Aspirations and environmental performance feedback: A behavioral perspective for green supply chain management

Abstract:

Purpose. This study investigates the relationships between environmental performance feedback and green supply chain management (GSCM). It explores how environmental performance above or below aspirations affects the implementation of GSCM practices (specifically sustainable production and sustainable sourcing) through the lens of the behavioral theory of the firm (BTOF), which has received scant attention in the operations management literature.

Design/methodology/approach. The study uses data from the sixth round of the International Manufacturing Strategy Survey. It employs hierarchical linear regression to test the proposed hypotheses. Moreover, the study tests an alternative model to rule out the possible role of financial performance aspirations in explaining the implementation of sustainable production and sourcing.

Findings. The results indicate that organizations determine their efforts put into the two GSCM practices according to environmental performance feedback: the greater the aspiration-environmental performance discrepancy, the stronger the efforts put into implementing GSCM practices.

Originality/value. This study contributes to the GSCM literature by revealing the impact of environmental performance aspirations on the implementation of GSCM practices through the lens of the BTOF. It also extends the BTOF by applying it in the

GSCM context and indicating that performance feedback is based on environmental performance instead of financial performance in this specific context.

Keywords: green supply chain management; aspirations; environmental performance feedback; sustainable production; sustainable sourcing

1. Introduction

Green supply chain management (GSCM) has drawn substantial attention in recent decades (e.g. Fahimnia et al., 2015; Geng et al., 2017; Ghisellini et al., 2016; Li et al., 2019a; Sarkis, 2012). GSCM is defined as the integration of environmental concerns in supply chain management practices (Sarkis et al., 2011). Several external and internal drivers of GSCM practices have been identified in the literature. For external drivers, the motivation of organizations to engage in GSCM practices is mainly derived from the pressure of external stakeholders, e.g. suppliers, customers, competitors, regulatory entities, and community groups (Zhu et al., 2005; Chien and Shih, 2007; Giunipero et al., 2012; Hsu et al., 2013; Dubey et al., 2015; Santos et al., 2019). The internal drivers that motivate organizations to adopt GSCM practices come from factors such as the desire for cost reduction, waste and pollution elimination, quality improvement (Walker et al., 2008), increased resource utilization and competitive advantage (Giunipero et al., 2012), and socio-cultural responsibility (Hsu et al., 2013).

Thus, research on the drivers of GSCM practices has provided insight into the motivations of organizations to implement GSCM practices. However, the roles of performance aspirations and performance feedback have not been addressed in the literature. Considering that organizations have environmental performance expectations stimulated by both external and internal drivers, a behavioral perspective is appropriate for investigating decision-making on GSCM (Kirchoff et al., 2016a). The behavioral theory of the firm (BTOF) has been widely applied in various research settings to understand organizational decision-making (Argote and Greve, 2007). One assumption of the BTOF is that organizations have limited attention (Cyert and March, 1963; Washburn and Bromiley, 2012). As a result, they allocate their attention by monitoring the achievement of goals and making sequential decisions, rather than focusing on all the goals simultaneously (Washburn and Bromiley, 2012). Besides, the BTOF assumes that organizations are boundedly rational and tend to follow stabilizing routines to solve short-term pressuring problems, instead of considering situations holistically and pursuing optimal solutions (Argote and Greve, 2007; Cyert and March, 1963). As the BTOF argues, organizations set an aspiration level for a performance dimension, which can be derived from recent performance of their comparable organizations (i.e. social aspiration) and their own historical performance (i.e. historical aspiration) (Baum and Dahlin, 2007; Cyert and March, 1963). Afterwards, they take strategic actions to respond to the performance feedback—the discrepancy between their actual performance and aspiration level. These strategic actions might vary according to different assessment outcomes of the performance feedback (Lant, 1992). There is considerable evidence that organizational behaviors are significantly influenced by aspirations (e.g. Kim et al., 2015; Ref and Shapira, 2017; Rhee, 2009; Xu et al., 2019). Nevertheless, the concepts of aspiration and performance feedback have not been widely applied in operations management (OM) research except for some pioneering studies (e.g., Kirchoff et al., 2016a; Wiengarten et al., 2019; Yang et al., 2017). To narrow this research gap and further understand drivers of GSCM decisions, this study investigates the impact of organizations' aspirations in adopting GSCM practices from the behavioral perspective.

We employed data from an international survey and used hierarchical linear regression to test our hypotheses. The results indicate that organizations invest in GSCM practices according to environmental performance feedback, i.e. their environmental performance relative to aspirations. It is found that for environmental performance either above or below aspirations, the greater the aspiration-performance discrepancy, the stronger the organization's efforts put into the implementation of GSCM practices. Moreover, we tested an alternative model to check the possible role of financial performance aspirations in GSCM decision making. This study identifies a new pathway for GSCM research from the BTOF perspective and explores the role of environmental performance feedback in the implementation of GSCM practices. As a result, this study extends the frontier of GSCM research by understanding *how* organizations make relevant decisions about environmental management.

The rest of this paper is organized as follows. The relevant literature is reviewed and research hypotheses are developed in Section 2. This is followed by research method in Section 3. The analytical results of analyses are reported in Section 4. Research findings are discussed in Sections 5. Conclusions are summarized in Section

6, in terms of theoretical contributions develop based on the present research, its practical implications and limitations, and suggestions for future research.

2. Literature review and hypotheses development

2.1 Aspirations and performance feedback

The BTOF suggests that in order to handle performance variation and simplify managerial procedures, organizations employ a series of standard routines and adapt themselves to distinct decision-making circumstances by trial and error (Argote and Greve, 2007; Cyert and March, 1963). Organizations set an aspiration level for each performance dimension, which serves as a target/goal for the accomplishment of a specific organizational activity (Mezias et al., 2002; Washburn and Bromiley, 2012). This target/goal also serves as a boundary between gain and loss, through which organizations can explicitly attain perceptions of success and failure (Greve, 1998; Schneider, 1992). Organizations use to set two kinds of aspiration namely historical aspiration (HA) and social aspiration (SA), depending on which reference points they compare to. HA refers to an organization's internal self-comparison, which is associated with the organization's own past experience (Greve, 2003a; Lant, 1992). SA refers to an organization's external peer-comparison, which is obtained by consulting peer organizations' performance (Baum et al., 2005; Greve, 1998; Massini et al., 2005). Thus, both internal and external referents can significantly influence the setting of aspiration levels of organizations (Wiseman and Bromiley, 1996).

Organizations can use aspirations for performance evaluation by comparing their actual performance with the aspiration level set previously (Guo and Ding, 2017). For each performance dimension, a performance above aspirations signals a success/satisfaction (positive performance feedback), whereas a performance below aspirations represents a failure/dissatisfaction (negative performance feedback) (Rudy and Johnson, 2016). The BTOF emphasizes that organizations have selective attention and are boundedly rational (Argote and Greve, 2007; Washburn and Bromiley, 2012). In effect, their behavioral decisions might vary according to different levels of performance feedback. Specifically, a perception of crisis caused by a negative performance feedback in the short term would prompt organizations to engage in immediate strategic changes in order to reverse the current backward situation (Kim et al., 2015). Consequently, a "problemistic search" would be initiated to search for alternative and better practices than those in the past (Cyert and March, 1963; Park, 2007; Schimmer and Brauer, 2012). To find a safe and inexpensive solution for improving performance, organizations would undertake "mimetic isomorphism" behavior by imitating the practices of leading peers (DiMaggio and Powell, 1983: 151). In contrast, when organizations receive positive performance feedback, their sense of vested interest and advantageous position would lead to a lack of motivation in searching for alternative practices. Positive performance feedback strengthens decision makers' confidence in their current practices, which are the result of past actions, regarding them as the primary source for their achievements and performance (Park, 2007; Audia and Greve, 2006).

There is ample evidence that organizational behaviors are significantly influenced by aspirations. The behavioral effects of aspirations have been studied in various areas, e.g. strategic positioning (Park, 2007; Schimmer and Brauer, 2012), new market entry (Ref and Shapira, 2017), acquisition (Iyer and Miller, 2008; Kim et al., 2015), non-market strategic action (Rudy and Johnson, 2016; Xu et al., 2019), organizational change (Greve, 1998; Kuusela et al., 2017), learning (Rhee, 2009), patenting strategy (Guo and Ding, 2017), research and development (Chen and Miller, 2007; Gaba and Bhattacharya, 2012; Greve, 2003a), new product development (Parker et al., 2017; Tyler and Caner, 2016), supplier selection (Yang et al., 2017), and environmental, health and safety (EHS) breaches (Wiengarten et al., 2019). The majority of existing studies are in the fields of strategy, organization and innovation, with only few recent articles in the OM field (e.g. Wiengarten et al., 2019; Yang et al., 2017).

2.2 Green supply chain management practices and environmental performance

GSCM has been acknowledged as a significant business strategy to improve eco-sustainability and achieve profit and market share objectives through reducing environmental risks and impacts (Zhu et al., 2008). Prior studies have mainly classified GSCM practices into internal and external dimensions (e.g. Geng et al., 2017; Liu et al., 2018; Zhu and Sarkis, 2004). In this study, we focus on two representative GSCM practices, namely sustainable production (SP) and sustainable sourcing (SS). Specifically, SP refers to organizations' internal efforts while SS concerns the cross-boundary efforts towards suppliers. Through the adoption of SP, organizations aim to improve technical effectiveness in quality management and implement greener and leaner production processes (Florida, 1996; Golini and Gualandris, 2018; Wu, 2013). Meanwhile, by fostering SS, organizations expect to assess and monitor suppliers' environmental sustainability behaviors, as well as develop practices to meet environmental demands through joint efforts with suppliers (Golini and Gualandris, 2018; Vachon and Klassen, 2006; Zhu et al., 2013). Although SP and SS have distinct focuses, they complement each other at the same time.

According to the BTOF's propositions, when organizations fail to achieve their environmental performance aspirations, they would suffer from a perception of failure, which will then stimulate an attempt to change this loss situation. As a result, these organizations will search for the remedy of their unsatisfactory environmental performance. This search aims at altering present tactics and finding new solutions (Schimmer and Brauer, 2012). The practices of a successful organization are often regarded as the source of its success (Park, 2007). Hence, underperforming organizations will incline towards GSCM practices of high performance organizations and pay particular attention to peers in similar business contexts (DiMaggio and Powell, 1983; Park, 2007). They tend to be less determined towards their current strategic behaviors; instead they prefer mimetic behaviors to approach the strategic profiles of better-performing organizations (Baum et al., 2005; Greve, 2008). In a GSCM context, prior studies have verified that undertaking formal sustainable initiatives leads to environmental benefits for organizations (Adebanjo et al., 2016; De Giovanni, 2012; Kang et al., 2018). Thus, in order to improve performance to a satisfying level, organizations that fall behind the environmental goals will have great incentives to learn and implement similar GSCM practices, including SP and SS adopted by those better-performing organizations. Based on the above discussion, we hypothesize:

H1. When the organization's environmental performance is *below* aspirations, the *lower* the environmental performance, the *stronger* the incentives to implement (a) sustainable production and (b) sustainable sourcing.

In an opposite situation, where their environmental performance is above aspirations, the BTOF suggests that organizations will be disinclined to change but stick to their current practices: positive outcomes will lead to repeated behavior unless the organization fails to achieve aspirations (Cyert and March, 1963; Lant et al., 1992). Besides, performance above aspirations can be regarded as a good reason to avoid risky change (Greve, 2003a). Sticking to current strategic practices is a cheap way to avoid risks associated with change (Greve, 1998; Labianca et al., 2009). In a GSCM context, when an organization experiences satisfactory environmental performance, it will tend to attribute that to its current GSCM practices, including SP and SS, as its superior performance serves to affirm the reliability and effectiveness of these practices and stimulates the organization to continue its current practices (Lant et al., 1992). In the meantime, concerning the pressures from stakeholders, media and the general public, the sense of success signaled by satisfactory environmental performance would also enhance an organization's confidence and determination in carrying out SP and SS. As a result, the organization has the incentives to continuously engage in GSCM practices, thus leading to a high level of implementation of both SP and SS. Thus, we propose:

H2. When an organization's environmental performance is *above* aspirations, the *higher* the environmental performance, the *stronger* the incentives to implement (a) sustainable production and (b) sustainable sourcing.

3. Research method

3.1 Sample and data

We used data from the sixth round International Manufacturing Strategy Survey (IMSS VI) to test the proposed hypotheses. The IMSS is an international survey designed to investigate the strategies, practices and performance of manufacturers around the world, and was carried out by an international research team. Wherever needed, the English language questionnaire was translated into local language by the researchers involved, using double and/or reverse translation. To ensure the representativeness of the sample, the procedure of information collection was standardized in each country. All the data were collected from operations, production or plant managers. If the respondents agreed to participate in this survey, they would be contacted and the questionnaire would be sent to them by ordinary mail or e-mail. The final sample of IMSS VI contains 931 plants in 22 countries across six industries (ISIC 25-30), with an overall response rate of 36 percent. After dropping responses with missing data, 746 responses were included in the final sample of this study, as shown in Table Ⅰ.

[Insert Table I here]

3.2 Non-response bias, late-response bias and common method bias

In order to test for non-response and late-response bias in the IMSS sample, the local researchers accessed the existing databases of public firms in their countries. These secondary data were used to uncover any significant differences between respondents and non-respondents and between the early and late respondents in terms of size, industry, sales or proprietary structure (Cheng et al., 2016). If such databases were not available to local researchers, non-response bias and late-response bias were examined by using questionnaire items, such as size, industry and operational performance (Cheng et al., 2016). No evidence of non-response bias or late-response bias was found in IMSS VI.

To address common method bias, we first conducted an exploratory factor analysis (EFA), which discovered four distinct factors with eigenvalues above 1.0, explaining 67.7 percent of total variance. The first factor explains 38.0 percent of total variance, which is not the majority of total variance (Hair et al., 2010). Afterwards, a confirmatory factor analysis (CFA) was conducted to test Harman's single factor model. The model fit indices of the single factor model (χ^2/df=31.582, RMSEA=0.203, CFI=0.717, GFI=0.737, IFI=0.718, RFI=0.629, and NFI=0.712) are unacceptable according to conventional cutoff criteria (Hu and Bentler, 1999). These test results indicate that common method bias is not a serious concern in our study.

3.3 Measures

Dependent variables. The measures of two dependent variables, i.e. sustainable production (SP) and sustainable sourcing (SS), were identified from the literature (e.g. Golini and Gualandris, 2018). Both variables (see Appendix) are measured on five-point Likert scales using three items each (Golini et al., 2014; Hajmohammad et al., 2013). Their values were calculated by weighting the averages of all the corresponding items.

Independent variables. To estimate environmental performance above or below aspirations, we followed Greve (2003a) and Rudy and Johnson (2016) and used spline specifications, which are flexible in allowing performance feedback to have different slopes above and below aspirations. Thus, we have two independent variables: environmental performance below aspirations (EPBA) and environmental performance above aspirations (EPAA). Specifically, EPBA equals *environmental performance – aspiration level* when environmental performance is below the aspiration level and equals 0 otherwise. Similarly, EPAA equals *environmental performance – aspiration level* when environmental performance is above the aspiration level and equals 0 otherwise.

Setting aspirations is a significant step in an organization's performance feedback process. Previous studies (Greve, 2003a; Rudy and Johnson, 2016) estimated an organization's aspiration (A) level as a weighted combination of social aspiration (SA) and historical aspiration (HA) levels using Equation 1, in which α is the weight of HA. Specifically, SA is the industry average performance of an organization's reference groups, while HA represents an organization's past performance (Baum et al., 2005; Massini et al., 2005).

$$A = (1 - \alpha) \times SA + \alpha \times HA \qquad (1)$$

However, the IMSS VI questionnaire did not measure social or historical aspiration directly. Thus, instead, we estimated the discrepancies of environmental performance from social and historical aspirations in this study. First, we used two items to measure *environmental performance compared to social aspiration*, where environmental performance specifically refers to an organization's use of energy and other resources, and carbon footprint (Giménez et al., 2012). The survey questions (see Appendix) enquire about this construct in terms of (1) materials, water and/or energy consumption and (2) pollution emission and waste production levels (Golini et al., 2014; Paulraj, 2011), compared with the plant's main competitors, in which "1 = much higher" (i.e. much worse environmental performance), "3 = equal", and "5 = much lower" (i.e. much better environmental performance). We calculated the averages of these two items to represent the corresponding construct. We defined a performance score of "3" as the social aspiration level, meaning that the plant has an equal performance relative to its main competitors. Hence, environmental performance below social aspiration (EPBSA) is equal to *environmental performance compared to social aspiration* minus 3 when environmental performance is worse than social aspiration and 0 otherwise. Environmental performance above social aspiration (EPASA) is equal to *environmental performance compared to social aspiration* minus 3 when environmental performance is better than social aspiration and 0 otherwise.

Second, we also used two items to measure *environmental performance compared to historical aspiration* and calculated the average of two items to represent this construct. The survey questions (see Appendix) enquire about this construct in terms of (1) materials, water and/or energy consumption and (2) pollution emission and waste production levels (Golini et al., 2014; Paulraj, 2011), compared to three years ago, in which "1 = increased" (i.e. lower environmental performance), "2 = stayed about the same", and "5 = strongly decreased" (i.e. much better environmental performance). Here, a performance score "2" is defined as the historical aspiration level, as "2 = stayed about the same (+5%/-5%)" in the questionnaire. Hence, environmental performance below historical aspiration (EPBHA) is equal to *environmental performance compared to historical aspiration* minus 2 when environmental performance has decreased below the historical aspiration and 0 otherwise. Environmental performance above historical aspiration (EPAHA) is equal to *environmental performance compared to historical aspiration* minus 2 when environmental performance is better than historical aspiration and 0 otherwise. In previous studies (Kim et al., 2015; Lant et al., 1992), historical aspiration is estimated by the exponentially weighted moving average of historical performance in previous periods. However, the time series of environmental performance are not available in the IMSS survey. Nevertheless, we noticed that earlier observations have diminutive weights in the calculation of the exponentially weighted moving average. Thus, it is acceptable to use EPBHA and EPAHA to estimate the discrepancies of environmental performance from the historical aspiration level.

We used the following equations to estimate EPBA by combining EPBSA and EPBHA, and estimate EPAA by combining EPASA and EPAHA, respectively.

$$EPBA = \begin{cases} (1-\alpha) \times EPBSA + \alpha \times EPBHA, & \text{environmental performance below aspiration;} \\ 0, & \text{otherwise.} \end{cases} \quad (2)$$

$$EPAA = \begin{cases} (1-\alpha) \times EPASA + \alpha \times EPAHA, & \text{environmental performance above aspiration;} \\ 0, & \text{otherwise.} \end{cases} \quad (3)$$

Following previous studies (Greve, 2003a; Rudy and Johnson, 2016), we determined the value of alpha in Equations 2 and 3 by adopting a stepwise approach, which adds an increment of 0.1 from 0.1 to 0.9 to find the best model fit based on Adjusted R^2 and F value. The alpha was accordingly selected to be 0.9.

Control variables. We controlled for plant size, external stakeholder pressures, sustainability orientation, and industry effects. Compared with small organizations, large organizations may have more redundant resources and are more likely to implement sustainable efforts (Haleem et al., 2017; Shou et al., 2019). We measured plant size as the natural logarithm of the total number of employees. Organizations will respond to strong stakeholder pressures by implementing high levels of GSCM practices (Haleem et al., 2017; Xiao et al., 2018). Environmental pressure was measured by a single item following Porter and Kramer (2002) and Sarkis et al. (2010). Organizations that are sustainability oriented concentrate on environmentally friendly attributes of products, safety and healthy processes (Haleem et al., 2017), and devote more efforts to adopting GSCM practices (Kirchoff et al., 2016b; Shou et al., 2019). Sustainability orientation was measured by three items adopted from Giménez et al. (2012) and Gualandris et al. (2014) and was calculated as the average of the scores on these items. Finally, we also included industry dummies to address industry-specific effects. The detailed measurement of the control variables is reported in the Appendix.

3.4 Reliability and validity

We did a series of analyses to ensure the reliability and validity of the measurements. Following Ben-Oz and Greve (2015) and Yang et al. (2017), we used CFA to test the unidimensionality and reliability of constructs. The model fit indices (χ^2/df=4.090, RMSEA=0.064, IFI=0.962, NFI=0.950 and CFI=0.962) indicate acceptance of the model (Hu and Bentler, 1999). The CFA factor loadings are listed in Table II. With all items having strong loadings on the construct they are supposed to measure, construct unidimensionality is confirmed. All Cronbach's alpha and composite reliability (CR) values are greater than 0.7, except for environmental performance relative to main competitors, which, with a value of 0.685, is very close to the threshold and acceptable (Flynn et al., 1990; Fornell and Larcker, 1981; Hair et al., 2010). Thus, the results indicate that the constructs are reliable.

[Insert Table II here]

We further used CFA to evaluate the convergent and discriminant validity of the constructs. As shown in Table II, all the factor loadings are greater than 0.50, and all estimates for average variance extracted (AVE) of the constructs are greater than 0.5. Thus, our constructs have convergent validity. Discriminant validity was first tested by assessing whether the correlations among the constructs are less than 0.70. As shown in Table III, all constructs meet that criterion. The square root of the AVE of each construct is greater than its correlation with other constructs, which further confirms discriminant validity (Fornell and Larcker, 1981).

[Insert Table III here]

Considering that we used a dataset with countries from different regions in this study, it is essential to test measurement equivalence across regions. Three kinds of measurement equivalence were examined: calibration, translation and metric equivalence (Mullen, 1995). Standardized Likert scales were used across countries, which ensured calibration equivalence in this study. Furthermore, the original IMSS questionnaire was developed in English and later translated into other languages by national researchers, using double and/or reverse translation in order to guarantee translation equivalence. Finally, a multi-group CFA analysis was undertaken to examine the similarity of the measurement models (Rungtusanatham et al., 2008). To control for regional differences, we tested the models across continents, i.e., the Americas, Asia and Europe, following previous studies (Cheng et al., 2016; Vanpoucke et al., 2014). In the baseline model (in which the factor loadings were set freely across the continents), the indices are χ^2/df=2.380, RMSEA=0.043, IFI=0.970, NFI=0.950 and CFI=0.970. In the constrained model (in which the factor loadings were constrained to be equal across continents), the indices are χ^2/df=2.372, RMSEA=0.043, IFI=0.965, NFI=0.942 and CFI=0.965. These results indicate that the data from different regions fits the model well. We then compared the change in CFI value (ΔCFI) between the baseline model and the constrained model to see whether the difference is negligible (Cheung and Rensvold, 2002). In this study, the value of ΔCFI is 0.005, which is smaller than the threshold value of 0.01 (Cheung and Rensvold, 2002). Thus, measurement equivalence is confirmed.

4. Analyses and results

4.1 Main results

Hierarchical linear regression was used to test the proposed hypotheses. To control for potential heteroscedasticity, Huber-White robust standard errors were deployed (White, 1980). In addition, to ensure that multicollinearity is not a problem, we calculated variance inflation factors (VIFs). For all models, the VIFs are not higher than 3.0, which is significantly below the suggested threshold value of 10.0 (Hair et al., 2010). Thus, multicollinearity is not a significant issue in our study.

Afterwards, all variables were introduced into the models for the two dependent variables (i.e., SP and SS) following a stepwise approach. First, in Model 0, we included all control variables. Then, in Model 1, we included the two independent variables (EPBA and EPAA) simultaneously.

The regression results are shown in Table Ⅳ. It is observed that EPBA is significantly negatively associated with both SP (β=-0.333, p=0.061) and SS (β=-0.507, p=0.009). Thus, both H1a and H1b are supported. EPAA is significantly positively associated with both SP (β=0.339, p=0.000) and SS (β=0.287, p=0.000), which provides strong support for H2a and H2b. Figure 1 depicts the effects of environmental performance feedback.

[Insert Table IV here]

[Insert Figure 1 here]

4.2 Test for alternative explanation

Prior studies have found that adopting GSCM practices may strengthen an organization's financial performance (e.g. Chien and Shih, 2007; Geng et al., 2017; Rao and Holt, 2005). Therefore, it is possible that organizations implement GSCM practices according to their financial performance feedback, which is based on their aspirations for financial performance. To rule out this alternative explanation, we ran a complementary analysis using financial performance instead of environmental performance. After dropping responses with missing data, 666 responses were included in the final sample of this supplementary examination.

Financial performance was measured using two items: (1) sales, and (2) return on sales (ROS) (Miller and Roth, 1994; Zhou et al., 2014; see Appendix) and calculated as their average. Similar to measuring environmental performance above and below aspirations, we measured financial performance below aspirations (FPBA) and financial performance above aspirations (FPAA) indirectly. We used two scales of financial performance in the IMSS survey. One scale enquires about sales and ROS “compared to the three years ago” (1=much lower, 3=equal performance, 5=much higher). A score “3” can be regarded as the approximate historical aspiration level. Hence, financial performance below historical aspiration (FPBHA) is equal to *financial performance compared to historical aspiration* minus 3 when financial performance has decreased and 0 otherwise. Financial performance above historical aspirations (FPAHA) is equal to *financial performance compared to historical aspiration* minus 3 when financial performance has increased and 0 otherwise.

The other scale measures sales and ROS of the business unit in the previous year (see Appendix). Following previous studies (Fiegenbaum and Thomas, 1995; Herriott et al., 1985; Lev, 1974), we estimated the social aspiration level by calculating the industry average from the IMSS dataset. Hence, financial performance below social aspiration (FPBSA) is equal to *financial performance compared to social aspiration* minus the corresponding industry average when financial performance is below the industry average and 0 otherwise. Financial performance above social aspiration (FPASA) is equal to *financial performance compared to social aspiration* minus the corresponding industry average when financial performance is above the industry average and 0 otherwise. Afterwards, we developed two equations similar to Equations 2 and 3 to estimate FPBA and FPAA, in which alpha was still set as 0.9.

The regression results are reported in Table V. No significant relationship is observed between FPBA/FPAA and SP/SS. The insignificant results suggest that organizations make decisions about GSCM practices based on environmental performance aspirations, not on financial performance aspirations.

[Insert Table V here]

4.3 Robustness check

The IMSS data were collected from multiple countries. In order to control for potential country-specific effects, we adopted hierarchical linear modeling (HLM) as a robustness check, although the sample does not cover an adequate number of countries (Peterson et al., 2012). Following the recommendations of Aguinis et al. (2013), we took a stepwise approach as shown in Table VI. First, we ran a null model (Model 0) to divide the variance of GSCM practices into within- and between-country components. The intraclass correlation (ICC) for each model is above 0.1, which indicates a nested data structure (Aguinis et al., 2013). We then included all the control variables in Model 1. Next, we included the independent variables using two different models, i.e., random intercept model (Model 2) and random slope model (Model 3).

For each model, we computed the deviance to evaluate the goodness-of-fit of the model. Then, we compared the deviance reduction across models. The results in Table VI show that the deviances reduce continuously from Model 0 to Model 3. However, the deviance reduction from Model 2 to Model 3 for SS is insignificant, which implies that the relationships between the independent variables (i.e., EPBA and EPAA) and the dependent variable (i.e., SS) do not vary significantly across countries (Aguinis et al., 2013). In other words, although the IMSS data has a nested structure, there is no strong evidence of country-level moderating effects for the tested models of SS. Hence, the random intercept model is appropriate to do this check. Besides, HLM provides similar results that support all the hypotheses except H1a. According to hierarchical linear regression, EPBA is significantly associated with SP (β=-0.333, p=0.061), which supports H1a, whereas in the random intercept model the association is insignificant (β=-0.207, p=0.278). The difference can be due to the direct cross-level effects (Aguinis et al., 2013) and the small number of countries in the present sample, since HLM demands a minimum of 30 groups (Peterson et al., 2012). Nevertheless, the HLM results generally support the proposition that organizations determine their efforts in GSCM practices according to environmental performance feedback.

[Insert Table VI here]

4.4 Endogeneity check

As endogeneity can probably never be completely eliminated from empirical analysis (Murray, 2006; Guide and Ketokivi, 2015), we have taken several precautions to minimize the potential risk. First, endogeneity can result from common method bias (Antonakis et al., 2014; Guide and Ketokivi, 2015). We addressed this type of endogeneity through statistical remedies, as elaborated in Section 3.2. Second, to address endogeneity due to variation in the respondents' motivation, late-response bias was also checked, as reported in Section 3.2 (Damali et al., 2016). Third, while the cross-sectional nature of our survey means that causality cannot be established, the questionnaire items were derived from the literature and written with common items that sought to elicit time-ordered responses (Damali et al., 2016). Fourth, we followed the suggestions of Antonakis et al. (2014) to ensure valid causal claims and avoid possible endogeneity bias by including appropriate control variables to reduce omitted variable bias and generate estimates based on the maximum likelihood method.

Furthermore, we investigated the possibility of simultaneity and reverse causality between the dependent and the independent variables. Different from prior studies that consider GSCM practices as independent variables and performance as dependent variables, we aim to investigate how managers decide on the implementation of GSCM practices and hence treat the discrepancies of environmental performance from social and historical aspirations as the independent variables and GSCM practices as the dependent variables. The risk of simultaneity and reverse causality between the dependent and independent variables is indeed minimal: practices (are believed to) affect performance but will not influence the discrepancy between performance and aspiration. Generally, there is a time delay from the perception of environmental performance to the formation of environmental performance feedback. When organizations formulate their social aspiration (SA), selection, observation, and comparability are important steps (Baum et al., 2005; Greve, 2003b); similarly, in order to establish historical aspiration (HA), organizations also need a period of time to gather, calculate and update their historical benchmark. Therefore, a salient distance exists between the perception of environmental performance and the accomplishment of environmental performance feedback. Moreover, organizations will determine their environmental aspirations based on a joint consideration of HA and SA (Greve, 2003a;

Rudy and Johnson, 2016). An organization's SA will be affected by the average level of its industry. However, the average level of a specific industry will not be much influenced by the GSCM practices of a single organization. Furthermore, an organization's HA will be updated over time (Lant et al., 1992). Thus, one cannot infer that a high level of GSCM practices will necessarily result in higher or lower environmental performance feedback.

Based on the reasons above, simultaneity and reverse causality are unlikely to confound the relationship between environmental performance feedback and GSCM practices (Roberts and Whited, 2012). Nevertheless, we still tested *ex post* whether endogeneity was a potential issue in the relationship between environmental performance feedback and GSCM practices. Following Sluis and De Giovanni (2016), Hausman's test was performed. We first regressed EPBA on all exogenous variables and GSCM practices. The unstandardized regression coefficients of sustainable production (SP) and sustainable sourcing (SS) were both insignificant, indicating that endogeneity was not present. Then, we did the same analysis for EPAA. As the two regression coefficients of SP and SS were significant, we substituted the estimates for EPAA in Model 1 to derive the error terms, and tested if the covariances between EPAA and the error terms were significantly different from zero. The results showed that both covariances were insignificant. This indicates that EPAA was not endogenous. Thus, in short, the results of Hausman's test show no endogeneity concerns in this study.

5. Discussion

The empirical results support the proposed hypotheses. In short, the greater the aspiration-environmental performance discrepancy, the more efforts organizations put into the implementation of SP and SS. The results are consistent with the BTOF's argument that performance deviations from aspirations matter when organizations consider whether and how to adopt strategic actions (Greve, 1998; Labianca et al., 2009). When environmental performance is above aspirations, organizations are inclined to rely on the previous strategic profiles to maintain their advantageous positions (Greve, 1998; Labianca et al., 2009). When environmental performance is below aspirations, organizations are prone to change their previous strategic actions (Park, 2007) and imitate better-performing peers (DiMaggio and Powell, 1983).

As shown in Figure 1, the slope of SS with negative performance feedback is steeper than that with positive performance feedback. That is, organizations with environmental performance below aspirations have stronger incentives to engage in SS for improving their unsatisfactory performance. This result is in line with previous studies that the slope is steeper in the failure range (Baum et al., 2005). According to the BTOF, decision makers react more strongly to threats than to opportunities; and performance below aspirations is more likely to stimulate risk-taking activities (Baum et al., 2005; Tversky and Kahneman, 1986). In other words, firms with performance below aspirations are more likely to adopt strategic changes than firms with accomplished aspirations (Greve, 2003b; Lant and Mezias, 1992).

Besides, our results disclose decision makers' preference towards the two GSCM practices. Figure 1 shows that the implementation level of SS is higher than that of SP, particularly in the case of negative environmental performance feedback. This may be due to the risk and potential benefits associated with SS and SP. Compared to SP, SS is riskier as it goes beyond the organizational boundaries and involves multiple supply chain members, which induces higher uncertainties in its implementation. At the same time, SS is likely to bring higher environmental performance improvement than SP (e.g. Geng et al., 2017; Zhu and Sarkis, 2007). Hence, organizations may take the risk of SS and adopt it as a more worthwhile solution especially when they face negative environmental performance feedback. This finding is in line with previous studies that organizations with negative performance feedback tend to initiate risk-taking activities (Baum et al., 2005; Xu et al., 2019).

The test for an alternative explanation shows that financial performance feedback does not have a significant relationship with the implementation of GSCM practices. Although existing studies tend to link GSCM practices with financial performance more (e.g. Chien and Shih, 2007; McGuire et al., 1988; Rao and Holt, 2005) and it is more intuitive to assume that financial performance feedback can stimulate the implementation of GSCM practices, this study provides strong evidence that GSCM decisions are made solely based on environmental performance feedback. The robustness check provides further support to this finding.

6. Conclusion

6.1 Theoretical contributions

This study broadens the current knowledge on GSCM decision-making. Drawing upon the BTOF, we investigate the effects of environmental performance feedback on strategic actions for GSCM, in particular sustainable production and sourcing, and develop three main theoretical contributions.

First, our study provides novel insights to the GSCM literature. While existing research examined *why* organizations adopt GSCM practices (e.g. Zhu et al., 2005; Chien and Shih, 2007; Dubey et al., 2015; Santos et al., 2019), our study empirically investigates *how* organizations use performance feedback to decide on their adoption of GSCM practices. We posit that GSCM decision-making depends on the extent to which an organization's environmental performance meets its aspirations. For environmental performance both above and below aspirations, the greater the discrepancies with aspirations, the more efforts organizations put into implementing GSCM practices. These findings are generally in line with previous research that used the BTOF to explore the relationship between performance feedback and strategic actions in other areas (e.g., Gaba and Bhattacharya, 2012; Iyer and Miller, 2008; Kuusela et al., 2017).

Second, our study extends the application of the BTOF in operations management research. Although the BTOF has been widely applied in strategic and organizational management research, it has rarely been applied in the OM field. Investigating the drivers of decision-making on GSCM practices, we find that organizational aspirations are based on environmental performance rather than financial performance. This extends the BTOF literature as prior studies have mainly centered on financial performance (e.g. Kirchoff et al., 2016a; Wiengarten et al., 2019). Our study therefore broadens the focus of performance feedback from sole economic concerns to sustainability dimensions. It is even rational to conjecture that organizations' social performance feedback may also be based on aspirations for social performance instead of economic performance.

Third, our study provides a new perspective for understanding SP and SS. Prior studies have considered SP and SS from different perspectives, such as process innovation (Golini and Gualandris, 2018) and stakeholder involvement (Vachon and Klassen, 2006; Zhu et al., 2013). From a behavioral perspective, this study indicates that organizations may regard SP and SS as strategic actions to respond to environmental performance feedback. Moreover, compared to SP, organizations may regard SS as a risker strategic action with, however, higher potential for environmental performance improvement. This finding deepens our understanding of GSCM practices and reveals the preference of decision makers in the context of GSCM.

6.2 Practical implications

The results of this study provide multiple insights for managers and policy makers. First, considering the influence of environmental performance feedback on GSCM decision-making, it is important for managers to actively and continuously monitor social (i.e. their competitors' environmental performance) and historical (i.e. their own past environmental performance) references, based on which they can set appropriate aspiration levels for further performance assessment.

Second, the top management of multinational corporations should be aware that subsidiaries located in different countries will be influenced by local social aspirations in the decision-making on sustainable practices. The social aspiration for environmental performance is mainly determined by the local industry and may therefore vary from country to country. Headquarters should take these contextual factors in decision-making into account (Li et al., 2019b) and actively decide on the level of autonomy they give to local managers to determine their implementation efforts under the guidance of a corporate sustainability strategy.

Finally, the study provides implications for policymakers. The pressure from stakeholders, media and the general public can push up the GSCM investment of an entire industry, which will elevate social aspirations and in turn stimulate the sustainable efforts of individual organizations within the industry. Therefore, it is recommended for governmental and non-governmental policy makers to set and press forward higher industrial standards, especially for industries that cause serious resource waste and environmental pollution, and enhance social aspirations through that.

6.3 Limitations and suggestions for future research

This study has limitations, which present opportunities for future research. First, we adopted a cross-sectional design, which cannot confirm causality. Although we investigated the risk of simultaneity or reverse causality between the dependent and the independent variables, conducting a longitudinal examination with panel data to track dynamic environmental performance feedback and strategic actions would still be valuable for establishing causality. This would also allow taking the time organizations need to decide on and fully implement GSCM practices into consideration. Second, our study determined aspiration-performance discrepancies indirectly. In future research, it is desirable to measure historical and social aspirations directly. Third, we explored the behavioral effects of environmental performance feedback in a sample of manufacturing companies. Future research should extend the investigation to social performance feedback and the interaction between the three bottom-line performance indicators, and include not only manufacturing industries but also service industries. Fourth, it is worth investigating how organizations set their aspiration levels since this process may be affected by contextual factors such as organizational culture. Finally, as the sample used for our HLM analysis does not comprise a sufficient number of countries, we advise follow-up research to test possible moderating effects of country level variables such as national culture, law enforcement and developmental level.

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Appendix – Survey Questions

Sustainable production: Please indicate the current level of implementation of action programs related to (1= None; 5= High):

SP1	Environmental certifications (e.g. EMAS or ISO 14001)
SP2	Energy and water consumption reduction programs
SP3	Pollution emission reduction and waste recycling programs

Sustainable sourcing: Please indicate the current level of implementation of action programs related to (1= None; 5= High):

SS1	Suppliers' sustainability performance assessment through formal evaluation, monitoring and auditing using established guidelines and procedures
SS2	Training/education in sustainability issues for suppliers' personnel
SS3	Joint efforts with suppliers to improve their sustainability performance

Sustainability orientation: Consider the importance of the following attributes to win orders from your major customers in the last three years (1= Not important; 5= Very important).

SO1	More environmentally sound products and processes
SO2	Higher contribution to the development and welfare of the society
SO3	More safe and health respectful processes

Environmental pressure: How do you perceive the following characteristics of the environment in which your business unit operates (1= Very weak; 5= Very strong)?

EPre1	Environmental pressure (e.g. stakeholders call for environmentally friendly products and processes)

Environmental performance[1]: How does your current performance compare with that of your main competitor(s)? (1= Much higher; 3=Equal; 5= Much lower)

EPSA1	Materials, water and/or energy consumption
EPSA2	Pollution emission and waste production levels

Environmental performance[2]: How has your performance changed over the last three years (1= Increased (+ 5% or worse); 2= Stayed about the same (+5%/-5%); 3= Slightly decreased (-5/-15%); 4= Decreased (-15/-25%); 5= Strongly decreased (-25% or more))?

EPHA1	Materials, water and/or energy consumption
EPHA2	Pollution emission and waste production levels

Financial performance[3]: Please indicate your Sales and Return On Sales of the business unit in 2012.

FPSA1	Sales (1= < 10 Million €; 3= 50-100 Million €; 5= > 500 Million €)
FPSA2	Return on Sales (ROS) (1= < 0%; 3=5-10%; 5= > 20%)

Financial performance[4]: Please indicate your Sales and Return On Sales of the business unit compared to the three years ago (1= Much lower; 5= Much higher).

FPHA1	Sales
FPHA2	Return on Sales (ROS)

Items used to compare environmental performance to social aspiration.
[2] Items used to compare environmental performance to historical aspiration.
[3] Items used to compare financial performance to social aspiration.
[4] Items used to compare financial performance to historical aspiration.

Table Ⅰ. Sample overview

Country/ region	N	%	Size (number of employees)	N	%	Industry (ISIC code)	N	%
Europe			Less than 50	21	2.82	25	234	31.37
Belgium	23	3.08	50-249	318	42.63	26	103	13.81
Denmark	27	3.62	250-499	118	15.82	27	124	16.62
Finland	27	3.62	500-999	99	13.27	28	173	23.19
Germany	12	1.61	1,000-4,999	112	15.01	29	76	10.19
Hungary	42	5.63	5,000 or more	78	10.46	30	36	4.83
Italy	27	3.62	**Total**	**746**	**100.00**	**Total**	**746**	**100.00**
Netherlands	38	5.09						
Norway	26	3.49						
Portugal	26	3.49						
Romania	37	4.96						
Spain	20	2.68						
Sweden	21	2.82						
Switzerland	23	3.08						
Slovenia	17	2.28						
Asia								
China	96	12.87						
India	87	11.66						
Japan	77	10.32						
Malaysia	13	1.74						
Taiwan	26	3.49						
America								
Brazil	26	3.49						
Canada	21	2.82						
USA	34	4.56						
Total	**746**	**100.00**						

Table II. CFA results

Construct	Item	Factor loading	S.E.	Cronbach's alpha	Composite reliability	AVE
Sustainable production	SP1	0.615	0.050	0.793	0.816	0.601
	SP2	0.824	0.037			
	SP3	0.863	0.037			
Sustainable sourcing	SS1	0.761	0.036	0.873	0.879	0.708
	SS2	0.859	0.038			
	SS3	0.898	0.036			
Sustainability orientation	SO1	0.767	0.035	0.842	0.843	0.643
	SO2	0.862	0.035			
	SO3	0.773	0.037			
Environmental performance[1]	EPSA1	0.717	0.030	0.685	0.689	0.526
	EPSA2	0.733	0.034			
Environmental performance[2]	EPHA1	0.747	0.042	0.733	0.732	0.578
	EPHA2	0.773	0.043			

[1] Items used to compare environmental performance to social aspiration.
[2] Items used to compare environmental performance to historical aspiration.

Table III. Correlations of the constructs[1]

		Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	Sustainable production	3.312	1.046	0.775						
(2)	Sustainable sourcing	2.849	1.066	0.615	0.841					
(3)	Environmental performance[2]	3.192	0.629	0.257	0.299	0.725				
(4)	Environmental performance[3]	2.689	0.845	0.293	0.227	0.344	0.760			
(5)	Plant size	2.591	0.743	0.317	0.197	0.068	0.086	-		
(6)	Environmental pressure	3.327	1.058	0.343	0.238	0.157	0.137	0.174	-	
(7)	Sustainability orientation	3.254	0.955	0.448	0.481	0.278	0.196	0.107	0.435	0.802

[1] Values on the diagonal are the square-root of AVE.
[2] Items used to compare environmental performance to social aspiration.
[3] Items used to compare environmental performance to historical aspiration.

Table IV. Regression results for sustainable production and sourcing

	Sustainable production		Sustainable sourcing	
	Model 0	**Model 1**	**Model 0**	**Model 1**
Constant	0.840***	0.920***	1.032***	1.092***
	(0.224)	(0.214)	(0.242)	(0.235)
ISIC-25	-0.138	-0.219	-0.431*	-0.504**
	(0.156)	(0.151)	(0.172)	(0.164)
ISIC-26	-0.014	-0.088	-0.060	-0.125
	(0.167)	(0.162)	(0.180)	(0.173)
ISIC-27	0.067	0.036	-0.050	-0.077
	(0.163)	(0.158)	(0.177)	(0.170)
ISIC-28	-0.261+	-0.312*	-0.395*	-0.440**
	(0.158)	(0.153)	(0.176)	(0.168)
ISIC-29	0.005	-0.078	-0.165	-0.235
	(0.165)	(0.161)	(0.186)	(0.182)
Plant size	0.341***	0.323***	0.177***	0.161***
	(0.042)	(0.040)	(0.046)	(0.045)
Environmental pressure	0.141***	0.125***	0.016	0.002
	(0.036)	(0.035)	(0.036)	(0.035)
Sustainability orientation	0.373***	0.321***	0.481***	0.437***
	(0.040)	(0.039)	(0.041)	(0.041)
EPBA		-0.333+		-0.507**
		(0.177)		(0.194)
EPAA		0.339***		0.287***
		(0.046)		(0.052)
Adj. R^2	0.295	0.340	0.270	0.301
F	49.85	47.45	38.60	35.81
VIF	2.90	2.56	2.90	2.56

Standard errors in parentheses

$^{+}p < 0.1$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table V. Results of the alternative model

	Sustainable production		Sustainable sourcing	
	Model 0	**Model 1**	**Model 0**	**Model 1**
Constant	0.848^{***}	0.866^{***}	1.170^{***}	1.124^{***}
	(0.245)	(0.251)	(0.256)	(0.256)
ISIC-25	-0.140	-0.140	-0.476^{**}	-0.477^{**}
	(0.169)	(0.170)	(0.182)	(0.182)
ISIC-26	-0.005	-0.002	-0.131	-0.137
	(0.184)	(0.184)	(0.194)	(0.193)
ISIC-27	0.127	0.129	-0.039	-0.045
	(0.176)	(0.176)	(0.189)	(0.189)
ISIC-28	-0.260	-0.259	-0.453^{*}	-0.455^{*}
	(0.174)	(0.174)	(0.188)	(0.188)
ISIC-29	0.064	0.072	-0.177	-0.196
	(0.177)	(0.179)	(0.198)	(0.197)
Plant size	0.351^{***}	0.351^{***}	0.168^{***}	0.170^{***}
	(0.045)	(0.045)	(0.048)	(0.047)
Environmental pressure	0.136^{***}	0.136^{***}	0.001	0.001
	(0.039)	(0.039)	(0.038)	(0.038)
Sustainability orientation	0.358^{***}	0.359^{***}	0.464^{***}	0.462^{***}
	(0.042)	(0.043)	(0.043)	(0.044)
FPBA		0.035		-0.084
		(0.083)		(0.099)
FPAA		-0.037		0.089
		(0.078)		(0.087)
Adj. R^2	0.291	0.289	0.266	0.265
F	44.57	36.10	33.45	28.61
VIF	3.11	2.75	3.11	2.75

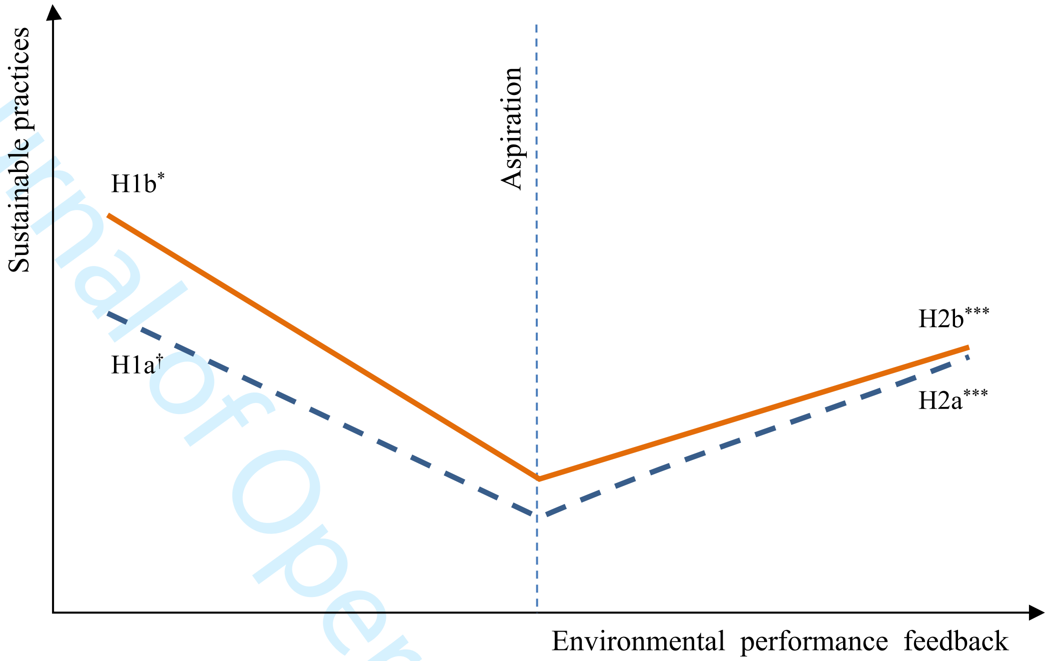
Standard errors in parentheses

$^{+}$ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table VI. Results of robustness check

	Sustainable production				Sustainable sourcing			
	Model 0	**Model 1**	**Model 2**	**Model 3**	**Model 0**	**Model 1**	**Model 2**	**Model 3**
Intercept	3.241***	3.366***	3.405***	3.386***	2.684***	2.911***	2.945***	2.950***
	(0.0818)	(0.160)	(0.158)	(0.156)	(0.126)	(0.182)	(0.181)	(0.180)
ISIC-25		-0.160	-0.208	-0.200		-0.330*	-0.374*	-0.377*
		(0.154)	(0.151)	(0.150)		(0.149)	(0.147)	(0.146)
ISIC-26		-0.075	-0.129	-0.119		-0.186	-0.227	-0.231
		(0.165)	(0.162)	(0.160)		(0.159)	(0.157)	(0.157)
ISIC-27		0.060	0.031	0.046		-0.039	-0.061	-0.064
		(0.160)	(0.157)	(0.155)		(0.154)	(0.152)	(0.152)
ISIC-28		-0.291+	-0.317*	-0.302*		-0.282+	-0.309*	-0.318*
		(0.158)	(0.154)	(0.153)		(0.152)	(0.150)	(0.149)
ISIC-29		-0.026	-0.076	-0.027		-0.147	-0.187	-0.211
		(0.173)	(0.169)	(0.167)		(0.166)	(0.164)	(0.163)
Plant size		0.352***	0.328***	0.317***		0.168***	0.151***	0.155***
		(0.046)	(0.045)	(0.045)		(0.044)	(0.044)	(0.044)
Environmental pressure		0.136***	0.124***	0.128***		0.031	0.022	0.024
		(0.033)	(0.033)	(0.032)		(0.032)	(0.032)	(0.032)
Sustainability orientation		0.344***	0.307***	0.298***		0.336***	0.309***	0.309***
		(0.039)	(0.039)	(0.038)		(0.038)	(0.038)	(0.038)
EPBA			-0.207	-0.119			-0.393*	-0.344+
			(0.190)	(0.194)			(0.185)	(0.189)
EPAA			0.283***	0.329***			0.209***	0.179***
			(0.048)	(0.056)			(0.046)	(0.049)
ICC	0.103				0.288			
Deviance	2128.138	1894.048	1859.634	1848.111	1999.291	1855.844	1835.147	1831.965
Deviance reduction		234.090***	34.414***	11.523*		143.447***	20.697***	3.182
AIC	2134.138	1916.048	1885.634	1870.111	2005.290	1877.844	1861.147	1853.965

Standard errors in parentheses
+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$



Note: The solid line is for sustainable sourcing and the dashed line is for sustainable production.
† $p < 0.1$, * $p < 0.05$, *** $p < 0.001$

Figure 1. Effects of environmental performance feedback