

Leading by Example: A Model of Organizational Citizenship Behavior for the Environment

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Abstract

Organizational citizenship behaviors for the environment (OCBEs), which are based on individual, voluntary and informal initiatives, are increasingly considered as an essential ingredient of corporate greening. Drawing on the emerging literature on this issue, this paper explores the determinants and consequences of managers' OCBEs. A study of 304 managers from the manufacturing sector allowed us to validate a new model of managers' OCBEs based on structural equation modeling. The model shows the role of environmental values and perceived behavioral control (PBC) in the adoption of OCBEs. As expected, the model also shows positive and significant relationships between OCBEs, environmental management practices and performance in this area. The study sheds new light on the impacts of OCBEs and explores the reasons why they can be used to lead by example and to improve environmental performance

Keywords: organizational citizenship behaviors for the environment; leadership; environmental performance; sustainability; eco-initiatives; corporate greening

Introduction

The literature on environmental management has mostly focused on formal and organizational-level practices: pollution prevention measures, green technologies, sustainability reporting, the implementation of environmental management systems, auditing and certification procedures etc. Nevertheless, environmental initiatives consist of a wide variety of measures that cannot be reduced to formal and organizational-level practices. Activities that can have an impact on the environmental sustainability are indeed very diverse, complex and therefore difficult to integrate within formal management systems (Lane and Robinson, 2009; Lülfs and Hahn, 2013; Ramus and Killmer, 2007). Moreover, the management of environmental issues depends on the voluntary sharing of tacit knowledge based on individual experiences that are difficult to formalize through structured and explicit practices (Boiral, 2009; Hart, 1995). Furthermore, the success of formal and organizational-level initiatives, such as the implementation of the ISO14001 environmental management system, largely depends on the individual, informal and discretionary behaviors of employees (Boiral, 2007; Jiang and Bansal, 2003).

These kinds of workplace discretionary behaviors toward the environment, which have been recently termed 'organizational citizenship behaviors for the environment' (OCBEs), are clearly akin to the behaviors described in organizational citizenship behavior literature and are

constituted by individual, informal, and discretionary behaviors that contribute to organizational greening (Boiral, 2009; Daily et al., 2009; Lamm et al., 2013; Ramus and Killmer, 2007).

The purpose of the present paper is to analyze the determinants and consequences of the OCBEs adopted by managers. The exploration of managers' OCBEs allows us to make an important contribution to the emerging literature in this area. With a few recent exceptions (Lamm et al., 2013; Paillé et al., 2013a, 2013b), this literature is theoretical and based on hypotheses that have yet to be validated. As a result, it is unknown or uncertain what the main drivers of OCBEs and their impacts on environmental performance are. Furthermore, the literature has focused on employees' OCBEs, even though managers can also perform discretionary and informal initiatives for the environment. The important role of managers in achieving environmental sustainability has been highlighted in the literature (Bansal and Roth, 2000; Cordano and Frieze, 2000; Egri and Herman, 2000; Kearins and Collins, 2012). Nevertheless, these studies focused mainly on the role of managers' values, their commitment to environmental issues and the implementation of formal practices. The manners in which managers' values and commitments can translate into individual, informal and discretionary behaviors for the environment remain largely underexplored. Some theoretical papers have emphasized the importance of managers' support for environmental issues in encouraging employee commitment in this area (Govindarajulu and Daily, 2004; Ramus and Killmer, 2007). Although a handful of empirical studies have recently undertaken to explain the underlying behavioral processes whereby managers' support can improve environmental practices and performance (Lamm et al., 2013; Paillé et al., 2013a, 2013b), the determinants and consequences of managers' OCBEs remain largely unexplored.

The focus on managers' OCBEs allows us to shed more light on an essential but neglected aspect of environmental leadership. Managers' actions tend to speak much louder than words (Harung et al., 2009; Yaffe and Kark, 2011). Therefore, from the employees' perspective, managers' OCBEs can constitute exemplary behaviors reinforcing their concern and commitment towards the environment. Managers' OCBEs can also facilitate the implementation of more formal environmental practices by demonstrating the degree of their personal commitment in this area and their willingness to be a source of support in the organization's effort to become greener.

The paper explores the reasons why these OCBEs can play an essential part in environmental management and provides empirical evidence regarding their causes and consequences. It also discusses the managerial implications of modeling managers' OCBEs, and the new research avenues opened by the approach.

The remainder of the paper is structured as follows. First, the literature on OCBEs is analyzed and the hypotheses of the study are explained. Second, the methodology of the empirical study is presented. Third, the results of the structural equation modeling are detailed. Finally, the main contributions and limits of the paper are discussed in the conclusion.

Theoretical Background and Hypotheses

Existing Literature on OCBEs

The emerging literature on OCBs has essentially focused on exploring four main issues: the definition, scope, and possible applications of OCBs (Boiral, 2009; Daily et al., 2009; Ramus and Killmer, 2007); the theoretical modeling of their possible determinants and consequences (Daily et al., 2009); the development of measurement scales (Boiral and Paillé, 2012; Lamm et al., 2013; Paillé and Boiral, 2013) and the empirical exploration of the main drivers of OCBs (Lamm et al., 2013; Paillé et al., 2013a, 2013b). Examining these issues allows us to describe the main steps in the evolution of the literature on OCBs, and the limitations of studies in this area.

First, the nature, scope and possible applications of OCBs have been explored in the earliest studies on this issue (Boiral, 2009; Daily et al., 2009; Ramus and Killmer, 2007). The definitions proposed in these studies are in line with the traditional concept of OCB. For example, according to Daily et al. (2009, p. 243), OCBs can be defined as 'environmental efforts that are discretionary acts, within the organizational setting, not rewarded or required by the organization'. According to Ramus and Killmer (2007), discretionary eco-initiatives can be considered to be a form of pro-social behavior because they contribute to social welfare and the creation of added value. Boiral (2009) explores the possible environmental applications of the main dimensions of OCBs listed by Organ et al. (2006): helping (collaboration and encouraging other workers to consider environmental issues), sportsmanship (positive attitude toward the inconveniences associated with environmental practices), organizational loyalty (support for the environmental policies and actions of the organization), organizational compliance (compliance with environmental practices and procedures), individual initiative (discretionary suggestions and initiatives in the workplace), and self-development (acquisition of environmental knowledge).

Second, theoretical frameworks have been proposed in the literature to explain the main drivers and consequences of OCBs. According to Ramus and Killmer (2007), voluntary eco-initiatives are driven by supervisory support, social norms, personal predisposition and self-efficacy. Daily et al. (2009) propose a similar model, in which OCBs are motivated by supervisory support, environmental concern, perceived corporate social performance and organizational commitment. Drawing on the general literature on OCBs, the study also hypothesizes that OCBs should improve environmental performance by encouraging green initiatives that go beyond job descriptions. Building on the environmental psychology literature, Lülfs and Hahn (2013) recently proposed a more complex model that distinguishes distal predictors (organizational context, awareness of need, awareness of consequences and social norms) and more direct motivational determinants (perceived behavioral control, personal moral norms and attitude toward OCBs) of employee willingness to adopt voluntary pro-environmental behavior. According to this model, the habitual processes can be considered as a moderator between intentions and actions based on voluntary pro-environmental behavior. Although these studies help to clarify the role of OCBs through interesting conceptual models, such models remain theoretical and have not been empirically validated.

Third, recent studies have addressed certain limitations of these theoretical models by proposing measurement scales for OCBs. Boiral and Paillé (2012) propose a measurement scale based on three dimensions: eco-initiatives (discretionary behavior and suggestions to improve environmental practices or performance), eco-civic engagement (voluntary participation in the organization's environmental programs and activities) and eco-helping (voluntarily helping colleagues to better integrate environmental concerns). This measurement scale has been validated through exploratory and confirmatory studies. Lamm et al. (2013) also propose a

measurement scale for OCBEs based on very specific eco-initiatives: recycling bottles and paper, double-sided printing etc. Although they are based on concrete behaviors, these initiatives do not exhaust the multidimensional aspects of OCBEs and may appear merely symbolic with regard to the extent and complexity of environmental issues. Finally, Lamm et al. (2013) and Boiral and Paillé (2012) develop complementary measurements which capture the different aspects of the multifaceted nature of OCBEs.

Fourth, a handful studies have begun to explore empirically the determinants of OCBEs and, more generally, the manners in which the environmental practices can influence individual discretionary initiatives. In their study of employees and managers from firms with and without ISO14001 certification, Perez et al. (2009) show that the environmental commitment of organizations tends to foster employees' OCBs, notably within certified firms. However, the study explores the impacts on general OCBs such as helping behavior and civic virtue and does not focus on OCBs directed toward the environment (OCBEs). Lamm et al. (2013) and Paillé and Boiral (2013) showed that OCBEs are related to general OCBs but represent a distinct construct. The study also shows that OCBEs are influenced by perceived organizational support, affective commitment and belief that sustainability is important. Finally, Paillé et al. (2013a, 2013b) demonstrate how social exchange processes (perceived supervisory support, perceived organizational support and employee commitment) have a positive impact on OCBEs.

Although this burgeoning literature allows us to better understand the role, importance and possible determinants of OCBEs, it remains limited by the small amount of empirical research on this issue. OCBEs remain an essentially theoretical concept whose determinants and impacts need to be further explored. Furthermore, while the mainstream literature on environmental management has emphasized, above all, the importance of manager commitment to improving corporate greening (Bansal and Roth, 2000; Egri and Herman, 2000; Metcalf and Benn, 2013), the concept of OCBEs has focused on employee initiatives only. This raises the question of the application of OCBEs to voluntary and non-rewarded eco-initiatives by managers.

Leading by Example: the Role of Managers' OCBEs

Although the literature on general OCBs has by and large focused on employees, various studies have shown that the concept could also apply to the discretionary, informal and extra-role behavior of managers (Bowler et al., 2010; Krishnan and Arora, 2008; Yaffe and Kark, 2011). For example, leaders' OCBs have been associated with transformational leadership (Krishnan and Arora, 2008), lower levels of organizational cynicism concerning change (Rubin et al., 2009), group OCB and exemplary behaviors (Yaffe and Kark, 2011). The focus on OCBEs adopted by the managers rather than the employees is a promising avenue of research for several reasons.

First, just as in the case of other employees, the environmental commitment of managers can either be driven by formal practices and external pressures or be discretionary and not explicitly recognized by the formal rewarding system. For example, although the list of OCBEs proposed by Lamm et al. (2013) focuses on employees' behaviors, it concerns everyday actions that can also be performed by managers: recycling behaviors, turning off lights when leaving the office, using reusable water bottles and coffee cups etc. Similarly, most OCBE items proposed by Boiral and Paillé (2012), notably those related to eco-initiatives such as carrying out environmental

actions in daily work activities, can easily apply to managers. However, managers can also undertake more formal, prescribed and recognized environmental initiatives: apply internal procedures and codes of conduct, implement an environmental audit upon request by the head office etc. For example, the ISO 14001 management standard on environmental management prescribes formal and organizational-level procedures that specifically target the managers: defining the environmental policy, performing the annual review of the system, clarifying roles and responsibilities etc. Furthermore, certain formal environmental practices that may seem discretionary have been repeatedly shown in the literature to depend to a large extent on external pressures (Bansal and Roth, 2000; Boiral, 2007; Yin and Schmeidler, 2009), which tend to leave little room to maneuver for managers concerned with the social legitimacy of their organizations. Generally speaking, most organizational-level and formal environmental practices can be considered as part of managers' as well as employees' tasks. Conversely, individual environmental behaviors that are not prescribed by these practices or explicitly recognized by the organization can be considered as OCBs. Formal environmental practices and OCBs are not necessarily mutually exclusive. For example, managers' OCBs, such as the initiatives for recycling and energy saving, can eventually lead to more formal and organization-level programs in this area. Nevertheless, because of their discretionary and non-rewarded nature, OCBs are not supposed to be primarily driven by formal management systems.

Second, managers' OCBs can be perceived as exemplary behaviors demonstrating their personal and genuine commitment to the environment, and can also be considered as a model to be followed by the employees. Yaffe and Kark (2011) show that leaders' OCBs tend to appear as exemplary behaviors to emulate inside the organization, which reinforces group OCBs and effectiveness. Generally speaking, the literature on leadership has emphasized the importance of the coherence between managers' values and discourse and their actual behavior (Alvesson and Sveningsson, 2001; Harung et al., 2009; Yaffe and Kark, 2011). Similarly, to be credible and encourage employee commitment, environmental leadership needs to be translated into the personal and concrete behaviors underlying the concept of OCBs. As highlighted by Metcalf and Benn (2013), environmental actions must be driven by the leaders' integrity and coherence between the professed values and the displayed behaviors.

Leading by example is critical, as studies have consistently shown that managers' commitment to the environment is too often superficial, ceremonial and more focused on appearances than substance (Boiral, 2007; Springett, 2003; Yin and Schmeidler, 2009). This stream of the literature is generally based on neo-institutional theory, which claims that external pressures tend to encourage ceremonial and superficial management practices intended to reinforce the social legitimacy of organizations rather than to improve internal effectiveness (Boiral, 2007; Meyer and Rowan, 1977). Such superficial adaptation to external pressures has been consistently observed in the case of formal practices such as the ISO 14001 certification (Boiral, 2007; Yin and Schmeidler, 2009). On the other hand, managers' OCBs appear to be much less prone to being limited to ceremonial actions aimed at reinforcing organizational legitimacy, because they are based on personal, discretionary and informal initiatives that are virtually invisible to external stakeholders.

Third, the literature has emphasized the key role of manager commitment and leadership in ensuring the success of environmental practices and performance improvement in this area (Bansal and Roth, 2000; Boiral, 2009; Egri and Herman, 2000; Fernández et al., 2006; Metcalf

and Benn, 2013). The personal commitment of managers has been associated with the success of most environmental practices: pollution prevention, stakeholder consultation, ISO 14001 implementation, employee participation, industrial ecology etc. (Cordano and Frieze, 2000; Egri and Herman, 2000; Kearins and Collins, 2012). Nevertheless, the literature on this issue has essentially focused on general pro-environment values, skills and formal practices. As a result, the behavioral aspects of environmental leadership have been largely neglected (Metcalf and Benn, 2013; Fernández et al., 2006). This literature gap has not really been addressed by the emerging research on OCBEs, which remains focused on employee initiatives. The exploration of managers' OCBEs could therefore help to better understand the manners in which environmental concern can be translated into managers' routine behaviors and to analyze the effects of such behaviors.

Modeling the Determinants and Consequences of Managers' OCBEs

Figure 1 depicts the proposed research model, which allows us to test the possible determinants and consequences of managers' OCBEs.

Determinants of Managers' OCBEs

Research based on social psychology has shown that beliefs and values play an important role in explaining behaviors, including those related to general environmental issues (Ajzen, 1991, 2002; Daily et al., 2009; Lülfs and Hahn, 2013; Smith and O'Sullivan, 2012). Similarly, in the literature on environmental management, personal values have been considered as one of the main drivers of managers' commitment to and actions for corporate greening (Bansal and Roth, 2000; Cordano and Frieze, 2000; Fukukawa et al., 2007; Williams and Schaefer, 2012; Ketola, 2010). These environmental values have been associated with various concepts: eco-centrism, new environmental paradigms, environmental concerns, personal predisposition for the environment, social and environmental accountability, personal moral norms etc.

Because they are based on discretionary and informal initiatives rather than on external pressures, it is likely that OCBEs depend even more on personal values than formal practices do. The role of personal values has also been highlighted in the literature on general OCBs (Organ et al., 2006; Van Dyne et al., 1994). The research on OCBEs echoes this literature and suggests that values represent one of the main drivers of eco-initiatives (Boiral, 2009; Ramus and Killmer, 2007; Lülfs and Hahn, 2013). For example, according to Daily et al. (2009, p. 247) 'an individual's personal environmental concern will prove to be the strongest predictor of his or her propensity to engage in OCBE'. Drawing on this literature on environmental management, values, and OCBEs, we hypothesize the following.

Hypothesis 1. *Environmental values are positively related to manager's OCBEs.*

Most studies aimed at exploring the determinants of personal behaviors, including those in the field of environmental psychology and environmental management (Ajzen, 2002; Cordano and Frieze, 2000; Greaves et al., 2013; Lülfs and Hahn, 2013; Ramus and Killmer, 2007) adopt as a key variable perceived behavioral control (PBC), based on Ajzen's theory of planned behavior (Ajzen, 1991, 2002). PBC, which refers to the 'subjective degree of control over performance of the behavior' (Ajzen, 2002, p. 668), has been used in various studies on environmental

psychology and green consumption behaviors, notably to take into account the constraints and obstacles to taking action: lack of time, problems with information acquisition, costs, difficulties in changing personal habits etc. (Bamberg, 2003; Moisander, 2007). Cordano and Frieze (2000) used PBC to analyze the pollution reduction preferences of environmental managers. The positive relationships between PBC and OCBEs were hypothesized by Ramus and Killmer (2007) and by Lülfs and Hahn (2013). Nevertheless, to our knowledge, this relationship has neither been validated empirically nor explained in the specific context of OCBEs and environmental management in general. The specific reasons why PBC is assumed to drive OCBEs are related to the complexity, costs and technical aspects of environmental issues. Many environmental issues require an interdisciplinary and collaborative approach that can hardly be addressed through analyzing individual behaviors only (Boiral et al., 2009; Hart, 1995; Lane and Robinson, 2009). The cost and time which they require may also be perceived as a constraint to OCBEs. Moreover, important environmental aspects are often quite technical, notably in industrial organizations. As a result, managers may feel that they lack the competencies and information to adopt appropriate OCBEs, except for very simple and mostly symbolic actions, such as using scrap paper for notes or minimizing printing. The perception that OCBEs can be adopted easily is therefore assumed to be a strong predictor of such behaviors. Consistent with this idea, we hypothesized the following.

Hypothesis 2. Perceived behavioral control (PBC) is positively related to managers' OCBEs.

Consequences of Managers' OCBEs

The main consequences of managers' OCBEs consist in the improvement of the perceived environmental performance and greater involvement in environmental practices. The impacts of OCBs in general on performance have been widely explored in the literature (Organ et al., 2006; Podsakoff and MacKenzie, 1997; Van Dyne et al., 1994). Although the nature and the extent of this impact remain unclear, OCBs seem to be positively related to various performance indicators such as workgroup quality, group effectiveness, employee satisfaction and retention, managerial productivity, and adaptation to change (Organ et al., 2006; Podsakoff and MacKenzie, 1997). As stated by Podsakoff and MacKenzie (1997, p. 135), OCBs 'may enhance performance by "lubricating" the social machinery of the organization, reducing friction, and/or increasing efficiency'.

Drawing on this extensive literature on OCBs, Daily et al. (2009) posit that OCBEs are positively related to environmental performance, which is considered to be one of the facets of organizational effectiveness. Daily et al. (2009) and Boiral (2009) also postulate such a positive relationship, which is explained by the important role of employees in organizational greening and the impacts of the aggregate of individual behaviors directed toward the environment. Nevertheless, this relationship remains speculative, notably at the managerial level. Moreover, OCBEs are not monolithic, and their impact may vary depending on individuals' positions or activities. From this perspective, managers' OCBEs are likely to have a more significant impact on environmental performance than employees' OCBEs. Managers are indeed supposed to have more knowledge of the environmental issues of their organizations than their employees, and more freedom to act accordingly. Thus, they should overcome the difficulties related to OCBEs more easily and therefore have a stronger PBC on this issue. In addition, because of the

managers' positions inside organizations, their OCBEs tend to be emulated by other employees and to have a multiplier effect on environmental performance.

The environmental performance of organizations does not depend solely on informal, individual and voluntary initiatives. The literature on environmental management has consistently shown that performance in this area can be significantly improved by various formal practices: the implementation of an environmental management system, the publication of an environmental policy, the introduction of appropriate indicators, the codification of environmental procedures etc. (Christmann, 2000; Yin and Schmeidler, 2009). Unlike OCBEs, these managerial initiatives are essentially based on formal and organizational-level actions that are part of the enforceable requirements of the job. Although individual-level and organizational-level environmental initiatives are different, they are not necessarily independent. According to Daily et al. (2009), OCBEs are in fact positively related to the perceived supervisory support for environmental issues and organizational commitment in this area. In their empirical study based on a social exchange perspective, Paillé et al. (2013a, 2013b) find that environmental management practices tend to reinforce the perception of supervisory and organizational support, which results in more OCBE initiatives. Nevertheless, these observations are based on OCBEs adopted by the employees rather than the managers.

In fact, the OCBEs which managers adopt are, in themselves, indicative of their own commitment to and support for the environment. From this perspective, the implementation of more formal and effective environmental practices (e.g. publishing an environmental policy, determining specific targets for environmental performance or using an environmental management system) depends on the environmental commitment of managers. The relationship between the manager's environmental commitment and the implementation of formal and organizational-level practices in this area is well established in the literature (Bansal and Roth, 2000; Cordano and Frieze, 2000; Szekely and Knirsch, 2005). As a result, it is reasonable to assume that managers' OCBEs reflect an environmental commitment that is translated into both informal/individual-level initiatives and formal/organizational-level practices. The improvement of environmental performance is therefore expected to be the consequence of those two types of complementary initiative at the individual and the organizational levels. Based on these observations, we hypothesize the following.

Hypothesis 3. Managers' OCBEs are positively related to environmental management practices.

Hypothesis 4. Environmental management practices are positively related to environmental performance.

Hypothesis 5. Environmental management practices mediate the relationship between managers' OCBEs and environmental performance.

Method

Research Design

The data were collected from a survey administered to a random sample of 1556 Canadian manufacturing companies recorded in Scott's database. This database lists fully autonomous entities or subunits of larger organizations. In all cases, the companies were listed as separate entities in the database. Organizations with 20 or more employees for which the contact names of the top management team were available were selected. The final sample included 1514 organizations (after the exclusion of erroneous addresses, organizations that had moved etc.). The questionnaire was first validated using a pretest administered to academics and 20 managers. Data were then collected using a structured questionnaire sent to the CEO or the highest member of the 'corporate' top management team (for autonomous entities) or 'local' top management team (for business subunits) listed in the database. The questionnaire was sent to the respondents along with a letter explaining the purpose of the study and a self-addressed stamped envelope. Four weeks after the initial mailing, the non-respondents received a replacement questionnaire.

A total of 304 usable questionnaires were received, for a response rate of 20%. A sample size of 100–200 is generally considered adequate for small-to-medium structural equation models (Anderson and Gerbing, 1988; Bentler and Chou, 1987). In the current study, the sample size is adequate to test the proposed model ($n = 304$). Furthermore, based on the guidelines by MacCallum et al. (1996), the study has adequate statistical power of 0.99, well above the recommended threshold of 0.80.

The company size was on average 348 employees and the respondents had an average of 14.1 years of experience working for their organizations. Appendix 1 presents the description of the sample in terms of the respondent's position and level of education, and the number of employees in the organization. An analysis of the non-response bias was performed to confirm the validity of the data. Initially, the comparison between respondents and non-respondents with respect to size, industry and geographical region did not reveal any significant differences. Moreover, the comparison between the first and last 10% of respondents (the latter used as a proxy for the non-respondents) did not reveal any significant differences in the responses obtained for the main constructs of the study. Hence, it appears that the nonresponse bias is not a major concern in this sample.

Measurement of Constructs

Three items adapted from an instrument developed by Cordano and Hanson Frieze (2000) and based on Ajzen's theory were used to measure the perceived behavioral control (PBC). The respondents were asked to assess their influence on and control over the implementation of environmental initiatives within their organization. The managers' environmental values were measured by using a short version (three items) of the scale developed by Fukukawa et al. (2007). The managers' OCBs were measured using the three-item scale developed by Boiral and Paillé (2012). Environmental management practices were measured using a five-item scale. The respondents were asked to indicate to what extent each environmental initiative had been implemented by their organization. All the statements were related to typical requirements for an environmental management system. For environmental performance, respondents were asked to rate the performance of their facilities over the past three years in comparison with other players in their industries. Four items derived from two different instruments (Judge and Douglas, 1998; Wagner and Schaltegger, 2004) were used to measure this construct. This combination made it possible to take into account the operational and managerial dimensions of the environmental

performance. This measurement was adapted from subjective instruments. According to many authors (e.g. Ketokivi and Schroeder, 2004; Dess and Robinson, 1984; Venkatraman and Ramanujam, 1987), objective and subjective measures are equally useful in terms of consistently providing valid and reliable performance assessments. All items were measured using a five-point Likert scale. The instruments used to measure the main constructs are presented in Appendix 2.

Analysis

The two-stage process recommended by Anderson and Gerbing (1988) was followed. The first stage involved examining the measurement model, while the second stage aimed to assess the research model by using structural equation modeling (SEM). For both stages, the chi-square statistic and several other fit indices were used to examine the data. The indices included the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the non-normed fit index (NNFI). For RMSEA, the expected value is below 0.05 (Schermelleh-Engel et al., 2003) For CFI and NNFI, values above 0.95 are recommended (Hu and Bentler, 1999). Statistical analyses were performed using the AMOS 18 software (Arbuckle, 2009).

Results

Checking Common Method Variance

Given that all variables in the present study were based on a single source, an important challenge consisted in checking whether the bias due to common method variance (CMV) might inflate the findings, leading to misinterpretation¹. As shown in Table 1, overall, both the measurement model and the measurement model with a common factor provided a good fit of the data. However, the baseline comparison indicates that measurement model offers a better fit. Finally, the ΔAIC (between measurement model and measurement model with common factor) was greater than 30, while according to Linley et al. (2009) 'conventionally $\Delta AIC > 15$ is considered very substantial' (p. 882). Thus, these results lead to the conclusion that common variance is lacking.

First Stage-Measurement Models

A confirmatory factor analysis was performed to assess the psychometric properties of the measures. As reported in Table 1, the measurement model provided an excellent fit to the data ($\chi^2 = 219.7$, $df = 125$, $p = .001$; $CFI = 0.96$; $NNFI = 0.95$; $RMSEA = 0.05$; $AIC = 311.5$). All indicators loaded significantly ($p < 0.001$) onto their respective constructs.

Table 2 reports the composite reliability (CR), the average variance extracted (AVE) and Jöreskog's ρ . Hair et al. (1998) recommend threshold CR and AVE values above, respectively,

¹ Given the particular design of the present study, and following the recommendation by Podsakoff et al. (2003), the single-common-method-factor approach is the appropriate technique for testing CMV. Following Marler et al. (2009), items were loaded on their theoretical constructs as well as on a created latent method factor. To conclude that the bias due to CMV may influence the findings, the measurement model with a common factor should yield a better fit than the measurement model. Conversely, if the measurement model offers a better fit, one may conclude that the bias does not threaten the findings.

0.70 and 0.50 for each construct. Fornell and Larcker (1981) recommend that Jöreskog's ρ should be above the 0.70 threshold. Following Fornell and Larcker (1981), and Hair et al. (1998), the CR values ranged from 0.95 to 0.98, and the AVE values from 0.51 to 0.72. In addition, Jöreskog's ρ ranged from 0.75 to 0.92.

Discriminant validity was assessed by comparing, for each pair of constructs, the average of their respective AVE and their shared variance. According to Fornell and Larcker (1981), if for two given constructs the average AVE is higher than the shared variance, the discriminant validity of the two constructs is evidenced. Table 2 shows that for each pair of constructs the requirement has been met. Therefore, based on the previous results, convergent validity, internal consistency and discriminant validity are evidenced by the data.

Second Stage (SEM) Relationships among the Variables

Using AMOS (Arbuckle, 2009), the model tests were based on the covariance matrix and were estimated using maximum likelihood estimation. The research model fitted the data well, $\chi^2 = 268.5$, $df = 145$, $p = 0.001$; CFI = 0.95; NNFI = 0.95; RMSEA = 0.05.

Before testing the hypotheses, in order to eliminate the possibility of the presence of one or more nested models that might show a better fit and lead to the rejection of the research model (James et al., 2006), the latter was compared to several competing models. Fourteen models were compared. The results of the comparisons of the models are shown in Table 3. All of these competing models (i.e. alternative models) provided a good fit of the data. Of these models, alternative model 9 offered a better fit than the other alternative models. Alternative model 9 added three paths to the research model. The research model with these three added paths was computed. While the path from PBC to environmental performance was significant ($\beta = 0.388$, $SE = 0.041$, $t\text{-value} = 5.871$, $p = 0.001$), given that relationships are above the standard cut-off of 0.05, paths from PBC to environmental management practices ($\beta = 0.134$, $SE = 0.096$, $t\text{-value} = 1.922$, $p = 0.055$) and from environmental values to environmental performance ($\beta = 0.098$, $SE = 0.044$, $t\text{-value} = 1.645$, $p = 0.098$) were not. Next, these two paths were removed, and the computation was rerun. By removing the path from PBC to environmental management practices, and the path from environmental values to environmental performance, the overall fit was improved. The research model with the added path from PBC to environmental performance is alternative model 12. In addition, the AIC for alternative model 12 is significantly smaller than that reported for the research model. The $\Delta AIC = 30.4$ and is superior to the conventional $\Delta AIC > 15$ (Linley et al., 2009). Finally, these results led to the conclusion that alternative model 12 (depicted later in Figure 2) should be retained (James et al., 2006).

Hypothesis 1, which predicted a significant positive relationship between environmental values and managers' OCBs, is supported by the data ($\beta = 0.305$, $SE = 0.087$, $t\text{-value} = 4.187$, $p < 0.001$). Hypothesis 2, which predicted a significant positive relationship between PBC and managers' OCBs, is supported by the data ($\beta = 0.416$, $SE = 0.075$, $t\text{-value} = 5.752$, $p < 0.001$). Hypothesis 3, which predicted a significant positive relationship between OCBs and environmental management practices, is supported by the data ($\beta = 0.493$, $SE = 0.097$, $t\text{-value} = 6.964$, $p < 0.001$). Hypothesis 4, which predicted a significant positive relationship between environmental management practices and environmental performance, is supported by the data ($\beta = 0.337$, $SE = 0.030$, $t\text{-value} = 5.003$, $p < 0.001$).

Hypothesis 5 implies testing mediation. Mediations were performed using the bias-corrected bootstrap method, because it gives statistical power (Cheung and Lau, 2007). Briefly, mediation (with $n = 5000$ bootstrap resamples) was investigated by directly testing the significance of the indirect effect of the independent variable (IV) on the dependent variable (DV) through a mediator (M) quantified as the product of the effects of the IV on M (a), and the effect of M on DV, partialing out the effect of IV (b). Mediation is demonstrated when the indirect effect is significant and the confidence interval of the bias corrected does not include zero (Preacher and Hayes, 2008).

Hypothesis 5 predicted that environmental management practices mediate the relationship between managers' OCBEs and environmental performance. In the model with environmental management practices as a mediator, the standardized direct effect of managers' OCBEs on environmental performance is 0.182. The 95% bias-corrected confidence intervals for this direct effect are between 0.081 (lower bound) and <0.355 (upper bound), with a p-value less than 0.001 in a two-tailed significance test. The standardized indirect effect of managers' OCBEs on environmental performance through environmental management practices was 0.166. The 95% bias-corrected confidence intervals for this indirect effect are between 0.083 (lower bound) and 0.237 (upper bound), with a p-value less than 0.001 in a two-tailed significance test. These results lead to the conclusion that the relationship between managers' OCBE and environmental performance was partially mediated by environmental management practices. Notably, it was estimated that the mediator accounted for 47.6% of the variance (indirect effect/total effect; $0.166/.349$). Thus, hypothesis 5 was supported by the data.

Finally, the final model depicted in Figure 2 suggests testing several mediations. While the first mediation implies PBC, OCBEs and environmental management practices toward the environment, the second mediation involves environmental value, OCBEs and environmental management practice, and the third one indicates a possible long mediation chain (PBC \rightarrow OCBEs \rightarrow environmental management practices \rightarrow environmental performance). Therefore, additional analyses were performed and indicated no mediation effects².

² The first mediation implies PBC, managers' OCBEs and environmental management practices toward the environment. In the model with OCBEs as a mediator, the standardized direct effect of PBC on environmental management practices is 0.222. The 95% bias-corrected confidence intervals for this direct effect are between 0.011 (lower bound) and 0.451 (upper bound), with a p-value less than 0.06 for a two-tailed significance test. Findings indicate that zero is contained in the 95% bias-corrected confidence interval. This means that managers' OCBEs do not mediate the relationship between PBC and environmental management practices (Shrout and Bolger, 2002). The second mediation involves environmental values, managers' OCBEs and environmental management practices. In the model with OCBEs as a mediator, the standardized direct effect of environmental values on managers' OCBEs is 0.100. The 95% bias-corrected confidence intervals for this direct effect are between 0.153 (lower bound) and 0.392 (upper bound), with a p-value of 0.642 in a two-tailed significance test. Given that the 95% bias-corrected confidence interval contains zero, managers' OCBEs do not mediate the relationship between environmental value and environmental management. Finally, the third mediation involves testing a long mediation chain between PBC and environmental performance, consisting of a three-path mediational model (PBC \rightarrow managers' OCBEs \rightarrow environmental management practices \rightarrow environmental performance). A bootstrap procedure may be adopted for performing a long mediation chain (Taylor et al., 2008). Overall, the same requirements as for mediation tests implying only one mediator are expected for mediation tests implying two mediators. The mediation is evidenced if the 95% confidence interval does not include zero for the indirect effect estimates. However, the above results for Hypothesis 4 (PBC \rightarrow managers' OCBEs \rightarrow environmental management practices) indicate that zero is contained in

Discussion

The main objective of the study was to explore the determinants and consequences of managers' OCBs. The findings of the study support the hypotheses proposed in the theoretical model. As predicted by Hypothesis 1, the managers' environmental values are positively related to OCBs. This finding is consistent with the literature on the role of values and ethical concerns to explain the environmental commitment of managers (Bansal and Roth, 2000; Cordano and Frieze, 2000; Fukukawa et al., 2007; Galpin and Whittington, 2012; Williams and Schaefer, 2012). It is also consistent with the few theoretical models on OCBs that have emphasized the role of manager values (Daily et al., 2009; Lülfs and Hahn, 2013; Ramus and Killmer, 2007). Hypothesis 2, concerning the role of PBC in managers' OCBs, is also supported by the findings, which are in line with the literature on environmental management based on Ajzen's theory (Cordano and Frieze, 2000; Ramus and Killmer, 2007). The integration of PBC in our model allowed us to take into account not only the value-based motivations for environmental initiatives, but also the perceptions of difficulty or ease associated with such initiatives. These findings on the consequences of OCBs are also consistent with the propositions of the emerging and theoretical literature on this issue (Boiral, 2009; Daily et al., 2009). Hypothesis 3, concerning the positive relationship between OCBs and environmental management practices, and Hypothesis 4, on the positive relationship between environmental management practices and environmental performance, are confirmed by the findings. The results of the study also demonstrate that environmental management practices can play a mediating role between OCBs and environmental performance (Hypothesis 5). Finally, the findings show a positive relationship between the PBC and environmental performance. Although this was not initially hypothesized, this relationship can be explained by the managers' belief in the efficacy of their own behaviors to improve corporate greening. Therefore, the more managers perceive that they are capable of performing OCBs (PBC), the more they also consider the environmental performance of their organization to be high.

Contributions and Directions for Future Research

The main contributions of this study are related to the empirical validation of various theoretical propositions put forward by the emerging literature on OCBs and the exploration of a new form of eco-initiatives focused on managers rather than employees.

The first important finding concerns the significant relationship observed between managers' OCBs and environmental performance. This type of relationship remains much debated in the vast literature on general OCBs (Organ et al., 2006; Podsakoff and MacKenzie, 1997). Although Paillé et al. (2013a, 2013b) report findings that support the relationship between OCBs and environmental performance at employee level, to our knowledge this has never been demonstrated in the area of environmental management at manager level. Therefore, this paper contributes to the emerging literature in this area and explores the possible reasons underlying the

the 95% confidence interval. Therefore, we conclude that managers' OCBs and environmental management practices do not play mediating roles between PBC and environmental performance.

environmental benefits of managers' OCBEs. Nevertheless, the dependent variables explored in the paper are quite limited and do not cover all the possible outcomes of OCBEs. Furthermore, the paper's sample is focused on managers only. As a result, the model explored does not provide information on the manner in which managers' eco-initiatives are perceived inside the organizations and their impact on frontline workers. Future research could explore these issues by investigating the relationship between the managers' and employees' OCBEs. If eco-initiatives by managers are emulated by employees, as assumed in this paper, such relationships should be positive. Another avenue for future research would be to explore the impacts of managers' OCBEs on human resource management. Environmental issues are a major social concern that transcends the economic objectives of organizations. As a result, managers' personal commitments in this area could reinforce the employees' motivation, commitment and adherence to organizational policies. This type of relationship has been investigated in the study by Paillé et al. (2013a), which demonstrated that the employees' OCBEs appear to coincide with the perception of the supervisors' and organization's support for the environment. Nevertheless, this study focused on formal practices for the environment rather than manager eco-initiatives, and it failed to demonstrate a positive relationship between organizational commitment and employees' OCBEs.

Second, our study allows us to better understand the factors that drive managers' OCBEs. Although the role of values and PBC in motivating OCBEs has been hypothesized in the literature (Ramus and Killmer, 2007; Daily et al., 2009; Lülfs and Hahn, 2013), it has not been validated empirically. Since OCBEs appear to have a positive impact on environmental performance, it is important to further explore their main drivers. As suggested by Ramus and Killmer (2007), future research could more systematically use Ajzen's theory of planned behavior (Ajzen, 1991, 2002) to this end. This theory posits that four types of variable explain behaviors: the attitudes, the subjective norms, the PBC and the intentions. The present study was not intended to validate the Ajzen's theory and it only covers variables associated with the PBC and attitudes (environmental values). Future studies could analyze in depth all the variables proposed by this theory to measure their relationships with OCBEs. The study by Cordano and Frieze (2000), although it focuses on pollution prevention practices only, can be helpful in operationalizing such measurements. The distinction between behavioral intention and observable behaviors should also be considered. This distinction seems all the more important given that environmental issues tend to fuel the social desirability bias of respondents and, therefore, to obscure the distinction between intentions and actions. The influence of external pressures on OCBEs could also be explored. Although OCBEs are, by nature, discretionary and non-rewarded, institutional pressures in the form of environmental regulation or stakeholders' expectations could encourage both managers and employees to take voluntary initiatives even though they are not formally prescribed by the organization. External pressures can indeed reinforce environmental values and awareness, which, in turn, can foster OCBEs. Future research could explore such relationships and bridge the gap between the emergent research on OCBEs and the more established literature based on neo-institutional theory and environmental management. This literature has shown how external pressures and the search for organizational legitimacy can translate into more or less substantial internal practices for the environment (Boiral, 2007; Yin and Schmeidler, 2009). Nevertheless, the role of managers' OCBEs in this institutionalization process of environmental practices has been largely neglected. The role of managers' profile and psychology in OCBEs could also be explored. Given the impact which the managers' personal characteristics, such as education and ownership status, have on the

environmental performance and social commitment of organizations (Fernández et al., 2006; Huang, 2012; Jia and Zhang, 2013), it is likely that these characteristics also influence discretionary and non-rewarded eco-initiatives. Finally, future research could build on the literature on leadership and developmental psychology (Boiral et al., 2009; Harung et al., 2009; Rooke and Torbert, 2005) to explore the relationships between the OCBEs and the development of stages of consciousness. According to this literature, managers' environmental initiatives at a post-conventional stage are indeed more driven by personal values and less dependent on external pressures, formal management systems, prescribed procedures etc. than those of managers at a conventional stage. As a result, one can assume that post-conventional managers are more likely to adopt OCBEs than their conventional counterparts.

Third, the study extends the scope of OCBEs, which in the current literature is limited to employee behaviors only. The reasons why the focus on managers' OCBEs is a promising avenue of research are explained in the literature review section above. Future research could delve more deeply into the characteristics of managers' OCBEs and explore, in practical terms, the types of eco-initiative carried out by pro-environmental managers in their daily activities. Nevertheless, given the complexity of the environmental issues faced by organizations (Boiral, 2009; Lane and Robinson, 2009; Boiral, 2009) it is likely that OCBEs are a multidimensional concept that can hardly be reduced to a few specific and predetermined eco-initiatives. The present research puts emphasis on eco-initiatives by using measurement previously developed by Boiral and Paillé (2012) that focuses on general environmental actions in daily work activities. Future research could include the measurement scale provided by Lamm et al. (2013) in order to measure more precisely the nature and scope of eco-initiatives. Future research could also explore, through a qualitative study, the features and scope of OCBE initiatives. Such a study could analyze how these initiatives are emulated inside the organization. The manners in which OCBEs can be used by managers to lead by example and the extent to which such leadership can actually promote environmental actions and concerns throughout the organization must be further explored. In the same vein, future research could analyze the role of managers' OCBEs in the implementation of more substantial environmental management practices. For example, the effectiveness of the ISO 14001 standard on environmental management could be reinforced if the managers are personally more committed in this area and therefore more inclined to perform OCBEs.

Managerial Implications

The findings of our study have implications for managers who wish to improve the environmental performance of their organizations. Those managers should focus not only on formal management practices, but also on their own environmental behaviors in their daily activities.

Although these behaviors may seem of little significance when taken individually, they can have a multiplier effect when they are emulated by employees. Leading by example through simple actions such as recycling or energy saving can have a leveraging effect on the whole organization by sending the message that environmental protection is important for both the managers and the organization. Because of their diversity and multifaceted nature, various OCBEs can be used by managers to demonstrate their personal commitment in this area. Personal initiatives in the workplace mostly depend on the specific activity of each organization and do not necessarily focus on desk-related behaviors such as double-sided printing. In order to have value as an example and be emulated within the organization, managers' OCBEs must be as far as possible

related to the employees' own daily activities within the workplace. OCBEs can also focus on managers' discretionary participation in the environmental programs and activities of the organization. For example, the top managers' personal involvement in environmental training programs can be perceived by employees as a strong signal of commitment and support in this area. Similarly, managers could become personally involved in environmental committees, pollution prevention programs or the measurement of environmental performance. The managers' involvement can also focus on personal help and support to employees' own commitment. For example, managers could informally encourage employees to integrate environmental issues to a greater degree in their daily activities, make personal suggestions to this end or invite them to discuss solutions to specific problems. Whatever the type of OCBE implemented, these individual behaviors are not incompatible with the implementation of formal and organizational-level practices. On the contrary, the results of this study suggest that managers' OCBEs tend to reinforce the effectiveness of such formal practices. As highlighted by neo-institutional and critical research on environmental management (Boiral, 2007; Colwell and Joshi, 2013; Springett, 2003; Yin and Schmeidler, 2009), these practices are too often superficial, externally driven and not necessarily intended to change behaviors inside the organization. By adopting more OCBEs, managers could add more substance and credibility to these formal practices and improve their effectiveness by encouraging employee commitment. This catalytic effect seems to explain the positive relationships observed in our study between managers' OCBEs, environmental management practices, and environmental performance.

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Appendix 1

Respondent's position

CEO/general manager	21.1%
Senior executive/other manager	6.9%
Production manager	6.9%
Information not available	3%

Respondent's level of education

Secondary	3.3%
Post-secondary (other than university)	25.3%
University – undergraduate level	45.7%
University – graduate level	24%
Information not available	1.6%

Company size

Number of employees	% of companies
<100	11%
Between 100 and 149	24.1%
Between 150 and 299	29.8%
Between 300 and 499	20.7%
>500	14.4%

Appendix 2

Perceived behavioral control (PBC)

Please indicate your degree of agreement with the following statements. Scale: 1 = totally disagree, to 5 = totally agree.

Items

1. It is within my control whether or not I implement more environmental initiatives.
2. I can obtain the resources needed to increase the number of environmental initiatives at our facility.
3. Facility management supports my efforts to implement environmental initiatives.

Environmental values

What is your degree of agreement with these statements on environmental accountability? Scale: 1 = totally disagree, to 5 = totally agree.

Items

1. Business executives should be held accountable for the effects of their decisions on the environment (e.g., emissions, effluents and waste, energy usage, effects on biodiversity).
2. The remuneration of managers should take into account the environmental performance of their organization.
3. Corporations should be held accountable for their effects on the environment (e.g., emissions, effluents and waste, energy usage, effects on biodiversity).

Managers' OCBEs

Please indicate if the following statements accurately describe your conduct with respect to environmental issues inside your organization.

Scale: 1 = totally disagree, to 5 = totally agree.

Items

1. In my daily activities, I weigh the environmental impact of my personal actions.
2. I propose new practices that improve my facility's environmental performance.
3. I perform voluntary environmental actions and initiatives in my daily activities.

Environmental management practices

Please indicate to what extent the following environmental initiatives have been implemented in your facility. Scale: 1 = not at all implemented, to 5 = fully implemented.

Items

1. Publishing an environmental policy.
2. Determining specific targets for environmental performance.
3. Publishing an annual environmental report.
4. Using an environmental management system.
5. Monitoring environmental performance.

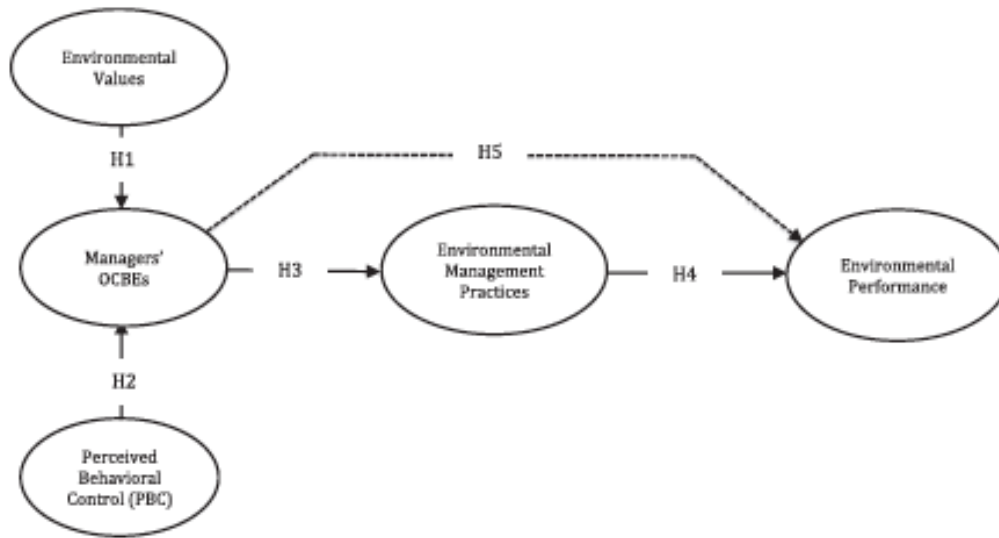
Environmental performance

Please rate the environmental performance of your facility over the past three years relative to others in your industry on each of the following items.

Scale: 1 = much worse, to 5 = much better.

1. Regulatory compliance.
2. Environmental impacts.
3. Management environmental risk.
4. Overall environmental performance.

Tables and figures



Note: Dashed arrow is used to depict indirect relationship; solid arrows represent direct relationships.

Figure 1. Theoretical model

Models	χ^2	df	χ^2/df	CFI	NNFI	RMSEA	AIC
Null model	3087.7***	171	18.05	—	—	—	—
Measurement model	219.7***	125	1.75	0.96	0.95	0.05	311.5
Measurement model with common factor	243.8***	124	2.00	0.95	0.94	0.05	342.8

Table 1. Results of model comparisons ($N = 304$)

*** $p < 0.001$.

Constructs	Composite reliability	Average variance extracted	Jöreskog' ρ
PBC	0.95	0.53	0.77
Environmental values	0.96	0.52	0.76
Managers' OCBEs	0.96	0.51	0.75
Environmental management practices	0.98	0.72	0.92
Environmental performance	0.95	0.62	0.86

Table 2. Psychometric properties

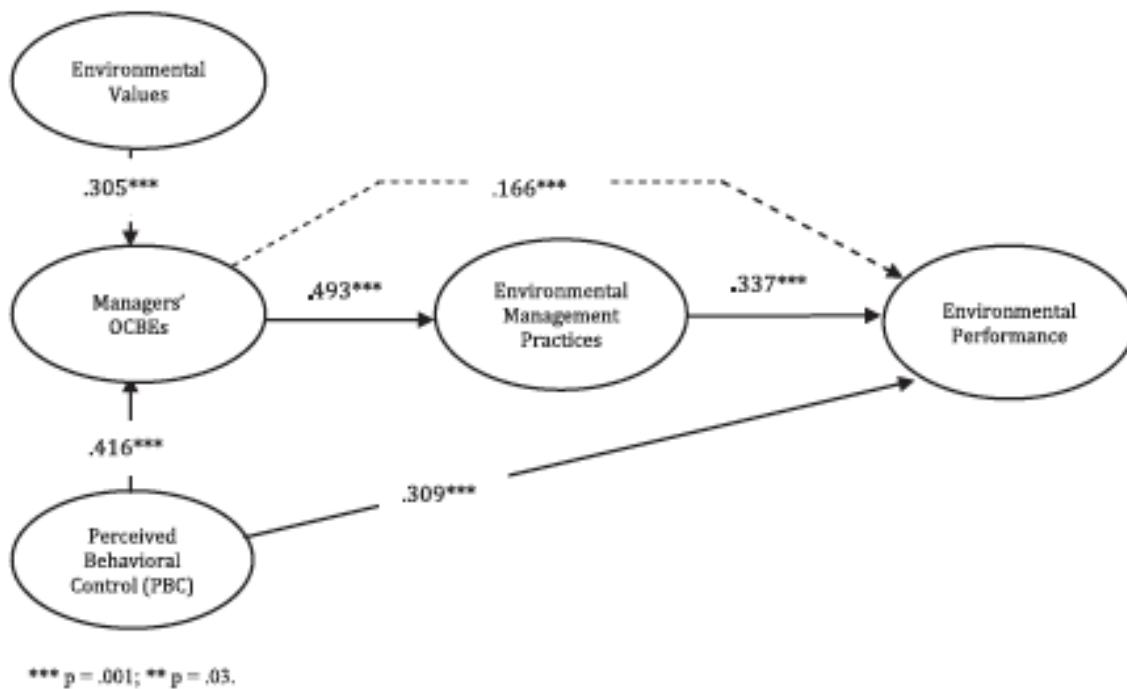
Models	χ^2	df	χ^2/df	CFI	NNFI	RMSEA	AIC
Research model	308.1**	147	2.09	0.94	0.93	0.06	394.1
Alternative model 1: adds a path from environmental values to environmental management practices	307.8**	146	2.10	0.94	0.93	0.06	395.8
Alternative model 2: adds a path from PBC to environmental management practices	303.3**	145	2.09	0.94	0.93	0.06	393.3
Alternative model 3: adds a path from environmental values to environmental performance	301.7**	144	2.09	0.94	0.93	0.06	393.7
Alternative model 4: adds a path from PBC to environmental performance	267.1**	143	1.86	0.95	0.94	0.05	361.1
Alternative model 5: adds paths from environmental values to environmental management practices, and from environmental values to environmental performance, let freed paths from PBC to environmental management practices, and from PBC to environmental performance	306.2**	145	2.11	0.94	0.93	0.06	396.2
Alternative model 6: adds a path from PBC to environmental management practices, from PBC to environmental performance, let freed paths from environmental values to environmental management practices, and from environmental values to environmental performance	270.7**	145	1.86	0.95	0.94	0.05	360.7
Alternative model 7: adds a path from environmental values to environmental performance, from PBC to environmental performance, let freed paths from environmental values to environmental management practices, and from PBC to individual initiative	271.7**	145	1.87	0.95	0.94	0.05	361.4
Alternative model 8: adds paths from environmental values to environmental management practices, from environmental values to environmental performance and from PBC to environmental performance, let freed path from PBC to environmental management practices	271.2**	144	1.88	0.95	0.94	0.05	363.2
Alternative model 9: adds paths from PBC to environmental management practices, from PBC to environmental performance and from environmental values to environmental performance, let freed path from environmental values to environmental management practices	268.0**	144	1.86	0.95	0.95	0.05	360.0
Alternative model 10: adds paths from environmental values to environmental performance, from PBC to environmental management practices, and let freed paths from environmental values to environmental management practices, and from PBC to environmental performance	302.3**	145	2.08	0.94	0.93	0.06	392.3
Alternative model 11: adds paths from PBC to environmental performance, from environmental values to environmental management practices, and let freed paths from PBC to environmental management practices, and from environmental values to environmental performance	273.7**	145	1.88	0.95	0.94	0.05	363.7
Alternative model 12: adds paths from PBC to environmental performance, and let freed paths from environmental values to environmental management practices, from PBC to environmental management practices, and from environmental values to environmental performance	273.9**	146	1.88	0.95	0.94	0.05	361.9
Alternative model 13: adds paths from environmental values to environmental performance, and let freed paths from	306.4**	146	2.09	0.94	0.93	0.06	394.4

(Continues)

Models	χ^2	df	χ^2/df	CFI	NNFI	RMSEA	AIC
environmental values to environmental management practices, from PBC to environmental management practices, and from PBC to environmental performance							
Alternative model 14: adds paths from environmental values to environmental performance, and from PBC to environmental performance, and let freed paths from environmental values to environmental management practices, and from PBC to environmental management practices	271.4**	145	1.87	0.95	0.94	0.05	361.4

Table 3. Results of model comparisons ($N = 304$)

** $p < 0.001$; CFI, comparative fit index; NNFI, non-normed fit index; RMSEA, root mean square error of approximation; AIC, Akaike information criterion.



Note. Dashed arrow is used to depict indirect relationship; solid arrows represent direct relationships.

Figure 2. Final model (based on alternate model 12)