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THE DARK SIDE OF ISO 14001: THE SYMBOLIC ENVIRONMENTAL BEHAVIOR

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ABSTRACT

Some of the academic research on ISO 14001 has focused on analyzing the benefits of its adoption. However, this international standard has also received some criticism, particularly in respect of the adoption of ISO 14001 when not accompanied by significant improvements in environmental performance. This study analyzes the relationship between the symbolic environmental behavior and the adoption of ISO 14001. In so doing, it uses binary logistic regression to analyze an international sample of 1,961 manufacturing facilities that each employs more than 50 people. The results indicate that the higher the symbolic environmental performance of the firm, the greater the probability of adopting ISO 14001.

KEYWORDS: symbolic environmental behavior, ISO 14001, environmental performance, logistic binary regression

JEL CODES: Q530; Q560; M190; M140

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1. INTRODUCTION

Since the official launch of ISO 14001 in 1996, more than 320,000 organizations worldwide have certified their environmental management systems (EMSs)[1] through this standard (ISO, 2014). Numerous studies have shown the benefits that businesses can achieve by adopting ISO 14001: organizational (e.g., Delmas, 2001), commercial (e.g., Iatridis and Kesidou, 2016; King et al., 2015), those related to improving corporate reputation (e.g., Jiang and Bansal, 2003), and those related to stakeholders' management (e.g., Castka and Prajogo, 2013; Heras and Boiral, 2013). However, several critics have questioned the symbolic manner in which some firms adopt this standard (Aravind and Christmann, 2011; Boiral, 2007; Yin and Schneider, 2009). Such symbolic adoption refers to the firm's use of ISO 14001 as a way to legitimize their environmental performance, seeking the support of the institutions but without necessarily implying a substantive environmental commitment (Aravind and Christmann, 2011; Delmas and Montes Sancho, 2010; Iatridis and Kesidou, 2016). Initially, the primary motivation of the first firms that adopted ISO 14001 appeared to be to improve production efficiency (Russo, 2009) or to comply with legal requirements on environmental matters (Jiang and Bansal, 2003). However, nowadays, firms that choose to adopt ISO 14001 may be motivated to a greater extent by the increasing institutional legitimacy that it provides (Aravind and Christmann, 2011; Boiral, 2007; Castka and Prajogo, 2013; King et al., 2005; Yin and Schneider, 2009). For example,

[1] An EMS is "*a formal system for articulating goals, making choices, gathering information, measuring progress, an improving performance*" (Florida and Davison, 2001:64)

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King et al. (2005) indicate that the adoption of ISO 14001 can reduce and even avoid the problems of asymmetric information in certain transactions (i.e., one of the agents does not have sufficient credible information about the environmental performance of the other agent involved). Thus, when firms prefer to give priority to external legitimacy rather than internalizing a substantive environmental performance (Delmas and Montes Sancho, 2010), variations may occur in terms of environmental performance when they adopt particular environmental practices (Boiral, 2007), as in the case of ISO 14001. Aravind and Christmann (2011) have shown that the results of the environmental performance of firms that adopted ISO 14001 with a low level of implementation (i.e., firms that had not invested a great deal of time or resources in maintaining and updating their EMSs) were not significantly different from the results of firms that did not adopt ISO 14001.

The aim of this paper is to analyze whether a symbolic environmental behavior is related to the adoption of ISO 14001. This is based on the premise that managers do not choose to uniformly adopt ISO 14001 (i.e., adopting yes or no), but the result of their decision may also include the option of adopting the standard in a symbolic manner. To analyze this relationship this study draws on data from a survey conducted by the Environmental Directorate of the Organisation for Economic Co-operation and Development (OECD) and uses binary logistic regression to analyze an international sample comprised of 1,961 facilities in different manufacturing sectors. The results suggest a positive relationship between symbolic environmental behavior and the adoption of ISO 14001.

2. BENEFITS AND CRITICISM OF THE ADOPTION OF ISO 14001

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The adoption of ISO 14001 can generate competitive advantage for firms (e.g., Darnall, 2006; Delmas, 2001; Russo, 2009) through the promotion and development of distinctive skills in organizational, commercial, and related stakeholder management. With regard to organizational skills, the adoption of ISO 14001 may represent a valuable and intangible resource because it provides an ideal frame for the effective development of an EMS (Delmas, 2001). Improvements in operational efficiency can emerge because ISO 14001 is based on the principle of continuous improvement (Bansal and Hunter, 2003). ISO 14001 promotes internal assessments in the consumption of energy and resources, the implementation of cost analysis in the life cycle, and other similarly advanced practices of environmental management that are directly related to the reduction in environmental impacts (Ferron and Darnall, 2016; Potoski and Prakash, 2005). In addition, the adoption of ISO 14001 is positively associated with the development of complementary resources and skills related to obtaining competitive advantage, such as the adoption of quality management systems or the investment in new technologies and innovation (Darnall, 2006; Darnall and Edwards, 2006).

With respect to business skills, the overall trend of the adoption of ISO 14001 facilitates international trade through the harmonization of environmental management standards (Bansal and Hunter, 2003; Christmann and Taylor, 2001, 2006; Delmas, 2002). In the literature, the adoption of ISO 14001 has been considered as a possible solution for solving the problems of asymmetric information[2] between international trading partners (Christmann and Taylor, 2006; Heras and Boiral, 2013; King et al.,

[2] Asymmetric information problems occur when information about a transaction between a supplier and a buyer is not available equally to both (King et al., 2005).

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2005; Montiel et al., 2012) due to the signaling[3] conferred by the adoption of ISO 14001. This signaling reduces the costs associated with the transactions that occur in the value chain (Christmann and Taylor, 2006; Delmas, 2002; Heras and Boiral, 2013) as the adoption of ISO 14001 demonstrates that the firm meets certain requirements that are otherwise difficult for external agents (who are not involved in the internal processes of the firm) to observe (Montiel et al., 2012). Moreover, the adoption of ISO 14001 can award preferential access to foreign markets (Iatridis and Kesidou, 2016) that rely on ISO 14001 being widely recognized internationally (Delmas, 2002). In fact, even if the costs of adopting ISO 14001 can be high (Darnall, 2006), the pressure exerted by the markets and the customers is one of the main reasons why firms (especially those that implement advanced environmental management practices or are required to provide information about their environmental impacts) consider the investment in ISO 14001 to be worthwhile (Darnall, 2006; Delmas and Montiel, 2009; Jiang and Bansal, 2003). By adopting ISO 14001, firms can reap the benefits of credible signaling (King et al., 2005) and can thus legitimize their environmental performance (Aravind and Christmann, 2011).

In terms of skills related to managing stakeholders (e.g., customers, suppliers, labor unions, communities, environmental groups, regulators, etc.), the adoption of ISO 14001 is often motivated by *normative*[4] pressures. This is because the adoption of ISO 14001, being voluntary, facilitates and legitimates firm's environmental practices to

[3] The signaling is understood as activities that firms adopt in order to try to demonstrate that they have certain characteristics that, in other circumstances, would be hidden from third parties (Montiel et al., 2012).

[4] DiMaggio and Powell (1983) argued that organizations operating in similar institutional contexts tend to exhibit isomorphism, i.e., a consistent behavior pattern among them. Specifically normative isomorphism refers to the professionalization of certain management practices in the industrial sector.

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meet the demands of stakeholders (Heras and Boiral, 2013). For example, Castka and Prajogo (2013) found that secondary stakeholders (e.g., local communities, social groups, NGOs, etc.) might be influential when adopting ISO 14001 in firms interested in obtaining the benefits associated with the improved reputation that the standard can generate. In addition, those firms that continually seek innovative environmental solutions to address the pressures of external stakeholders (Henriques and Sadorsky, 1999) tend to adopt ISO 14001 in order to facilitate the integration of the demands of the stakeholders in the decision-making process (Castka and Prajogo, 2013; Delmas, 2001). Including the objectives of the stakeholders in the design of an EMS, and the subsequent adoption of ISO 14001, may involve the development of a valuable skill that is difficult to imitate by competitors because of the complexity and the inherent causal ambiguity of this process (Delmas, 2001).

However, despite these benefits, in recent years some of the literature on ISO 14001 has focused on highlighting the drawbacks associated with its adoption (Boiral, 2011; Boiral and Gendron, 2011; Heras et al., 2013). For example, from interviews with 189 employees (management and non-management), Boiral (2011) provided an overview of the main criticisms that arise in practice when adopting ISO 9001 and ISO 14001, such as the excessive bureaucratization required by the system, the limited character of continuity to assess the improvements obtained, or even the lack of rigor, focus, and confidence of audits carried out by third parties (Heras et al., 2013). The current study aims to examine some of these criticisms, specifically those related to the symbolic adoption of ISO 14001. In this regard, several studies have argued that the adoption of ISO 14001 is not always accompanied by significant improvements in the firm's environmental performance (Yin and Schneider, 2009). One criticism is that the adoption of ISO 14001 is not necessarily associated with the development of

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organizational capabilities that enable the firm to achieve significant reductions in their negative environmental impacts. This is because ISO 14001 is focused on the process and not on the results to be obtained (Bansal and Hunter, 2003; Delmas, 2001). Significant differences in environmental performance may even appear among firms with ISO 14001, despite having similar characteristics such as operating in the same sector or having a similar size (Yin and Schmeidler, 2009). In fact, previous studies have found inconclusive, and even negative results on the relationship between the adoption of ISO 14001 and the firm's environmental performance (e.g., Jiang and Bansal, 2003; King et al., 2005; Lannelongue et al., 2015; Yin and Schmeidler, 2009). Indeed, several studies have shown that there may be significant variations between firms in the development and implementation of ISO 14001 and that these variations can significantly affect the achievement of improvements in environmental performance (King et al., 2005; Yin and Schmeidler, 2009). For example, a study by Yin and Schmeidler (2009) found that a group of firms had adopted ISO 14001 and had "done only the minimum", thus transforming this adoption in a simple bureaucracy process. Thus, the adoption of ISO 14001 does not guarantee either a similar level of environmental performance nor consistency in the implementation of advanced environmental practices between undertakings (Boiral, 2011).

In contrast, the aspiration for legitimacy, as the main advantage related to the reputation granted by the adoption of ISO 14001, can become a double-edged sword. The adoption of the standard for the sole purpose of legitimizing management practices sometimes generates symbolic or superficial adoption (Aravind and Christmann, 2011; Boiral, 2007; Iatridis and Kesidou, 2016). This symbolic adoption involves the use of ISO 14001 as a way to legitimate the environmental practices of firms seeking the support of the institutional context but without necessarily implying an effective commitment to

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internal improvement (Aravind and Christmann, 2011). For example, Boiral (2007) found a "ritual integration" of ISO 14001 in firms with a low level of employee involvement and a high level of intensity in the pressures of their institutional context. This symbolic adoption damages ISO 14001 bases, such as continuous improvement in environmental performance, pollution prevention, and compliance with environmental regulations (ISO, 2014). Thus, confidence in the ability of standard to reduce the problems of asymmetric information (King et al., 2005) can increase the number of adopters of ISO 14001, but, in turn, this work suggests that is also positively related to environmental symbolic behavior, which can harm ISO 14001 as a signal. Thus, the adoption of ISO 14001 may be closely linked to the decoupling between achieving institutional legitimacy and achieving significant improvements in environmental performance (Aravind and Christmann, 2011; Boiral, 2007). This calls into question the confidence in ISO 14001 as a signal of the environmental performance of the firm (Montiel et al., 2012; Rondinelli and Vastag, 2000).

3. SYMBOLIC BEHAVIOR AND ENVIRONMENTAL PERFORMANCE

Symbolic behavior, as one of the reasons that firms' give for certifying several management systems (e.g., quality, environmental, among others), has been analyzed in literature about ISO standards in general (e.g., Boiral, 2011; Chirstmann and Taylor, 2006; Heras and Boiral, 2013) and about ISO 9001 in particular (e.g., Terlaak and King, 2006). In the case of environmental management, this study assumes that environmental symbolic behavior refers to firm' adoption of advanced practices of environmental management with the purpose of legitimizing actions but without achieving significant improvements in environmental performance. In the case of ISO 14001, previous literature has demonstrated a positive relation between its adoption and the achievement

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of improvements in environmental performance (Castka and Prajogo, 2013; Potoski and Prakash, 2005; Rondinelli and Vastag, 2000; Russo, 2009). However, the voluntary nature of ISO 14001 adoption (due to managers having to decide whether to commit resources for this adoption) could generate the impression that the firm is environmentally responsible when, in fact, that might or might not be the case (Darnall, 2006; Rondinelli and Vastag, 2000). This study considers that different profiles of ISO 14001 adoption exist, and variations among them could be associated with different results on firms' environmental performance.

When managers choose to adopt ISO 14001 they take into account their own internal motivations (González Benito and González Benito, 2005), the isomorphic pressures of the context in which the firm develops its activity (Yin and Schmeidler, 2009), as well as the potential advantages they achieve through its adoption (Castka and Prajogo, 2013; Heras et al., 2016). Depending on their ability to address these circumstances, they will decide whether to adopt (or not) ISO 14001 based on a symbolic approach or, in contrast, with a greater level of involvement in terms of environmental commitment, time, and resources (Boiral, 2007; Delmas and Montes Sancho, 2010; Lannelongue et al., 2015; Yin and Schmeidler, 2009).

In contrast to the symbolic adoption, firms that adopt ISO 14001 with a substantive approach (Delmas and Montes Sancho, 2010), that is, firms that are able to develop an effective response in reducing negative environmental impacts, evaluate, manage, and control a wide range of these impacts with the primary aim of decreasing (and even eliminating) them. Not only are they interested in appearing environmentally responsible, but also of being so. Firms that adopt this profile *de facto* can benefit not only from the commercial, reputational, and stakeholders-related advantages of ISO 14001, but they can also achieve internal or operational improvements (i.e. e., those

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related to organizational efficiency). As opposed to this *de facto* environmental behavior, a symbolic environmental behavior is achieved by adopting environmental practices (e.g., ISO 14001) with the aim of legitimization through the institutional context but without necessarily implying significant improvements in environmental performance (Aravind and Christmann, 2011; Boiral, 2007).

This symbolic behavior attempts to acquire the signaling that ISO 14001 confers to its adopter (Jiang and Bansal, 2003), even though the negative environmental impacts to which these firms pay attention are low (or even zero) and, therefore, they do not achieve significant improvements in their environmental performance. Consequently, this paper proposes that there is a positive relationship between this symbolic environmental behavior and the adoption of ISO 14001.

> ***Hypothesis:*** *The higher the firm's symbolic environmental behavior (i.e., adoption of environmental practices without achieving significant improvements in environmental performance), the greater the probability of adopting ISO 14001.*

4. METHOD

4.1. Data

Data for this study were obtained through a questionnaire developed by the Environmental Directorate of the Organisation for Economic Co-operation and Development (OECD) and a group of internationally renowned researchers[5]. The

[5] The author is grateful for the collaboration of Professor Nicole Darnall, one of the researchers who participated in the survey elaboration.

questionnaire was sent to facilities with at least fifty employees from different manufacturing industries in Germany, Canada, the United States, France, Hungary, Japan, and Norway. Note that these industries produce higher levels of pollution in the air, water, and land than do the services sectors (Stead and Stead, 1992). The OECD questionnaire was tested in France, Canada, and Japan prior to being translated into the official language of each country. The respondents were facility managers responsible for environmental issues. The OECD sent two consecutive mailings to ensure obtaining additional answers. During the development of the questionnaire four specific biases in the use of surveys were avoided: non-response, lack of generalization, social desirability, and common method variance[6]. The final response rate was 24.7% (4,186 facilities), which is consistent with response rates of previous studies about environmental practices (e.g., Christmann, 2000; Melynk, Sroufe and Calantone, 2003). The final sample for this study consists of 1,961 facilities.

4.2. Variables

The dependent variable of this study was the adoption of ISO 14001. This variable was measured using an item of the OECD questionnaire that asked managers: "*Has your facility acquired ISO 14001 environmental certification?*" Respondents answered: (1) "Yes" or (0) "No". There were three explanatory variables: "improvements in environmental performance", "importance of corporate image in adopting environmental practices", and "symbolic environmental behavior".

First, to measure the variable "improvements in environmental performance" I relied on several items that asked respondents: "*Have you experienced a change in your facility*

[6] For more detail, see Ferrón and Darnall (2016).

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in the following environmental impacts per unit of output of your product or production process in the last three years: use of natural resources (energy, water, etc.), solid waste generation, wastewater effluent, local or regional pollution of air and global pollutants (e.g., greenhouse gases)?". Respondents could answer: (1) "significant decreases", (2) "decreases", (3) "no change", (4) "increases", and (5) "significant increases". For each of the five mentioned environmental impacts, responses "1" and "2", which were identified with "significant decreases" and "decreases" respectively, were grouped under the label "improvements", whereas responses "3", "4", and "5", which were identified with "no changes", "increases", and "significant increases" respectively, were grouped under the label "no improvements". Thus, five dichotomous variables (i.e., one for each of the five impacts) were created in which the score "1" corresponded to the label "improved environmental performance" and the score "0" corresponded to the label "without improvements in environmental performance".

Following this, an ordinal variable was created that grouped the five dichotomous variables related to improvements in environmental performance so that the maximum improvement that a facility could achieve was 5 (i.e., there are improvements in the five environmental performance measures) and the minimum was 0 (i.e., no improvement in any of the measures of environmental performance). The average of this new ordinal variable was 2.26.

Second, the variable "importance of corporate image in adopting environmental practices" was measured by an item in OECD questionnaire that asked managers: "*What has been the importance of the motivation for "improved corporate image" on the adoption of the environmental practices of your facility?*" Respondents could answer: (1) "not important", (2) "moderately important", or (3) "very important". Based on this item, a new dichotomous variable was created in which the score "1" corresponded to

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"improving corporate image is a very important motivation to adopt environmental practices" and the score "0" corresponded to the remaining options.

Finally, the explanatory variable "symbolic environmental behavior" was measured using a combination of the two categories of the explanatory variables previously explained. A new dichotomous variable was created as follows. On the one hand, from the ordinal variable that reflected the number of improvements in environmental performance (explained above), only cases in which environmental improvements were equal to or less than "2" were considered (since the average improvement was 2.26). On the other hand, only cases in which the "importance of corporate image in adopting environmental practices" was equal to "1" (i.e., "improved corporate image" is very important when adopting environmental practices) were considered. Based on this combination a new dichotomous variable was formed in which the score "1" corresponded to the "symbolic environmental behavior" (i.e., considering those facilities that simultaneously had not experienced improvements in their environmental performance but whose managers considered corporate image to be very important motivation in the adoption of environmental practices) and "0" corresponded to no such symbolic behavior (i.e., the remainder of the cases). Table 1 shows the descriptive statistics and correlations of each of the OECD items.

INSERT TABLE 1 HERE

Since the sample used in this work consists of facilities located in countries with heterogeneous environmental legislation, Table 2 shows the distribution of the sample size, differentiating, by rows, the proportion of facilities that participated in the sample by country and, by columns, the dependent variable "adoption of ISO 14001", the

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explanatory variable "symbolic environmental behavior", and the percentage of symbolic adoption of ISO 14001 over the total.

INSERT TABLE 2 HERE

4.3. Statistical technique

The procedure used to test the hypothesis of this work is binary logistic regression. This technique is useful when trying to predict the relationship between a dichotomous dependent variable (in this case, adoption of ISO 14001: yes or no) and a set of explanatory variables (in this case, symbolic environmental behavior). The method used in this case was the step forward binary logistic regression. In the first step (base model), "improvements in environmental performance", "importance of corporate image", and the control variables "size" (measured by the number of employees in each facility) and "country" were included, whereas in the second step (full model) all variables contained in the base model were included and the explanatory variable "symbolic environmental behavior" was added. The coefficients estimated by the model, that is, Exp (B), may be used to ascertain the *odd ratio* of each independent variable introduced into the model. Thus, the values of Exp (B) represent the relationship between change in the probability of the dependent variable (i.e., adoption of ISO 14001) and change in a unit in the explanatory variable (i.e., symbolic environmental behavior) in the case of being statistically significant.

5. RESULTS

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Table 3 shows the measure of the model's goodness of fit through the result of the classification. The diagonal of the classification table shows the successes between what is predicted and what is observed. The success percentage of the classification is between 67.2% and 72.7% in the base model (step 1) and in the full model (step 2) respectively. This increase in the success percentage manifests the significant improvement that the inclusion of the explanatory variable "symbolic environmental behavior" implies in the goodness of fit of the final model.

INSERT TABLE 3 HERE

Table 4 shows the results of the binary logistic regression. Both models are statistically significant (χ^2 = 316,766; p< .01 y χ^2 = 324,728; p< .01 for base model and full model respectively). The R^2 values are especially useful when comparing the R^2 values of two models that use the same data, the fit being better in those models with higher R^2 value. In this case, the increasing progression of the R^2 value (e.g., from 0.211 to 0.216 in Nagelkerke's R^2) shows that the inclusion of the explanatory variable "symbolic environmental behavior" improves the explicative quality of the full model.

INSERT TABLE 4 HERE

In the base model, the estimated coefficient for the variable "improvements in environmental performance" (B = 0.312, p<.01) is positive and statistically significant, a result that corroborates previous literature that defends the existence of a positive relationship between the adoption of ISO 14001 and improvements in environmental performance (Delmas, 2001; Russo, 2009). Similarly, also in the base model, the

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estimated coefficient for the variable "importance of corporate image" (B = 0.364, p <.01) is positive and statistically significant, which shows the positive relationship between the adoption of ISO 14001 and managers' motivation for improving corporate image as very important when adopting environmental practices in the firm.

With regard to the full model, the estimated coefficient for the variable "symbolic environmental behavior" (B = 0.526, p <.05) is positive and statistically significant, indicating the existence of a positive relationship between the adoption of ISO 14001 and symbolic environmental behavior. The interpretation of this result, by the value of Exp (B), for the explanatory variable indicates that the probability of adopting ISO 14001 is 1.691 times more likely when a symbolic environmental behavior exists, everything else remaining constant. The change in the probability of the dependent variable to a change of the explanatory variable is calculated as follows:

$$Likelihood\ (ISO\ 14001\ adoption) = Exp\ (B)/[1+ Exp\ (B)] =$$
$$= 1.691/(1 +1.691) = 62.84\%$$

Consequently, the probability of the adoption of ISO 14001 increases by 62.84% when there is a symbolic environmental behavior. This result supports the hypothesis of this study that states that the higher the firm's symbolic environmental behavior, the more likely it is to adopt ISO 14001.

6. DISCUSSION, CONCLUSION, AND IMPLICATIONS

One of the main criticisms of ISO 14001 refers to its questionable potential to develop a firm's capacity related to the reductions in negative environmental impacts, which can cannibalize confidence in the standard as a consequence of providing a symbolic signaling of the environmental behavior of the firm. This research has examined the relationship between the firm's symbolic environmental behavior and the adoption of

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ISO 14001. The results contribute to the previous literature that has studied the symbolic adoption of ISO 14001 (Aravind and Chirstmann, 2011; Castka and Prajogo, 2013; Iatridis and Kesidou, 2016; Yin and Schneider, 2009), indicating that the more symbolic the environmental behavior of the firm, the greater the likelihood of adopting ISO 14001.

Firms with symbolic profiles try to gain legitimacy through the adoption of ISO 14001 but they do not necessarily achieve improvements in environmental performance. Consequently, this symbolic adoption of ISO 14001 results in corporate behavior that contributes to the degradation of confidence in the standard. It is important to note that ISO 14001 is adopted not only by firms with symbolic environmental behavior, but also by environmentally committed firms. However this lack of differentiation between these two groups involves combining under one label (i.e., "firms with ISO 14001") both symbolic behaviors (without significant improvements in environmental performance) as well as sincere behaviors (with significant improvements in environmental performance), thus undermining the confidence of the standard.

The results of this study open up new lines of research in relation to the symbolic adoption of environmental practices in general, and ISO 14001 in particular. First, once again demonstrating the link between symbolism and the adoption of ISO 14001, it would be particularly interesting to know whether this symbolic behavior is associated with improvements in profitability (i.e., economic and financial results), even differentiating between firms with and without ISO 14001. Second, the literature has shown that symbolic adoption may be facilitated by the weakness of external audits as a result of their lack of rigor (e.g., Aravind and Christmann, 2011; Boiral, 2011; Curkovic and Sroufe, 2011; Heras et al., 2013). At times, external audits do not really evaluate the integration of environmental practices in the firm's decision-making, neither are they

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focused on measuring the evolution of the improvements achieved, if any (Heras et al., 2013). Future studies might analyze how, and how much, the rigor of these external environmental audits affects the development of environmental symbolic (or *de facto*) behaviors.

One limitation of this study is the use, from a methodological point of view, of symbolic environmental behavior as a variable formed from the combination of several items. The measure of the symbolic environmental behavior offered here opens the possibility for future work that might consider alternative ways to measure this variable, for example, by using both primary information (i.e., surveys) and secondary information. Finally, although this work has considered the main criticisms concerning the symbolic adoption of ISO 14001, an in-depth study on the confidence of certifier firms is highly recommended, especially in contexts with high levels of political corruption (Montiel et al., 2012). A further research theme might also focus on whether managers today are prioritizing investment in the adoption of ISO 14001 or "decertificating" due to the economic recession (Heras et al., 2016).

This study also provides important contributions for managers. Some firms are reluctant to adopt ISO 14001 due to the excessive bureaucracy that the standard requires (Aravind and Christmann, 2011). In fact, Curkovic and Sroufe (2011, pp. 75) argue that some of the main criticisms of ISO 14001 are based on "*a limited focus on continuous improvement*" and "*the ability of a registered company to still produce large amounts of waste*". The results of this study suggest that these criticisms can be overcome by the substantive adoption of ISO 14001, rather than its symbolic adoption, since it is possible that managers who choose this symbolic adoption would not obtain all the benefits that the standard is capable of generating for the firm.

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TABLE 1. *Descriptive Statistics and Correlations*

N =1,961 facilities	1	2	3	4	5	6	7
1. ISO 14001 adoption	1.00						
2. Use of natural resources	.255**	1.00					
3. Solid waste generation	.262**	.388**	1.00				
4. Wastewater effluent	.096**	.376**	.382**	1.00			
5. Local or regional air pollution	.097**	.275**	.293**	.332**	1.00		
6. Global pollutants	.175**	.324**	.255**	.281**	.518**	1.00	
7. Importance of corporate image (very important)	.077**	.066**	.102**	.066**	.096**	.079**	1.00
Mean	.33	.53	.56	.43	.41	.33	.53
Standard deviation	.470	.499	.496	.495	.492	.469	.499
Minimum	0	0	0	0	0	0	0
Maximum	1.00	1.00	1.00	1.00	1.00	1.00	1.00

** Correlations are significant at |0.01| (bilateral).

TABLE 2. *Sample Size differentiating by variables and country*

	N [a]	ISO 14001 adopters	With symbolic environmental behavior	ISO 14001 adopters with symbolic behavior
TOTAL	1.961	645	535	154
U.S.	312	63	101	17
	15,9%	9,8%	18,9%	11,0%
Germany	288	87	36	12
	14,7%	13,5%	6,7%	7,8%
Hungary	212	56	99	23
	10,8%	8,7%	18,5%	14,9%
Japan	762	327	188	77
	38,9%	50,7%	35,1%	50,0%
Norway	137	41	38	11
	7,0%	6,4%	7,1%	7,1%
France	111	35	32	6
	5,7%	5,4%	6,0%	3,9%
Canada	139	36	41	8
	7,1%	5,6%	7,7%	5,2%

[a] Values on percentages show the proportion over the total of each variable for each country.

TABLE 3. *Classification table*

Step 1 (Base Model)					Step 2 (Full Model)				
Observed		Predicted			Observed		Predicted		
		ISO 14001 Adoption		Success percentage			ISO 14001 Adoption		Success percentage
			No	Yes				No	Yes	
ISO 14001 Adoption	No	**1,292**	0	100.0	ISO 14001 Adoption	No	**1,174**	118	90.9
	Yes	632	**0**	0.0		Yes	408	**224**	35.4
Global percentage				**67.2**	Global percentage				**72.7**

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TABLE 4. *Binary Logistic Regression Results*

	Base Model [a]			Full Model[a]		
	B	S.D.	Exp(B)	B	S.D.	Exp(B)
Constant	-2.998	.203	.050***	-3.168	.213	.042***
Environmental performance	.312	.033	1.366***	.388	.043	1.474***
Importance of image	.364	.112	1.439***	.094	.147	1.098
Size	.001	.000	1.001***	.001	.000	1.001***
Germany	.749	.213	2.116***	.733	.213	2.081***
Hungary	.623	.228	1.864**	.596	.227	1.815**
Japan	1.625	.179	5.079***	1.618	.178	5.043***
Norway	1.074	.255	2.926***	1.066	.255	2.904***
France	.866	.272	2.377***	.846	.272	2.330**
Canada	.347	.268	1.414	.365	.267	1.440
Symbolic Behavior				.526	.187	1.691**
Chi^2 Block	316.766***			7.962**		
Chi^2 Model	316.766***			324.728***		
-2 log likelihood	2119.397			2111.435		
Cox & Snell R^2	.152			.155		
Nagelkerke R^2	.211			.216		

[a] The dependent variable is "ISO 14001 adoption" (yes or no); U.S. is the excluded "country" dummy.
*** p<.01; ** p<.05