; Jamali et al., 2009).

Thus, this study aims at deepening the knowledge on the influence of the industrial context on PES in SMEs, by verifying how the industry environmental impact affects the environmental proactivity of firms, and if such an influence changes according to the dimension of the firm. The prospective analysis focuses on the scarcely investigated Italian SMEs, whose importance and peculiarity have generally been recognised in the literature as well as in practice (Longo et al., 2005) and globally known as a relevant context for understanding SMEs. For a broader comprehension of the investigated phenomenon, data have been collected by examining both large firms and SMEs and conducting telephonic interviews with members of 210 firms listed on the Italian Stock Exchange.

The article is structured in the following manner. The first part provides an overview of the theoretical background on PES in SMEs, examining its main antecedents. After a description of the research methodology, the adoption of PES by SMEs in environmentally critical and non-critical industries is compared to the context of these practices in large firms to identify the different impacts of size and industry effects. Results lead to a discussion of the findings and contributions, which principally refers to the individuation of interests, benefits, and practices that can foster PES in SMEs, particularly in environmentally critical industries.

2. THEORETICAL BACKGROUND

2.1. Proactive environmental strategies

The natural environment has become a significant issue in the context of the relationship between business and society (Wood, 2010), evolving from a mere compliance issue (Liu et al., 2010; Darnall, 2009) into a more strategic and voluntary matter (Lampikoski et al., 2014; Hamann et al., 2017). The phenomenon explains why it is increasingly important for firms to have a strategy-oriented approach to the natural environment and implement systematic patterns of voluntary environmental policies and practices (Aragón-Correa et al., 2008; Wijethilake, 2017). Such an approach has been defined as PES (Gonzalez-Benito & Gonzalez-Benito, 2006; Dahlmann, F. et al., 2008; Sangle, 2010); as it implies a higher level of effort in comparison to what current legislation and regulations require (Aragón-Correa et al., 2008). This definition is derived by the concept of environmental proactivity, which has been defined as "the voluntary adoption of measures which help reduce the environmental impact" (Barba-Sánchez & Atienza-Sahuquillo, 2016).

Extant literature has proposed various antecedents of PES (Vishwakarma et al., 2018), such as external and internal pressures to overcome regulatory compliance (Testa et al., 2011), the organisational context, design and learning (Sharma, 2000; Sharma & Vredenburg, 1998) and competitive forces (Russo & Perrini, 2010). Recently, a few studies acknowledged that the adoption of PES is

also strongly influenced by firm motives (Gonzalez-Benito & Gonzalez-Benito, 2006; Sangle, 2010); these motives can be summarised into three main categories: profitability, legitimation and ecologic attitude (Dahlmann, Frederik et al., 2008). Numerous studies have observed that companies operate primarily with for-profit motivations so that PES is considered as a tool for increasing short-term revenues (Lion et al., 2013). Other studies concentrate on legitimation, thereby indicating that PES is a tool to respond to stakeholders' requests regarding the environmental impact of firm processes and outcomes (Henriques & Sadorsky, 1999). Further, the ecologic attitude implies the moral obligation through which stakeholders recognise the activities that fit with the main ethical standards and principles of the company (Porter & Kramer, 2006). A more recent group of studies emphasised the role of strategic motivations (Wijethilake, 2017), which combines the ecologic attitude with the need of firms to manage environmental issues to create a long-term competitive advantage (Kurapatskie & Darnall, 2013) through the implementation of PES (Buysse & Verbeke, 2003).

Thus far, most of the contributions to environmental management and PES stem from the resource-based view (RBV) (Wernerfelt, 1984) and the following natural resource-based view of a firm (Shrivastava & Hart, 1995). These theories emphasise the role of resources that are unique, difficult to imitate or substitute, and valuable for the customer in creating competitive advantage; this implies that the environmental activities of a firm are a specific form of dynamic capability that can lead to better performance, both economic and environmental (Russo & Fouts, 1997).

About resources, many studies in this field have emphasised the impact of firm size and resources on PES (Williamson et al., 2006), thereby indicating that sustainable practices are more prevalent in larger firms (Baumann-Pauly, Wickert, Spence, & Scherer, 2013). Previous research has stated that the implementation of PES requires early investments and the presence of formal processes and systems dedicated to environmental management in various business areas (Dahlmann, et al., 2008; Sweeney, 2007; Buysse & Verbeke, 2003), through which firms can improve their environmental and business performance (Darnall et al., 2008). Even within SMEs, previous articles have recognised that the diffusion of environmental management processes is more significant in the medium rather than in small businesses (Brammer, Hoejmose, & Marchant, 2012), especially for what concerns manufacturing and marketing (Dahlmann, et al., 2008). Furthermore, it has been stated that the differences between SMEs and large firms cannot be overcome simply by scaling down practices for large firms to SMEs context (Uhlaner et al., 2012), as resources and regulatory requirements don't decrease equally (Aragón-Correa et al., 2008; Williamson et al., 2006). Also, such studies put in evidence that the strong ties between ownership and management increase the importance of personal motivations (Spence & Rutherfoord, 2003). As Dalhmann et al. (2008) pointed out; the evaluation of PES requires to take into consideration firm environmental motivation about environmental management processes and systems.

2.2. The industry context

Some scholars have argued that the RBV was not suitable to be applied universally as it does not consider the role of the context in which firms operate, but the subsequent Contingent Resource-Based View was able to integrate this theory by proposing that the advantages of resources and capabilities are also dependent on the context in which they are deployed (Schilke, 2014). The contingent perspective indeed could integrate RBV with exogenous factors that were usually absent from this literature, positing that competitive advantage is the "result of the proper alignment of endogenous organisational design variables with exogenous context variables" (Aragón-Correa & Sharma, 2003, p. 3). Additionally, the contingency perspective extended the RBV of the natural environment explaining the effect of the industry environment on the development of a proactive environmental strategy, namely "why two firms with similar resources (…) may develop different environmental strategies" (Aragón-Correa & Sharma, 2003, p. 4).

According to the contingent approach, the industry context influences how decision-makers perceive their environment, interpret it and react to it (Hartmann & Vachon, 2018).

The industry context is often operationalised along three dimensions: the degree of dynamism (Eisenhardt & Martin, 2000), the level of munificence (Misangyi et al., 2006) and the amount of complexity (DeSarbo, Di Benedetto, Song, & Sinha, 2005). However, another stream of research has highlighted the importance of the environmental impact of industries (Seiffert, 2008), affirming that industries can be divided into two categories: environmentally critical industries and environmentally non-critical industries. According to this perspective, 'environmentally critical' industries include energy, construction, and extractive, engineering, chemical, and public utility industries; 'environmentally non-critical' industries include consumer goods, financial services, communications and market services industries (Galani et al., 2012; Perrini et al., 2007). The influence of the environmental impact of industries on PES is derived by the assumption that industries have diverse characteristics (Galani et al., 2012), which may relate to risks, potential growth, employment opportunities, competition and government interference (Gao et al., 2005). Thus, firms that operate in environmentally critical industries must manage a wide range of environmental issues, as well as greater pressures from their stakeholders related to environmental performance (Monteiro & Aibar-Guzman, 2009). Previous research showed that the implementation of PES is higher in environmentally critical industries than in non-critical ones (Preuss, 2005), because firms in environmentally critical industries are under public scrutiny and, therefore, achieve strong environmental performances more frequently (Carbone et al., 2012). Also, previous research has

also shown that businesses from environmentally critical industries tend to report more extensively on environmental performance (Brammer & Pavelin, 2004) and disclose environmental information than companies from environmentally non-critical industries (Gao et al., 2005; Brammer & Pavelin, 2008).

2.3. The industry context for SMEs

Extant research on PES has mostly focused on large firms (Kurapatskie & Darnall, 2013), and there is a growing interest in how and why SMEs adopt PES (Revell & Blackburn, 2007; Hamann et al., 2017). In fact, SMEs comprise much of businesses in most countries, accounting for approximately 99% of all enterprises in the European Union (Moore & Manring, 2009). Previous research stated that the differences between SMEs and large firms could not be overcome simply by scaling down practices for large firms to the SMEs context (Uhlaner et al., 2012), as resources and regulatory requirements do not decrease in the same proportion (Aragón-Correa et al., 2008; Williamson et al., 2006).

About the RBV, as significant early investments are required to engage organisations in environmental management (Sweeney, 2007), existing literature hypothesises that SMEs are less involved in implementing PES as compared to large firms (Baumann-Pauly, Wickert, Spence, & Scherer, 2013). In fact, previous research emphasised that SMEs might face certain difficulties in dealing with strategic issues related to the natural environment, because of the absence of organisational units dedicated to environmental issues as well as of structured processes and systems (Simpson et al., 2004; Uhlaner et al., 2012). A few empirical studies have partially contradicted these assumptions, indicating that in certain industries SMEs may be able to successfully adopt complex PES, as large companies do (De Clercq & Voronov, 2011; Hoogendoorn, Guerra, & van der Zwan, 2015; Aragón-Correa et al., 2008); however, the results have not been clearly generalized.

About antecedents, previous research indicates that regulation is usually one of the essential precursors for SMEs to engage in environmental management, whereas other motivations play a smaller role (Revell & Blackburn, 2007). However, Brammer et al. (Brammer, Hoejmose, & Marchant, 2012) showed that compliance with regulation has become less important for SMEs, whereas strategic motives are becoming increasingly significant (Worthington & Patton, 2005; Lucato, Costa, & de Oliveira Neto, 2017).

The industry context plays a vital role in fostering PES within SMEs (Williams & Schaefer, 2013), as it determines a firm's potential usage of natural resources as well as its potential to pollute (Brust & Liston-Heyes, 2010). Previous studies indicated that SMEs operating in more sensitive industries have the opportunity to benefit from the adoption of higher environmental standards (Williamson et al., 2006) and differentiate themselves from similar firms by adopting PES (Uhlaner et al., 2012). Therefore, SMEs operating in environmentally sensitive industries are encouraged to function in a more environmentally responsible manner, as confirmed by the positive relationship between the industry effect and environmentally friendly behaviour (Hoogendoorn, Guerra, & van der Zwan, 2015; Perrini et al., 2007).

Notwithstanding the presence of various studies on SMEs, literature has mainly investigated the industry effect on PES in large companies or on limited samples through explorative analyses; however, there is little research in the context of SMEs. Considering that SMEs are significantly present in both environmentally critical and non-critical industries as well as the fact that it is challenging to study environmental issues in SMEs (Perrini et al., 2007), it is possible to affirm that research on the role of environmental impact on PES within SMEs requires further analysis (Brammer, Hoejmose, & Marchant, 2012). Earlier researchers who addressed the subject of environmental issues in SMEs sampled companies exclusively from industries that have been associated with a high level of environmental impacts.

Thus, this study aims to deepen the knowledge on the influence of the industrial context on PES in SMEs by verifying how the industry environmental impact affects the ecological response of firms, and if such an influence changes according to firm size. In this context, the following hypotheses are considered:

H1: Firm size affects PES: large firms are more environmentally proactive than SMEs.

H2: Industry environmental impact affects PES: firms operating in high environmental impact industries are more environmentally proactive than firms operating in low ecological impact industries.

As recommended by previous studies, a way to recognize the actual relevance of PES is referring to the presence of formal managerial structures and processes (Dahlmann, Frederik et al., 2008), even if some studies argue that such formalization may represent a limit to innovation (Könnölä & Unruh, 2007; Wagner, Marcus, 2009). Environmental management processes are explicit environmental management tools that participate in the strategic planning process (Buysse & Verbeke, 2003), whereas environmental management systems are formalised management systems that allow firms to reduce their negative environmental impacts, comply with legislation and improve its stakeholder management by monitoring systematically the environmental aspects of their processes (Atienza-Sahuquillo & Barba-Sánchez, 2014). In this context, the following hypotheses are considered:

H3: Firm size influences environmental management processes: large firms implement environmental processes more often than SMEs.

H4: Industry environmental impact influences environmental management processes: firms operating in high environmental impact industries implement environmental processes more frequently than firms operating in low environmental impact industries.

H5: Firm size influences environmental management systems: large firms implement Environmental Systems more often than SMEs.

H6: Industry environmental impact influences environmental management systems: firms operating

in high environmental impact industries implement environmental systems more frequently than firms operating in low environmental impact industries.

3. METHODOLOGY

3.1. Sample

Prior research on SMEs adopted diverse methods to categorise enterprises. Researchers mainly employed quantitative measures to recognise SMEs. In some instances, researchers imposed a cut-off amount of 250 employees to distinguish between SMEs and large corporations (Ahire & Golhar, 1996); in contrast, in other cases, researchers identified SMEs as those companies which have less than $2 million in a turnover or less than $5 million in total assets (Dilts & Prough, 1989). Other authors used qualitative criteria to identify SMEs, highlighting that small firms represent a business which is "run and controlled under the direct supervision of the owner" (Verhees & Meulenberg, 2004, p. 135). For this study, some employees, the most common criteria, was used to classify SMEs as firms with less than 250 employees and large companies as those with over 250 employees (Russo & Tencati, 2008).

The advanced analysis focuses on the Italian context, whose importance and peculiarity regarding SMEs has generally been recognised in the literature as well as in practice and globally recognised as a relevant context for understanding SMEs (Longo et al., 2005). For a broader comprehension of the investigated phenomenon, data have been collected both for large firms and SMEs, by interviewing 210 firms listed on the Italian Stock Exchange: listed companies usually have greater societal visibility, good economic performance, and are subject to specific duties with regard to the disclosure of environmental information because of the legal requirements (Liu et al., 2010). Besides, listed firms disclose more frequently their environmental practices as a tool of their stakeholder management (Yang et al., 2018).

Beginning from the idea that environmental impacts are strictly related to the nature of industry, previous studies were targeted to analyse the adoption of PES in SMEs operating in environmentally critical industries (e.g. extractive, metals and engineering, chemicals, printing and paper industries) (Brammer, Hoejmose, & Marchant, 2012), as these firms are exposed to many of the most pressing environmental pressures. To contribute to the academic debate, this study sampled firms from both industries which traditionally have significant environmental impacts (environmentally critical industries) and industries that do not have significant environmental impacts (environmentally non-critical industries).

3.2. Data collection

In March 2016, all 262 companies listed on the Italian Stock Exchange were approached by email through their corporate office to verify their interest in this research. When a suitable respondent was identified, a telephonic interview was conducted. Even though a lot of effort is required in data collection, the methodology of the telephonic interview was used because it provides a high response rate and reduces incompleteness, misunderstanding and inappropriateness in responses compared to other survey data collection methods (Lavrakas, 1993). To elicit responses that genuinely reflect the respondents' view, each respondent was assured that his or her identity and the name of the organisation would remain anonymous.

Beginning with the original sampling universe of 262 companies, a total of 210 questionnaires were obtained from March to September 2016. At the end of the data collection, an overall response rate of 80.2% was reached, which is higher than similar survey-based research. The final whole sample comprised 70 SMEs (28 small and 42 medium) and 150 large corporations.

As earlier research suggests that the level of engagement of a company towards PES depends on the size of the firm and on its context, for the purpose of this study we categorized firms in a 4-typology scheme to highlight the conjunct effect of these two factors. We measured firm size using the total number of employees and codified as "large" firms with a total number of employees higher than 249, and as "SMEs" firms with a total number of employees lower than 249. With regard to the industry effect, following earlier research, the extractive, metals and engineering, chemical, energy and public utility industries were considered environmentally critical; the other industries were categorized as environmentally non-critical (Galani et al., 2012).

Thus, we individuate the following categories of firm: "Large Critical" (LAR-CI), in which we included firms operating in environmentally critical industries with a total number of employees higher than 249; "Large Non-Critical" (LAR-NCI), in which we included firms operating in environmentally non-critical industries with a total number of employees higher than 249; "SMEs Critical" (SME-CI), in which we included firms operating in environmentally critical industries with a total number of employees lower than 249; "SMEs Non-Critical" (SME-NCI), in which we included firms operating in environmentally non-critical industries with a total number of employees lower than 249 (see Table 1).

Table 1. Firm typology

	Critical	*Non Critical*	*Total*
Large	29	111	140
SMEs	14	56	70
Total	43	167	210

To check for non-respondent bias, we conducted t-tests to verify whether there were significant differences between respondent and non-respondent listed companies. And the tests were run for size (t=0.217 p=0.787) and for operativity in critical industries (t=0.999 p=0.319). None of the tests was significant, suggesting that non-respondent bias does not impact the results. The companies that did not take part in the analysis were 50, namely 14 SMEs and 36 large firms.

3.3. Measures

Following earlier similar studies to reflect the breadth and multifaceted nature of environmental management, different scales were used. Environmental proactivity data were collected by analysing how firms are engaged in specific environmental issues. We relied on the typology of environmental issues developed by Waddock and Graves (Waddock & Graves, 1997). As done in previous studies, respondents were asked to indicate the extent of their organisation's involvement in each of these issues on a 5-point Likert scale, where zero indicated strong disagreement and four indicated strong agreement (see Table 2).

To reduce the items in the data into one factor that would represent the original data to the furthest extent possible, a principal components analysis was conducted (Hair et al., 1998). The final factor's internal reliability was acceptable because Cronbach's alpha was over the cut-off value of 0.9, and the sampling adequacy was reliable because Kaiser-Mayer-Olkin (KMO) coefficients were over the cut-off value of 0.7 (Nunnally, 1978).

To understand the motivations underlying the implementation of PES, the questions to be used were adapted from Sangle (Sangle, 2010), as these questions seek to capture the perception of advantages that can be gained from PES (see Table 3). We decided to rely on a questionnaire already validated, that reduced the semantic variations, and includes key dimensions derived referring to previous work done on the adoption of proactive environmental strategies (Aragón-Correa & Sharma, 2003; Aragón-Correa et al., 2008; Russo & Fouts Pa., 1997; Sharma & Vredenburg, 1998).

Data were also collected on different processes and systems adopted by the firms. These typologies were developed by a list adopted by Dahlmann et al. (2008), and respondents were asked to indicate the extent of their organisation's involvement in each of the processes and systems on a 5-point Likert scale, where zero indicated no implementation, and four indicated complete implementation (see Table 4).

The questionnaire was translated from English into Italian, and then back-translated into English to avoid any bias resulting. We also combined back-translation with other techniques, namely a pilot study and the use of independent reviewers, i.e., parties other than the translators, who reviewed the translated questionnaire (Chidlow et al., 2014).

Nonetheless, the quantitative methods used are consistent with research methods in SMEs calling for cross-national studies (Mullen et al., 2009).

The tables presented in the paper provide the mean scores for each element that was considered for the two groups of the sample based on size: SMEs (firms with less than 250 employees) and large firms (firms with more than 250 employees). The tables also show differences in mean scores between firms which operate in environmentally critical or non-critical industries.

To test the significance of differences in variance between large and small firms and between critical and non-critical industries, t-tests (χ^2) were conducted (Hair et al., 1998). To complete the analysis, differences between large firms operating in critical industries and those operating in non-critical industries and differences between SMEs in critical and non-critical industries were also presented. Because the data required different levels of measurement, non-parametrical test (Kruskal-Wallis) techniques were used to test the variance among the means of the four identified groups (Siegel, 1956). To better highlight the differences, the tables also show the rankings of each of the strategies based on the size of the mean rating relative to the size of the other means.

4. RESULTS

4.1. PES

First, the extent of PES in sample companies was explored to evaluate the importance of the various environmental issues in which a firm may be interested, as prior research suggests (Perrini et al., 2007).

Examining environmental proactivity, Table 2 shows that SMEs ($M = -0.33$; $\chi^2 = -3.1$; $p < 0.01$) are generically less proactive as compared to large companies (0.13), thereby confirming *H1*, in line with the results of previous studies. However, it is possible to verify a few interesting particularities by taking into consideration the industry context. Firms belonging to critical industries ($M = 0.50$; $\chi^2 = -6.5$; $p < 0.05$) are considerably more proactive in environmental strategies than firms belonging to non-critical industries ($M = -0.30$; $\chi^2 = -6.5$; $p < 0.05$), confirming *H2*; these differences are particularly meaningful in relation to emissions ($M = 2.45$ vs. $M = 1.52$), energy ($M = 2.40$ vs. $M = 1.50$) and waste ($M = 2.13$ vs. $M = 1.39$).

The results confirm that LAR-CI is considerably more engaged than other firms in all the analysed issues, but also highlight that SME-CI shows a stronger commitment ($M = -0.05$; $\chi^2 = -2.5$; $p<0.01$) than LAR-NCI ($M = -0.27$; $\chi^2 = -6.1$; $p < 0.01$). Indeed, SME-CI are rather involved in PES, particularly regarding emissions and pollution ($M = 1.83$), energy ($M = 1.78$) and waste management ($M = 1.74$). In most cases, SME-CI are more proactive than LAR-NCI. SME-NCI are generally not very environmentally proactive, with negative peaks on water ($M = 1.00$), climate change ($M = 1.00$), biodiversity ($M = 1.00$) and hazardous waste ($M = 1.03$) and a slight interest only in recycling issues ($M = 1.35$). However, the low commitment is consistent with that of firms working in non-critical industries, as also confirmed by low rankings of LAR-NCI in water ($M = 1.34$), hazardous waste ($M = 1.13$), biodiversity ($M = 1.05$) and climate change ($M = 1.00$).

Table 2. Descriptive statistics on environmental proactivity in critical/non-critical industries and in SMEs/large companies

	Critical			*Non-critical*			χ^2	*Large*			*SMEs*			χ^2	*Large*						χ^2	*SMEs*						χ^2	*Kruskal Wallis*
															Critical			*Non-critical*				*Critical*			*Non-critical*				
	M	SD	R	M	SD	R		M	SD	R	M	SD	R		M	SD	R	M	SD	R		M	SD	R	M	SD	R		
Environmental proactivity (α=0.882)	0.50	1.18		-0.3	0.67		-6.5**	0.13	1.07		-0.33	0.70		3.1**	0.70	1.21		-0.27	0.73		-6.1**	-0.05	0.92		-0.50	0.45		-2.5**	40.5**
Recycling	1.92	1.29	5	1.56	1.16	1	-2.1*	1.83	1.29	3	1.40	0.99	3	2.3*	2.08	1.32	5	1.65	1.24	1	-2.1*	1.48	1.12	5	1.35	0.92	1	-1.4	15.6**
Waste	2.13	1.40	3	1.39	0.85	4	-4.7**	1.81	1.22	4	1.40	0.92	3	2.3*	2.27	1.45	3	1.48	0.91	4	-4.1**	1.74	1.18	3	1.19	0.66	4	-1.6*	23.9**
Water	2.06	1.50	4	1.24	0.70	5	-5.3**	1.71	1.26	5	1.23	0.81	4	2.7**	2.23	1.56	4	1.34	0.81	5	-4.5**	1.61	1.23	4	1.00	0.00	6	-2.2**	30.2**
Energy	2.40	1.47	2	1.50	1.11	3	-5.1**	2.03	1.41	2	1.45	1.03	2	2.9**	2.63	1.50	2	1.60	1.19	3	-4.7**	1.78	1.20	2	1.24	0.86	3	-1.5*	35.0**
Emission and pollution	2.45	1.44	1	1.52	1.06	2	-5.4**	2.06	1.35	1	1.48	1.10	1	2.9**	2.68	1.42	1	1.63	1.12	2	-5.1**	1.83	1.34	1	1.27	0.87	2	-1.2	35.1**
Hazardous waste	1.56	1.14	6	1.12	0.50	7	-3.8**	1.36	0.92	6	1.15	0.61	5	1.6	1.65	1.20	6	1.16	0.58	7	-3.3**	1.35	0.93	6	1.03	0.16	5	-0.4*	13.6**
Climate change	1.41	1.03	8	1.14	0.66	6	-2.3*	1.35	0.97	7	1.00	0.00	7	2.8**	1.56	1.17	8	1.20	0.78	6	-2.3*	1.00	0.00	8	1.00	0.00	6	--	16.8**
Biodiversity	1.49	1.11	7	1.03	0.25	8	-4.5**	1.29	0.86	8	1.05	0.39	6	2.0*	1.63	1.22	7	1.05	0.30	8	-4.3**	1.13	0.63	7	1.00	0.00	6	-0.2	25.4**

Notes: 0 = strongly disagree; 1 = disagree; 2 = neutral; 3 = agree; 4 = strongly agree
determinant > 0.0000001; K.M.O. = 0.914; varimax rotation
** p-value < 0.05; ** p-value < 0.01*

Table 3. Descriptive statistics on the motivations of environmental proactivity in critical/non-critical industries and SMEs/large companies

	Critical			*Non-critical*			χ^2	*Large*			*SMEs*			χ^2	*Large*						χ^2	*SMEs*						χ^2	*Kruskal-Wallis*
															Critical			*Non-critical*				*Critical*			*Non-critical*				
	M	SD	R	M	SD	R		M	SD	R	M	SD	R		M	SD	R	M	SD	R		M	SD	R	M	SD	R		
Motives																													
Cost reduction	2.13	1.81	3	1.77	1.58	1	-1.5	2.12	1.80	1	1.40	1.21	2	2.9**	2.35	1.91	3	1.95	1.71	1	-1.3	1.52	1.38	2	1.32	1.11	1	-0.6	10.1*
Compliance	2.25	1.50	2	1.58	1.19	3	-3.6**	2.00	1.42	2	1.47	1.13	1	2.6**	2.45	1.51	2	1.68	1.26	4	-3.4**	1.70	1.36	1	1.32	0.94	1	-1.2	19.4**
Reputation	1.62	1.12	6	1.35	0.76	5	-2.1*	1.59	1.03	6	1.13	0.50	7	3.3**	1.82	1.24	6	1.43	0.83	5	-2.3*	1.09	0.42	6	1.16	0.55	3	0.6	15.0**
Customer relations	1.85	1.18	4	1.54	1.09	4	-1.9	1.83	1.22	3	1.27	0.76	4	3.3**	2.00	1.21	4	1.70	1.21	3	-1.5	1.43	0.99	3	1.16	0.55	3	-1.4	15.0**
Managerial	1.80	1.61	5	1.32	1.09	6	-2.6*	1.59	1.42	6	1.33	1.11	3	1.2	1.90	1.69	5	1.36	1.16	6	-2.3*	1.52	1.38	2	1.22	0.92	2	-1.0	8.1*
Environmental benefit	1.38	1.17	8	1.67	1.50	2	1.5	1.67	1.50	5	1.27	1.01	4	1.9	1.45	1.28	8	1.82	1.62	2	1.5	1.17	0.83	5	1.32	1.11	1	0.6	6.3
Employee relationship	1.58	1.28	7	1.25	0.85	7	-2.2*	1.49	1.18	7	1.10	0.54	8	2.5*	1.79	1.44	7	1.28	0.91	7	-2.6**	1.00	0.00	7	1.16	0.69	3	1.1	14.5**
Risk management	2.32	1.56	1	1.16	0.63	9	-7.5	1.80	1.36	4	1.20	0.71	5	3.2**	2.65	1.60	1	1.20	0.71	9	-7.5**	1.43	1.04	3	1.05	0.33	5	-2.1**	58.4**
Supplier relations	1.27	0.82	9	1.18	0.59	8	-0.9	1.24	0.71	8	1.17	0.64	6	0.7	1.27	0.79	9	1.22	0.65	8	-0.5	1.26	0.92	4	1.11	0.39	4	-0.9	0.7

Notes: 0 = strongly disagree; 1 = disagree; 2 = neutral; 3 = agree; 4 = strongly agree
** p-value < 0.05; ** p-value < 0.01*

4.2. Industry context and motivations for proactivity

The analysis of the benefits that firms perceive has led to some interesting findings, by indicating certain tendencies in the approach to environmental sustainability by firms.

Table 3 shows that for firms operating in environmentally critical industries, the benefits that can be derived from PES are perceived as important, especially the benefits related to compliance (M = 2.25). The importance of firm size is confirmed as well, as SMEs appraise the potential advantages less than large companies in terms of cost reduction (M = 1.40 vs. M = 2.12), compliance (M = 1.47 vs. M = 2.00), customer relations (M = 1.27 vs. M = 1.83) and risk management (M = 2.00). However, by comparing these categories, it is possible to gain more insights into the motivation of implementing PES.

LAR-CI show a greater interest in risk management (M = 2.65), compliance (M = 2.45) and cost reduction (M = 2.45), coherently with what was observed previously; LAR-NCI have similar interests in cost reduction (M = 1.95), customer relations (M = 1.70) and compliance (M = 1.68). Nonetheless, findings show that the effect of firm size is not predominant in any case, as it is possible to verify that SME-CI perceives managerial benefits (M = 1.52) and risk management issues (M = 1.43) as more important and have the same consideration for compliance (M = 1.70). Finally, for SME-NCI, the previous considerations are valid, although the results show that cost reduction (M = 1.35) and compliance (M = 1.35) are considered slightly more important.

4.3. Industry context and environmental management processes

Table 4 presents the results related to environmental processes and systems, which are helpful for understanding how PES is translated into specific initiatives.

Regarding environmental management processes, at a general level, *H3* is confirmed, as SMEs scarcely adopt environmental management processes, as the results are systematically lower than those for large corporations, including environmental policies (M = 1.27 vs. M = 1.88), environmental targets (M = 1.27 vs. M = 1.72) and internal audits (M = 1.17 vs. M = 1.59). Results confirm *H4*, as firms that are operating in a critical sector implement considerably more processes than those operating in other sectors. Beginning with the confirmation that the general level is below average, data confirm that environmental policies are more frequently implemented in environmentally critical industries (M = 2.09) than in environmentally non-critical (M = 1.44) ones; this also includes environmental targets (M = 2.01 vs. M = 1.30) and internal audits (M = 1.93 vs. 1.16).

Thus far, the analysis of environmental processes is consistent with previous literature, but further analysis shows some meaningful aspects that must be considered. In fact, considering both size and industry effects highlights that SME-CI employs external information (M = 1.61) and internal audits (M = 1.35) more than other practices and that they employ these practices more than LAR-NCI do (M = 1.20 and M = 1.16). Further, SME-CI adopts fewer practices than LAR-CI, as the latter confirm a robust adoption of environmental policies (M = 2.34), environmental targets (M = 2.23) and internal audits (M = 2.15). Examining SME-NCI reveals that there is a moderately low diffusion of these practices, even if, in certain cases, the values are close to those of LAR-NCI (e.g., for external information, M = 1.16 in both cases).

4.4. Industry context and environmental management systems

When considering firm size, the differences between large companies and SMEs have less weight. Results confirm *H5*, indicating that SMEs have a barely but still important minor application of environmental management systems, except ISO 14001 (M = 1.55), where differences with large companies are significant (M = 2.39).

As suggested by *H6*, environmental management systems appear strongly influenced by the industry context, which requires that firms belonging to environmentally critical industries achieve significant results in all the considered items, beginning with ISO 14001 (M = 2.85) and environmental management systems (M = 2.29), whereas firms in other sectors have lower values, with the maximum established again by ISO 14001 (M = 1.68).

Moreover, the intersection of firm size and industry context enables the determination of a different trend among the four categories considered here. In this case, there are again lower values for SME-NCI, while the values for SME-CI are slightly higher than those for LAR-NCI. In greater detail, SME-CI and LAR-NCI have similar values for the adoption of the Eco-Management and Audit Scheme (EMAS) (M = 1.26 vs. M = 1.13) and ISO 14001 (M = 1.91 vs. M = 1.83) but not for environmental management systems that appear more often in SME-CI (M = 1.70 vs. M = 1.23). However, this section of analysis has indicated a completely different context in LAR-CI, which adopts more thorough environmental systems, particularly ISO 14001 (M = 3.19) and environmental management systems (M = 2.52).

5. DISCUSSION

This research aspires to contribute to the literature on the PES in SMEs, by investigating the influence of the industrial context on proactive environmental strategy in small- and medium-sized enterprises (SMEs). In particular, this research examines how the industry environmental impact affects the proactivity of firms in the adoption of environmental policies and practices, and if such an influence changes according to the dimension of the firm. Thus far, in fact, the industry-context has been overlooked in some of its components, whereas this study indicated that the industry environmental impact could lead to a more consistent evaluation of the PES within SMEs.

Table 4. Descriptive statistics on environmental management processes and systems in critical/non-critical industries and in SMEs/large companies

	Critical			*Non-critical*			χ^2	*Large*			*SMEs*			χ^2	*Large*						χ^2	*SMEs*						χ^2	*Kruskal-Wallis*
															Critical			*Non-critical*				*Critical*			*Non-critical*				
	M	SD	R	M	SD	R		M	SD	R	M	SD	R		M	SD	R	M	SD	R		M	SD	R	M	SD	R		
Env. management processes																													
Environmental management plan	0.08	0.28	6	0.11	0.32	5	0.7	0.11	0.32	7	0.07	0.25	5	1.0	0.10	0.30	7	0.13	0.33	6	0.53	0.04	0.21	6	0.08	0.28	4	0.56	1.6
Environmental policy	2.09	1.24	1	1.44	0.92	2	-4.4**	1.88	1.19	1	1.27	0.69	2	3.7**	2.34	1.28	1	1.56	1.02	2	-4.16**	1.43	0.84	2	1.16	0.55	2	-1.51	32.7**
Environmental targets	2.01	1.27	2	1.30	0.83	3	-4.9**	1.72	1.19	3	1.27	0.69	2	2.8**	2.23	1.34	2	1.36	0.92	3	-4.67**	1.43	0.84	2	1.16	0.55	2	-1.51	32.3**
Internal audit	1.93	1.18	3	1.16	0.54	4	-6.3**	1.59	1.03	4	1.17	0.56	3	3.0**	2.15	1.24	3	1.20	0.61	4	-6.15**	1.35	0.78	3	1.05	0.33	3	-2.04**	45.9**
External audit	0.01	0.11	7	0.07	0.26	7	2.0*	0.05	0.21	8	0.05	0.22	6	-0.1	0.00	0.00	8	0.08	0.27	8	2.30*	0.04	0.21	6	0.05	0.23	5	0.18	5.1
Annual review	0.18	0.38	5	0.10	0.30	6	-1.7	0.15	0.35	6	0.08	0.28	4	1.2	0.19	0.40	6	0.11	0.32	7	-1.36	0.13	0.34	5	0.05	0.23	5	-1.03	4.3
External information	1.82	1.04	4	1.16	0.73	4	-5.4**	1.47	0.96	5	1.33	0.84	1	0.9	1.90	1.07	5	1.16	0.74	5	-5.04**	1.61	0.94	1	1.16	0.73	2	-2.06**	38.7**
Guidelines	1.82	1.41	4	1.49	1.07	1	-1.9*	1.77	1.35	2	1.27	0.76	2	2.7**	2.03	1.55	4	1.58	1.16	1	-2.05*	1.26	0.69	4	1.27	0.80	1	0.05	9.9**
Env. management systems																													
Environmental management system	2.29	1.11	2	1.16	0.53	3	-9.9**	1.76	1.03	2	1.27	0.76	2	3.3**	2.52	1.04	2	1.23	0.62	2	-9.51**	1.70	1.11	2	1.00	0.00	4	-3.85*	80.3**
EMAS	1.66	1.16	3	1.11	0.62	4	-4.4**	1.41	1.00	4	1.15	0.66	4	1.8	1.81	1.23	3	1.13	0.67	4	-4.36**	1.26	0.86	3	1.08	0.49	3	-1.03	30.5**
ISO: 14001	2.85	1.44	1	1.68	1.24	1	-6.3**	2.39	1.47	1	1.55	1.17	1	3.9**	3.19	1.30	1	1.83	1.32	1	-6.25**	1.91	1.41	1	1.32	0.94	1	-1.94	48.4**
Other	1.59	1.23	4	1.22	0.76	2	-2.7**	1.42	1.08	3	1.23	0.72	3	1.2	1.71	1.36	4	1.22	0.76	3	-2.83**	1.26	0.69	3	1.22	0.75	2	-0.23	9.64*

Notes: 0 = strongly disagree; 1 = disagree; 2 = neutral; 3 = agree; 4 = strongly agree
** p-value < 0.05; ** p-value < 0.01*

Beginning from the assumption that SMEs are less engaged in PES, this study has verified, through the industry-context perspective, that some SMEs can be more proactive than large corporations. The results indicate that the PES is principally subject to the industry-context and suggests that belonging to an industry characterised by a significant environmental impact fosters adoption of a more proactive approach to environmental issues. This is confirmed for both SMEs and large firms, not only within the two categories but also transversely. Also, this research shows that the adoption of the PES in SMEs is considerably influenced by the industry-context, as SMEs working in environmentally critical industries show significant degrees of interest, motivation and implementation towards environmental management issues (Dahlmann, Frederik et al., 2008).

Furthermore, the analysis of the motivations that lead to proactivity reveals a slightly different context. Given that large firms in critical industries have a definitively clear perception of the potential benefits, this study highlights that SMEs in environmentally critical industries place relative importance on managerial implications, risk management, and compliance. Again, despite the requirements for operating in selected industries, SMEs are stimulated to overcome and exploit these through a proactive approach, which implies turning a potential problem into an opportunity. Conversely, SMEs have a lower perception of benefits that are generically positively associated with firm sizes, such as cost reduction and improved reputation (Williamson et al., 2006; Hoogendoorn, Guerra, & van der Zwan, 2015). In these cases, the results are consistent with previous studies (Brammer & Pavelin, 2006), confirming that large companies give more regard to external appraisal and allocate more resources for tackling investments and modifying their core activities.

About environmental management processes, the findings of this study indicated that firms belonging to environmentally critical industries focus on processes related to technical and precise issues, such as targets, audits, and disclosure. This is valid for SMEs and large companies, even if the influence is significantly higher for the latter. Also, the analysis of processes confirms the trend observed for motivations, where larger firms adopt more communication-focused environmental processes. More precisely, environmental policy and guidelines are more widespread among large companies than SMEs, because these processes may embody a generic commitment and may not need to meet precise or technical obligations.

The results (see Table 4 above) of the implementation of systems indicate that universal systems, like ISO 14001, are highly diffused at the point where certification can be considered a prerequisite for operation in many industries. On the contrary, proper environmental management systems are more frequently adopted in environmentally critical industries, even if the level of SMEs is always lower than that of large firms. In fact, in environmentally critical industries, it is preferable to adopt a structured system which is useful for managing all the issues in an integrated manner. Nonetheless, EMAS certification is less widespread, as firms can obtain such certification for each single production site, implying that a significant amount of resources is required to achieve it for the entire group of plants.

6. CONCLUSION

In conclusion, this research has some implications for academics, practitioners, and policy-makers. For academics, there is the suggestion to deepen the current theory on SMEs to overcome possible stereotypes regarding their approach to environmental management. Future research should integrate more appropriately the industry-context perspective to be able to describe properly PES, which would be conversely only superficially investigated. Thus, industry environmental impact variables should be included in future studies, not only as control variables but also to more appropriately examine the effects of their interaction with other dimensions. Specifically, for analysis of SMEs, the study indicates that some issues vary significantly among industries with different environmental impacts. Future studies must evaluate the best perspective to adopt for research, by the nature of the subject of analysis.

This study provides possible indications for practitioners regarding the importance of environmental management, which is an issue not only for firms operating in environmentally critical industries but a theme with many potential advantages for all kinds of firms, including SMEs. This study identified the practices that may be used as leverage to foster the diffusion of the PES in SMEs, and, in particular, a few indications on the practices suitable to be adopted according to the industry in which the firms are operating.

Finally, the study offers some hints to policy-makers, as it recommends overcoming the assumption that the SMEs are less engaged in PES than large firms. If adequately motivated, SMEs can make a commitment to PES greater than large firms, by means of both monetary and non-monetary incentives promoting the adoption of PES. Besides, the different behaviours observed between environmentally critical and non-critical industries suggest differentiating policies among industries. In particular, in critical industries, where proactivity is enhanced, reward systems may favour further initiatives by firm more effectively than compliance initiatives. Conversely, in non-critical industries, where external pressures and motivations towards PES are scarce, new legal obligations may be necessary to foster the adoption of the environmental commitment considered adequate by the legislator.

The study confirmed that a small company operating in an environmentally critical industry needs to be proactive to compete with other firms, as the industry requires the maintenance of high standards. However, being small requires proactivity and, since SMEs have fewer resources, the challenge for managers and entrepreneurs is to identify new answers which need to be creative, innovative, informal and different from those of large firms (Lampikoski et al., 2014).

Finally, the study suggests that such answers must focus on specific areas of interest and the most relevant issues related to the industry, as a generic or randomised approach may not be suitable for providing appropriate advantages.

Despite the significant results of the study, the generalizability of the findings may be reduced by certain limitations regarding research design. The first limitation is related to the methodology adopted for investigating the proposed issues. As the study builds on the analysis of two dummy variables as independent variables, we considered that more sophisticated techniques would have been neither appropriate nor suitable for the purpose of the study. Consequently results may be less generalizable, but the analysis is consistent with previous studies (Brammer, Hoejmose, & Marchant, 2012) that were intended to shed light on the context of SMEs putting in evidence how the behaviour of such firms is different from others, with significant insights for both academics and practitioner. Another limitation is the geographical scope of the sample, which is remarkably significant but focused exclusively on Italian firms. Italy is recognised in the literature as a meaningful context for the presence and relevance of SMEs (Perrini et al., 2007), but the geographical scope of the data raises concerns regarding the generalizability of the results. The theme analysed in this study is mainly related to internal processes; therefore, it was preferable to employ a questionnaire for data collection. Thus, data could be investigated more broadly and significantly improved in further research by conducting a more in-depth study of strategic planning and impact measurement.

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