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Deploying Environmental Management Across Functions: The Relationship Between Green Human Resource Management and Green Supply Chain Management

Annachiara Longoni[1] · Davide Luzzini[2] · Marco Guerci[3]

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Abstract Balancing environmental, social, and economic performance is today considered a key responsibility that firms have toward society. As a result, academics, practitioners, and political decision makers are increasingly paying attention to environmental management systems improving a full spectrum of environmental performance. In that regard, even if recent literature suggests that environmental management should be deployed through a cross-functional approach, extant literature mostly focuses on independent functional systems. This paper addresses this gap investigating how the deployment of environmental management in the human resource function—adopting green human resource management (GHRM) practices—and the supply chain function—adopting green supply chain management (GSCM) practices—impact on environmental and financial performance. We draw from a multiple-respondent survey of human resource and supply chain managers in multiple industries in Italy. The study suggests that GHRM and GSCM impact on both environmental and financial performance and shows that GHRM and GSCM exert those impacts in a joint fashion. Indeed, our results show that GSCM plays a mediating role in the relationship between GHRM and performance. Overall, our results provide researchers and managers with relevant insights into the cross-functional deployment of the environmental values and principles across functions.

Keywords Environmental performance · Financial performance · Green human resource management · Green supply chain management

Abbreviations

GHRM	Green human resource management
GSCM	Green supply chain management
RBV	Resource-based view (of the firm)
SC	Supply chain
HR	Human resource

Introduction

Business ethics studies point out that ethical firms are required to balance their financial, social, and environmental performance (e.g., Becker 2012; Florea et al. 2013). Two research streams in academic literature are addressing this subject. On the one hand, a first stream of research is exploring when the financial, social, and environmental dimensions generate trade-offs and how to overcome such trade-offs (Hahn et al. 2010). On the other hand, a second research stream includes those scholars recognizing that each dimension has its own merit and debating how better social (e.g., Hafsi and Turgut 2013; Bai 2013; Ho et al. 2012) and environmental performance (e.g., Walls et al. 2012) can be achieved. The present paper focuses on the latter perspective investigating how firms can improve their environmental performance, which is still highly debated (George et al. 2015). In doing so, we partially explore also the trade-off discussion considering how environment-related actions impact on environmental and financial performance.

✉ Davide Luzzini
dluzzini@audencia.com

[1] ESADE Business School, Ramon Llull University, Av. Pedralbes, 60-62, 08034 Barcelona, Spain

[2] Audencia Business School, 8 route de la Jonelière, 44312 Nantes, France

[3] Department of Social and Political Sciences, Università degli Studi di Milano, via Conservatorio, 7, 20122 Milan, Italy

Therefore, the present paper is broadly related to the business ethics stream of research about environmental ethics, which is the sub-field of ethical studies extending the traditional anthropocentric field of ethics providing moral standing to non-human entities including animals, plants, and ecosystems (e.g., Leopold 1949). This is considered a key societal issue at the global level, which profoundly involves the business community (Sadler-Smith 2013). Indeed, preserving the natural environment has been labeled as a new business "megatrend" that forces fundamental and persistent shifts in how firms compete (Lubin and Esty 2010; Markman and Krause 2016). As a result, environmental management increasingly becomes a core element of firms' strategies (BCG&MIT 2009; McKinsey 2013), even though the effective implementation of environmental management systems is still questioned (Ervin et al. 2013; De Giovanni 2012). First, it is debated how firms can actually internalize the ethical imperative and institutional call for green behaviors in their core business processes (Harris and Crane 2002) and, accordingly, how they can avoid unethical behaviors such as greenwashing (Berrone et al. 2015); second, it is debated how firms can implement environmental management systems to effectively improve a full spectrum of environmental performance and, at the same time, their financial performance, or at least not damaging them (Epstein 2008). Recent cases (such as the Carrefour Group case reported by Lai et al. 2010) suggest that these challenges can be addressed by deploying environmental management cross-functionally diffusing environmental values and principles and not just through dedicated roles and departments (Wagner and Blom 2011). Consistent with this line of reasoning, the academic literature has called for more studies investigating the deployment of environmental management across different organizational functions (e.g., Pagell and Shevchenko 2014; Young et al. 2013).

In our study, we answer to this call by investigating the deployment of environmental management in two key organizational functions: the human resource (HR) and the supply chain (SC) function. Accordingly, human resource management is defined as "the management of work and people toward desired ends, [which] is a fundamental activity in any organization in which human beings are employed" (Boxall et al. 2007, p. 1). Environmental performance could stand among those desired ends and thus the HR domain is a fundamental field of investigation to study environmental management systems (e.g., Renwick et al. 2012). Supply chain management is defined as "the management of a network of relationships within a firm and between interdependent organizations and business units […] that facilitate the forward and reverse flow of materials, services, finances and information from the original producer to final customer with the benefits of adding value, maximizing profitability through efficiencies, and achieving customer satisfaction" (Stock and Boyer 2009, p. 691). These activities have a primary impact on the environment, making the adoption of environmental management systems in such context a crucial issue (Kleindorfer et al. 2005).

Specifically, the present study has two objectives. The first is to hypothesize and empirically test the positive effect of the environmental practices adopted in these organizational functions (i.e., green human resource management—GHRM and green supply chain management—GSCM) on a full spectrum of environmental performance and on financial performance. The second objective is to hypothesize and empirically test a specific mechanism that explains the link between GHRM and GSCM, showing in particular the role of GHRM for internalizing environmental values and principles among employees and thus in supply chain activities.

Indeed, despite the acknowledged effect of GHRM and GSCM practices on environmental performance in, respectively, the human resource management (see Renwick et al. 2012) and supply chain management (see Miemczyk et al. 2012) literatures, very few studies have explored these two systems jointly and the link between the two (Jabbour and Jabbour 2016). This gap is surprising for two reasons. First, although scholars theoretically acknowledge that GHRM practices are a key internal driver of GSCM practices (Cantor et al. 2012; Crane 2000; Gattiker and Carter 2010; Sarkis et al. 2010; Jabbour and Jabbour 2016), the extant research empirically investigating antecedents of GSCM has primarily focused on pressures external to the firm (e.g., Lee 2008; Paulraj 2009; Preuss 2005; Wolf 2014). Second, the general human resource management and supply chain management literatures have progressively investigated the relationship between HR and SC practices (Hohenstein et al. 2014; Jin et al. 2010), but that joint investigation has yet to happen in relation to environment-related practices and performance. In this study, we predict that the relationship between GHRM and GSCM occurs via a significant intervening mechanism (i.e., GSCM) that mediates the effect of an antecedent variable (i.e., GHRM) on both environmental and financial performance.

Given this, in the remainder of this article, we review previous literature on GHRM and GSCM practices and formulate specific hypotheses. These are then tested with an original dataset based on a double-respondent survey involving HR and SC managers.

Research Background

The key dependent variable that this study aims to explain is a full spectrum of environmental performance, which is conceived as "the outcome of a firm's strategic activities

that manage (or not) its impact on the natural environment" (Walls et al. 2012). Accordingly, the environmental responsibility of an ethical company should focus on all dimensions of environmental impacts, such as for example impact related to toxic emission, raw material and energy consumption, and waste production, and should avoid contradicting actions in relation to the natural environment (Zhu and Sarkis 2004; Zhu et al. 2005).

Since the practices that improve the environmental performance can emerge from several organizational functions (Porter and Kramer 2006), researchers recently called for cross-functional studies exploring simultaneous outcome and mutual relationship between different functions (Pagell and Shevchenko 2014; Jabbour and Jabbour 2016). In line with this reasoning, we investigate the environmental management systems in the HR and SC functions and their relationship, working at the intersection of two streams of literature that have developed mostly independently. On the one hand, human resource management has been considered a key factor in improving environmental performance since the mid-nineties (e.g., Milliman and Clair 1996; Wehrmeyer 1996), and its effects on environmental performance have been increasingly investigated (see for example Fernández et al. 2003; Jabbour and Santos 2008a; Jackson and Seo 2010; Jackson et al. 2011; Renwick et al. 2012). Different HR practices have been identified to deploy environmental values across the organization (e.g., Hoffman 1993; Russo and Fouts 1997; Fernández et al. 2003) and to implement environmental management initiatives (e.g., Jabbour and Santos 2008a and Jabbour and Santos 2008b). A recent review of empirical studies carried out by Renwick et al. (2012) confirms that a bundle of human resource management practices that "strategically target" environmental performance (i.e., the so-called GHRM bundle, composed of consistent and coherent HRM practices aimed at improving environmental performance) plays a key role in "greening the organization." The GHRM bundle includes HR practices identified by previous studies to help the greening of the organization, suggesting a synergistic effect of their joint adoption (Combs et al. 2006). Table 1 describes the GHRM bundle and related practices.

On the other hand, in the SC domain, environmental values and principles have been initially integrated into internal manufacturing processes (e.g., Sarkis and Rasheed 1995), through the adoption of reactive practices (e.g., pollution control technologies) and later through proactive and preventive practices (e.g., pollution prevention technologies) (Klassen and Whybark 1999). More recently, focal firms have been considered responsible not only for their internal operational processes, but also for their suppliers, thus extending environmental management activities outside the firm's boundaries (Krause et al. 2009; Seuring and Muller 2008). Accordingly, GSCM practices are commonly defined as actions taken to integrate environmental values and principles across SC processes (Srivastava 2007), which require to adopt both internally and externally oriented practices (Giménez et al. 2012; Wolf 2014). Thus, in line with the latest insights from the SC literature, we conceive internal and external GSCM practices as described in Table 2.

Notwithstanding the specific results achieved by the two above-reported streams of literature, our understanding of those two sets of practices still present some challenges. On the one hand, GHRM studies mainly focus on the direct impact on environmental performance, without clearly explaining the mechanisms through which GHRM impacts on both environmental and financial performance. On the other hand, despite the fact that GSCM research acknowledges the beneficial effect of such practices on environmental and financial performance, it does not explain why some firms successfully adopt GSCM while others do not, failing to understand which drivers allow overcoming the organizational barriers that limit GSCM adoption.

We suggest that the joint investigation of these two sets of practices may help explain in depth their impact on both environmental and financial performance, providing insightful implications for both theory and practice. To this end, we build on recent studies on the link between human resource management practices and organizational performance based on the resource-based view (RBV) (Boselie et al. 2005; Jiang et al. 2013), and formulate our hypotheses on the separate effect of GHRM and GSCM on environmental and financial performance ("Impact of GHRM on Environmental and Financial Performance" and "Impact of GSCM on Environmental and Financial Performance" sections), as well as on the relationship between these two sets of practices ("Relationship Between GHRM and GSCM" section).

Hypotheses Development

Impact of GHRM on Environmental and Financial Performance

First, we suggest that the GHRM bundle is a coherent set of organizational practices that have systemic effects on a full spectrum of environmental performance by (i) choosing ideal candidates aligned to environmental goals (Jabbour and Santos 2008a), (ii) providing employees with green competencies and organizational opportunities to take part in greening activities through green training and involvement (Teixeira et al. 2012), and (iii) enhancing the motivation to contribute to the greening of the organization

Table 1 Green human resource management bundle

GHRM bundle	Practices	Definition
A bundle of consistent and coherent GHRM practices which is considered to have synergistic and superior effects on the company environmental performance (Jackson et al. 2014; Renwick et al. 2012; Combs et al. 2006)	Green hiring	Adoption of environmental criteria (i.e., environmental competencies and/or personal orientation) in hiring and selection processes (e.g., Renwick et al. 2012; Jabbour and Santos 2008b)
	Green training ad involvement	Development of green-related competencies, which in turn enhances organizational capacity and performance and reinforces the importance of the organization's commitment to environmental initiatives (e.g., Daily et al. 2012; Teixeira et al. 2012); and employee involvement in green processes, thus providing employees the opportunity to contribute to the environmental development debate within the company (e.g., Liebowitz 2010)
	Green performance management and compensation	Monitoring and incentive systems to motivate employees to environmental management (e.g., Berrone and Gomez-Mejia, 2009; Brío et al. 2008)

Table 2 Green supply chain management practices

Practices	Definition
Internal GSCM practices	Actions taken to reduce consumption of raw resources, production of waste, use of toxic materials, and toxic emissions in internal operational processes (i.e., product development and production) (e.g., Giménez et al. 2012; Sarkis 2012)
External GSCM practices	Actions taken to reduce the volume of purchased items and the use of hazardous materials, minimize unnecessary packaging, and increase the use of recycled/recyclable materials in external operational processes (i.e., supplier selection and collaboration) (Giménez et al. 2012; Giménez and Sierra 2013; Zsidisin and Siferd 2001)

through compensation and incentives related to environmental outcomes (Jabbour and Santos 2008a; Ramus and Steger 2000). We do so by considering GHRM as a bundle of practices (see Table 1) in line with recent suggestions by Renwick et al. (2012). Therefore, we hypothesize that:

HP1 The GHRM bundle is positively related to environmental performance.

Furthermore, several authors suggest that the employee-level outcomes (i.e., employee competence, involvement, and motivation) associated to environmental-oriented practices (e.g., GHRM) can drive also financial performance (Epstein and Roy 2001; Turban and Greening 1997). Indeed, hiring employees who are committed to environmental development often leads to hiring talented employees attracted by a firm's environmental reputation (Linnenluecke and Griffiths 2010; Ramus and Steger 2000). Similarly, building on employees' involvement in environmental activities and providing environmental training and goals may improve their skills, motivation, retention, and job-related outcomes (Carmeli et al. 2007; Wagner 2013; Wagner 2015; Weber 2008), thus improving the firm's financial performance. Therefore, we suggest that:

HP2 The GHRM bundle is positively related to financial performance.

Impact of GSCM on Environmental and Financial Performance

Concerning GSCM practices, previous literature has shown a positive impact on environmental performance (e.g., Melnyk et al. 2002; Zhu and Sarkis 2004; Zhu et al. 2012). For example, empirical studies find that internal GSCM practices in a firm's production process improve a broad spectrum of environmental performance because of reductions in waste, the consumption of materials, and the amount of toxic emissions (Zhu and Sarkis 2004; Zhu et al. 2005). Concerning external GSCM, Geffen and Rothenberg (2000) find that in the manufacturing setting, strong relationships and close collaborations with suppliers result in opportunities to improve several environmental performance dimensions. Other authors suggest that supplier selection and collaboration on environment-related matters induce suppliers to act in a more environmentally friendly way and reduce their unsustainable behaviors, thus creating a positive effect on the full spectrum of environmental performance of the focal firm (Giménez et al. 2012; Carter

and Rogers 2008; Simpson and Power 2005; Theyel 2000). For example, on one dimension of environmental performance, Giménez et al. 2012 find that monitoring and educating their suppliers can help firms provide materials included in the final product that pollute less and produce less waste. It is therefore hypothesized that:

HP3 GSCM practices are positively related to environmental performance.

HP3a Internal GSCM practices are positively related to environmental performance.

HP3b External GSCM practices are positively related to environmental performance.

Recent literature also proposes a positive effect of GSCM on financial performance (Zhu et al. 2012). Golicic and Smith (2013) offer a valuable contribution on this issue. The authors examined over 20 years of research on GSCM using meta-analysis showing that the link between GSCM practices and operational and financial performance is positive and statistically significant. For example, by focusing on internal GSCM through environmentally friendly production practices, firms can achieve cost savings from reducing resources and improving efficiency (Giménez et al. 2012; Rao and Holt 2005). External GSCM is also shown to have a positive effect on financial performance (Rao and Holt 2005; Zhu and Sarkis 2004; Zhu et al. 2012). For example, Giménez et al. 2012 find that collaborating with their suppliers can help firms generate less waste in their production process, resulting in reduced costs and greater production efficiency. Moreover, by reducing their virgin material use, eliminating hazardous product constituents, and decreasing the environmental effect of their products through internal and external GSCM, firms may build a differentiation advantage impacting on firm sales and profit (Porter and Kramer 2006). It is therefore hypothesized that:

HP4 GSCM practices are positively related to financial performance.

HP4a Internal GSCM practices are positively related to financial performance.

HP4b External GSCM practices are positively related to financial performance.

Relationship Between GHRM and GSCM

Finally, we suggest that investigating the relationship between GHRM and GSCM can help better explain the mechanisms through which they impact on environmental and financial performance. In the human resource management literature, an increasing number of theoretical contributions and empirical studies focus on the mediating role of effective supply chain management practices, processes, and outcomes in the human resource management–performance relationship (e.g., Shub and Stonebraker 2009; Lengnick-Hall et al. 2013). In particular, Jabbour and Jabbour (2016) recently called for empirical investigations of the HRM–SCM mediation relationship in relation to environmental issues. Previous empirical studies partially tested such relationship showing that specific GHRM practices drive GSCM implementation (Sarkis et al. 2010; Lin and Ho 2011). If GHRM practices are absent, environmental competent, motivated, and engaged employees would be lacking, and traditional organizational culture and change management barriers would impede the implementation of GSCM practices (Sarkis et al. 2010; Jabbour and Jabbour 2016). We extend these empirical studies by exploring also the effects on environmental and financial performance.

Based on the RBV (Barney 1991), human resource management practices have been suggested to impact on organizational performance through the transformation of employees to became a rare, valuable, and inimitable resource contributing to the firm's goals through their utilization in business processes (e.g., Lado and Wilson 1994; Ray et al. 2004), including internal and external supply chain processes (e.g., Porter 1985; Ray et al. 2004). Extending this view to the environmental management context, GHRM may be crucial to diffuse environmental values and principles and provide environmentally capable and committed employees who deploy environmental principles in core SC business processes (Fernández et al. 2003; Hind et al. 2007; Jackson and Seo 2010). Specifically, we propose that the GHRM bundle positively impacts on GSCM practices adoption that then mediates the GHRM–performance relationship. Thus, the following hypotheses are formulated:

HP5 GSCM practices mediate the relationship between the GHRM bundle and environmental performance.

HP5a Internal GSCM practices mediate the relationship between the GHRM bundle and environmental performance.

HP5b External GSCM practices mediate the relationship between the GHRM bundle and environmental performance.

HP6 GSCM practices mediate the relationship between the GHRM bundle and financial performance.

HP6a Internal GSCM practices mediate the relationship between the GHRM bundle and financial performance.

HP6b External GSCM practices mediate the relationship between GHRM bundle and financial performance.

Methods

To test our hypotheses, we adopted a multi-respondent survey. We chose the survey method as it is largely consistent with our theoretical framework. Indeed, on the basis of the literature review, we were able to formulate specific research hypotheses on the relationships between the concepts under study, and therefore we framed our study with a theory testing approach. This is also in line with recent suggestions of quantitatively testing the GHRM–GSCM relationship, as a complementary stream to qualitative research (Jabbour and Jabbour 2016).

Furthermore, we adopted a multi-respondent survey to gain insight from people who are in the best position to view both human resource management and supply chain management perspectives. By doing so, we also avoided possible biases resulting from a single respondent. We devised two questionnaires, one for senior human resource (HR) managers and one for senior supply chain (SC), purchasing, or operations managers. The two questionnaires have some common questions regarding general information about the firm and, most importantly, on its environmental and financial performance (see Table 3). The HR questionnaire addresses the implementation of the GHRM bundle, whereas the SC questionnaire specifically addresses the implementation of GSCM practices; both questionnaires address environmental and financial performance. This structure has been helpful to triangulate information about performance and to obtain information about environmental practices from the more appropriate informant, increasing the reliability of our measures. At the same time, we have been able to contain the survey length, thus increasing the response rate.

Sample Frame and Data Collection

The scope of this empirical study was a single country, which is Italy. We decided to limit the focus of the study on a single country for two reasons: first because it is widely accepted that the country's environmental regulation plays a key role in explaining variance in firms' environmental performance (Sampson and Spring 2011) and, second, because national culture and business systems influence the adoption of voluntary management systems aimed at addressing environmental performance (Williams and Aguilera 2008). Therefore, we ruled out possible effects of national-based variables on our key dependent variable. We focused on the Italian context because the government in Italy specifically promotes environmental sustainability, motivating firms through a constructive dialogue with their stakeholders (Perrini et al. 2007; Albareda et al. 2008; Russo and Tencati 2009; Habisch et al. 2011).

The data were collected in Italy from autumn 2013 to spring 2014 by targeting manufacturing and service firms. Because of the need to contact high-level professionals, we worked closely with the two leading Italian human resource and supply chain management professional associations. We leveraged the collaboration with the two associations in several ways. First, we shared the research motivation with the associations' representatives, who showed great interest and confirmed the managerial relevance of the topics. Second, both associations helped in revising and approving the questionnaires by providing the perspectives of the two different groups of respondents to improve reliability (Forza 2002). Third, they contributed by distributing the surveys to their associates. We used a web-based survey: customized links for the HR and SC questionnaires were sent via e-mail to respondents, who were tracked after completion through the online platform. Fourth, we discussed the research results with the associations' members through a series of focus groups and dedicated events, which allowed us to improve our own understanding and to collectively develop a set of implications of our findings more relevant from a managerial perspective. Overall, the close collaboration with the two professional associations benefited not only the survey administration, but also the development and validation of our theoretical model, as well as the interpretation of results, which all participants (including associations' representatives and focus groups' participants) agreed upon and granted their feedback.

Thanks to the close collaboration with the two professional associations we obtained responses from both HR and SC respondents for 74 firms. We started from the lists of 3800 members of the HR managers' association and 1200 members of the SC managers' association and we drew a

Table 3 Survey structure

Questionnaires sections	Questions for the HR manager	Questions for the SC manager
General information	Company name, personal contact, contact of a HR/SC colleague	
GHRM practices	Green hiring, green training, green performance management and compensation	*No questions*
GSCM practices	*No questions*	Internal green SCM, external green SCM
Performance	Environmental performance, financial performance	

sample of 500 members in both cases. The time range for the survey administration was pre-agreed with the two associations and covered the period from autumn 2013 to spring 2014. During the data collection period, we started contacting the HR and SC managers sampled, dropping a contact after two recall e-mails and moving to the next one in the list. At the end of the data collection, we obtained the response from 140 firms. 125 firms answered to the SC questionnaire, whereas 96 firms answered to the HR questionnaire. Overall, 74 firms provided an answer to both questionnaires with all the information necessary for statistical analysis. Based on the number of e-mails sent to possible respondents, the response rate was approximately 10 %. In the final sample, 29.7 % of the firms were SMEs, 69 % were manufacturing firms, and the rest were service providers. The quality of the respondents was satisfactory: the vast majority were HR and SC directors or senior managers, with average seniority in their role of more than 8 years.

Non-respondent bias was tested by comparing early and later respondents using two-tailed *t* statistics across the survey items (Armstrong and Overton 1977). No statistically significant differences among the variables were identified between the two groups. We also ruled out common method bias through both the survey design and the statistical assessment, following Podsakoff et al. (2003).

Measures

We designed both the HR and SC questionnaires as a series of general questions formed by multiple items, including all the relevant measures that reflect the constructs in our theoretical model. All the relevant items used in the two questionnaires are shown in Table 4. The general questions posed and the scale used are described below.

The scale used to measure GHRM practices was adapted from Sun et al. (2007) and Renwick et al. (2012). We asked the HR respondent to specify, using a 6-point scale (1 = not implemented; 6 = fully implemented), how much effort their firm had invested over the past two years into a wide set of specific practices, which are related to *green hiring*, *green training and involvement,* and *green performance management and compensation.*

The scale used to measure internal and external GSCM practices was adapted from Zhu et al. (2005, 2012). We asked the SC respondent to specify, using a 6-point scale (1 = not implemented; 6 = fully implemented), how much effort their firm had invested over the past 2 years to implement *internal* and *external* GSCM practices.

Environmental performance was measured through improvements using the Kinder, Lydenberg, and Domini (KLD) strength parameters for evaluating the full spectrum of a firm's environmental performance, in order to take into account different environmental impacts at the same time (Walls et al. 2012). In line with the most common research practices in the field, each KLD parameter—representing an environmental performance dimension—was measured as the average improvement indicated by the SC and HR respondents on a 6-point Likert scale (1 = very low; 6 = very high). Then, we built a composite score of all KLD parameters, which captures the overall environmental performance of the firms under study.

Financial performance was measured by considering multiple financial indicators (i.e., return on investments, earnings growth, sales growth, and market share growth). Each financial indicator was measured as the average value indicated by both SC and HR respondents compared with their main competitors on a 6-point scale (1 = much worse; 6 = much better).

Finally, we controlled for firm size and industry. The control on size is related to the fact that larger firms may have more internal resources available to invest in improving environmental performance (Burke and Gaughran 2007; Wilkinson et al. 2001). Differently, the control on industry is related to the external context: indeed, as environment-related regulation plays a key role in shaping firms' environmental management systems, manufacturing firms are normally exposed (even in the same national context) to environment-related regulations in many cases stricter and more cogent than service firms (Sampson and Spring 2011); therefore, we expect that the type of industry (intended as a proxy of the regulation severity) may affect performance.

Data Analysis and Results

We employed the partial least squares (PLS) approach using Smart PLS 3 (Oh et al. 2012), and followed the indications provided by Peng and Lai (2012) to validate our measures and test our hypotheses. Furthermore, we used OLS regressions to check consistency and reliability of our results.

Table 4 shows the measurement scales of the reflective constructs for internal and external GSCM practices and for GHRM practices. All the relevant tests regarding item loading, composite reliability (CR), and average variance extracted (AVE) confirm the convergent and discriminant validity of the five reflective constructs (Fornell and Larcker 1981). Furthermore, since recent human resource management literature has focused extensively on the effect on organizational performance of bundles of human resource management practices rather than of single practices (Combs et al. 2006), we created a formative construct that we called the *GHRM bundle*—following specific methodological suggestions gleaned from the human resource management research (Chadwick 2010). Tables 5 shows that all weights of the reflective factors forming the

Table 4 Measurement properties of reflective constructs

Reflective constructs	Construct items (corresponding to survey questions)	Item loading	CR	AVE
Green hiring	Employee selection based on environmental criteria	0.899	0.89	0.81
	Employee attraction through environmental commitment	0.896		
Green training & involvement	Environmental training for employees	0.933	0.92	0.75
	Environmental training for managers	0.888		
	Job descriptions including environmental responsibilities	0.782		
	Employee involvement on environmental issues	0.854		
Green performance management & compensation	Environmental goals for managers	0.932	0.94	0.76
	Managers' evaluation includes environmental performance	0.954		
	Employees' evaluation includes environmental performance	0.894		
	Non-monetary incentives for environmental performance	0.695		
	Variable compensation based on environmental performance	0.858		
Internal GSCM	Design of products for reduced consumption of material/energy	0.868	0.91	0.63
	Design of products for reuse, recycle, recovery of material, component parts	0.792		
	Design of products to avoid or reduce the use and/or production of hazardous substances	0.718		
	Reduction in the variety of materials and components	0.776		
	Reduction in raw material consumption	0.781		
	Reduction in toxic material consumption	0.808		
External GSCM	Environmental auditing for suppliers	0.848	0.95	0.76
	Supplier selection on environmental criteria	0.888		
	Cooperation with suppliers for environmental objectives	0.838		
	Purchases specifications including environmental requirements	0.870		
	Supplier development for environmental compliance	0.908		
	Supplier collaboration for eco-design	0.878		
Environmental performance	Total direct and indirect toxic emissions	0.826	0.90	0.65
	Volume of recycled materials	0.812		
	Rate of renewable energy consumption	0.758		
	Number of eco-friendly products developed	0.818		
	Total direct and indirect energy consumption	0.809		
Financial performance	Return on investments	0.858	0.91	0.73
	Earnings growth	0.913		
	Sales growth	0.836		
	Market share growth	0.807		

GHRM bundle are significant, and that multicollinearity is not an issue as the traditional variance inflation factor (VIF) is far below the cut-off threshold of 3.3 (Diamantopoulos and Siguaw 2006). Once confirmed the goodness of our measures, we used second-order variable scores to conduct the analysis. To further test for discriminant validity, we controlled that the square root of the AVE estimates exceeds the correlation between each pair of constructs (Fornell and Larcker 1981; see Table 6).

The PLS results of the estimation models along with OLS regressions are shown in Table 7, including the standardized path coefficients, the significance based on two-tailed t tests for our hypotheses, and the VIF. To test the robustness and quality of the structural model estimate, we performed the main tests prescribed by Peng and Lai (2012), which were all satisfactory. Table 8 reports the Stone–Geisser's Q^2 (which are all greater than the cut-off threshold of 0), the relative effect sizes (f^2) of the exogenous constructs, and the overall model goodness of fit (GoF) in terms of the average communality (i.e., AVE) and R^2. The resulting GoF was 0.56.

Finally, following some of the most recent recommendations (e.g., Preacher 2015; Rungtusanatham et al. 2014), we performed several tests to confirm the mediation effect,

Table 5 Measurement properties of the formative construct

Formative construct	Reflective factors	Item weight	*t* stat	VIF
GHRM bundle	Green hiring	0.182	8.649	1.765
	Green training and involvement	0.452	12.380	1.667
	Green performance management and compensation	0.521	16.020	2.019

Table 6 Construct correlations

Variables	1	2	3	4	5
1. Green HRM bundle	**0.755**				
2. External GSCM	0.406	**0.872**			
3. Internal GSCM	0.282	0.569	**0.792**		
4. Financial performance	0.512	0.422	0.433	**0.854**	
5. Environmental performance	0.520	0.573	0.695	0.722	**0.805**

The square root of AVE is shown in bold on the diagonal of the correlation matrix and inter-construct correlations are shown off the diagonal

Table 7 Regression model

Path	PLS result			OLS result	
	Coefficient	*t* stat	VIF	Coefficient	*t* stat
Size ➔ financial performance	0.133	1.302	1.134	0.133	1.357
Size ➔ environmental performance	0.048	0.735		0.048	0.735
Industry ➔ financial performance	**0.265**	**2.628**	1.134	**0.265**	**2.708**
Industry ➔ environmental performance	**0.391**	**5.971**		**0.391**	**6.040**
GHRM ➔ financial performance	**0.319**	**3.467**	1.287	**0.319**	**3.057**
GHRM ➔ environmental performance	**0.218**	**3.204**		**0.218**	**3.168**
GHRM ➔ internal GSCM	**0.282**	**2.763**	1.000	**0.282**	**2.490**
GHRM ➔ external GSCM	**0.406**	**4.273**		**0.406**	**3.769**
External GSCM ➔ financial performance	0.139	1.036	1.688	0.139	1.164
External GSCM ➔ environmental performance	**0.206**	**2.219**		**0.206**	**2.614**
Internal GSCM ➔ financial performance	**0.242**	**2.017**	1.490	**0.242**	**2.162**
Internal GSCM ➔ environmental performance	**0.500**	**7.562**		**0.500**	**6.748**

The significant coefficients and corresponding *t* statistics are highlighted in bold

including the classical Baron and Kenny method (1986), the Sobel's test, and the bootstrapping analysis for indirect effects (Table 9). All of the aforementioned tests confirmed the results reported below.

Concerning GSCM practices, the results suggest that both internal and external practices are positively related to environmental performance, thereby supporting HP 1a and 1b. Only internal GSCM is positively related to financial performance, thereby supporting HP 2a but not HP2b. The GHRM bundle is positively related to both environmental and financial performance, thereby supporting HP3 and HP4. Both internal and external GSCM practices mediate the relationship between the GHRM bundle and environmental performance, thereby supporting HP 5a and 5b. On the contrary, the mediation hypotheses related to financial performance (HP 6a and 6b) are not supported. As for the control variables, we found that only industry was significant, suggesting that manufacturing firms experience greater improvements to their environmental and financial performance than service firms.

Discussion

The results presented above extend our available knowledge on how business organizations can positively respond to the ethical imperative regarding their relation with the natural environment.

First, we contribute to the discussion on the effectiveness of environmental management in different organizational functions (i.e., GHRM and GSCM) in relation to a full spectrum of environmental and financial performance. Considering GHRM practices, our results confirm that they are positively related to environmental performance (supporting HP1). This result suggests that the GHRM bundle may diffuse environmental values and principles, develop

Table 8 R^2, communality, and redundancy

Construct	R^2 adj	Communality (AVE)	Q^2	f^2 (Financial)	f^2 (Environmental)
GHRM bundle	–	0.570	0.556	0.137	0.148
Internal GSCM	0.067	0.627	0.038	0.069	0.670
External GSCM	0.153	0.761	0.120	0.020	0.100
Financial performance	0.384	0.730	0.289	–	–
Environmental performance	0.731	0.648	0.463	–	–
Average	0.467	0.675[a]	0.293	–	–

[a] The average of communality is computed as a weighted average of all of the communalities, using weights as the number of manifest variables in each construct with at least two manifest indicators

Table 9 Mediation test

	Direct effect coefficients (β)			Indirect effect (mediation)		Total effect
	c'	a	b	ab	Sobel test	$(a \times b) + c'$
GHRM ➔ external GSCM ➔ environmental performance	.218 (3.168)	.406 ($t = 3.769$)	.206 ($t = 2.614$)	.083	2.143 ($p = .032$)	.302
GHRM ➔ internal GSCM ➔ environmental performance		.282 ($t = 2.490$)	.500 ($t = 6.748$)	.141	2.341 ($p = .019$)	.359
GHRM ➔ internal GSCM ➔ financial performance	.319 ($t = 3.057$)		.242 ($t = 2.162$)	.068	1.633 ($p = .102$)	.387

employees' motivation and abilities related to environmental management, and offer them the opportunity to contribute to the environmental development of the firm (Cantor et al. 2012). Similarly, the GHRM bundle is also positively related to financial performance (supporting HP2), by deploying a motivated and committed workforce that generates economic value (Weber 2008). As for GSCM practices, our results confirm that internal and external GSCM practices are positively related to environmental and financial performance in different ways. Internal GSCM practices positively relate to both dependent variables, such that they may realize a strategic "fit" between environmental and financial performance (supporting HP 3a and 4a). Indeed, internal GSCM practices are often associated with higher efficiency in the use of inputs and assets (Schmidheiny 1992), thus promoting cost reductions through energy savings and product recycling (Zhu and Sarkis 2004; Zhu et al. 2005), making improvements in quality, creating new products and processes (Yang et al. 2010), and reducing re-work and waste (Kitazawa and Sarkis 2000). In contrast, external GSCM practices are related only to environmental (and not to financial) performance (supporting HP 3b, but not 4b). Indeed, selecting, monitoring, and collaborating with suppliers may produce contradictory effects on financial performance, which might be negative in the short term and positive in the long term. For example, on the one hand, such actions can improve the firm's reputation and possibly increase sales, but on the other hand they may involve a relational investment with suppliers that is not immediately repaid through savings or increased revenue. Moreover, requiring suppliers to make environment-related investments could cause them to increase their prices, thereby increasing purchasing costs for the focal firm in the short term. Since this study did not adopt a research design that allows us to explore the long-term impact of external GSCM on financial performance, we highlight that as a potentially insightful avenue for future research.

The second important contribution of this paper concerns the relationship between GHRM and GSCM practices, which shows how cross-functional environmental management systems affect organizational performance. Specifically, our results suggest that GHRM and GSCM do not exert their impact on environmental and financial performance independently, because (as predicted) we found GSCM practices to mediate the GHRM–performance relationship. Regarding environmental performance, our results show that the environmentally competent, involved, and motivated employees produced by the GHRM bundle enable the diffusion of environmental values and principles and thus the implementation of internal and external GSCM practices, which, in turn, leads to improved environmental performance. This result supports previous studies suggesting that internal resources lead to the implementation of GSCM practices (Paulraj 2011; Sarkis et al. 2010). In doing so, we connect to the broader

debate about the development of environmental management systems cross-functionally. Our results seem to be in line with the available knowledge on the cross-functional integration required for effective environmental management, which has been hypothesized by previous theoretical studies (e.g., Boiral 2003; Wong 2013). In particular, because our findings largely support the hypothesized mediation model, we confirm here the need for a cross-functional design and management of GHRM and GSCM practices. As far as mediation is concerned, although GHRM practices are positively related to internal GSCM practice implementation, which in turn are positively related to financial performance, we did not find support for the assumption that internal GSCM practices mediate the relationship between internal GHRM practices and financial performance. Therefore, the results suggest that the direct effect of GHRM on performance prevails over the indirect effect. Further research might investigate other mediators to determine whether GHRM practices only affect financial performance directly, with committed, motivated, and involved employees, or through a specific set of practices different from GSCM.

A final consideration regards the impact of the control variables (i.e., firm's size and industry). Indeed, similarly to other studies (e.g., Sampson and Spring 2011), our results show that manufacturing firms present significantly higher levels of environmental performance than service firms. We included this control variable in order to account for the role that industry-specific environmental regulation might play in fostering environmental management and performance of specific firms, even in the same national context. The fact that GHRM and GSCM practices still explain performance—despite controlling for the industry—gives more relevance to our results: whatever the industry-specific regulation about environmental management says, those practices should be used by firms for improving their environmental performance.

Theoretical and Managerial Implications

This study confirms and extends some of the basic findings reported by previous research. First, it provides empirical support that the deployment of environmental management in the HR and SC domains improve environmental and also financial performance. Doing so, this study extends previous meta-analyses suggesting that human resources practices (Jiang et al. 2012; Combs et al. 2006) and supply chain management practices (Zimmermann and Foerstl 2014) can provide firms' competitive advantage.

Second, this study supports the cross-functional deployment of environmental management systems, showing that GHRM "produces" a resource (i.e., competent, involved, and motivated employees) that is employed in supply chain management processes (i.e., GSCM) to drive organizational performance. By doing so, we highlight the need for environmental strategies to design GSCM practices together with GHRM practices.

In addition to the above-presented research implications, our findings present three implications for managers. First, we provide an empirically grounded argument for making investments on environmental management attractive to both HR managers and SC managers, showing that such investments improve both the environmental and financial performance.

Second, our findings provide a guideline to managers for prioritizing synergetic investments in GHRM (generating greater employee motivation and know-how) and then follow up with dedicated investments in GSCM, thus suggesting a cross-functional approach for environmental management.

Third, we warn managers who aim to simultaneously improve the firm's environmental and financial performance that internal GSCM practices positively affect both types of performance, whereas external GSCM practices only affect environmental performance. Therefore, it seems that the integration of environmental principles beyond the firm boundaries has yet to show its full potential and likely requires special attention.

Limitations and Future Research

We identify four main limitations that might constitute the basis for future research.

A first set of limitations is related to the dependent variables considered in the study. Indeed, an ethical firm is expected not only to interiorize the environmental imperative in a cross-functional fashion, but also to balance the environmental performance with financial and social performance. Even though we investigate the effects of environmental management on the financial performance, our study does not focus—by design—on the social performance. That can be considered here as a limitation of the study because some ethical dilemmas can arise when the environmental performance increases "at the expenses" of the social performance. Therefore, we recognize the value of an holistic view of sustainability performance (e.g., Hahn et al. 2010) and the need for future research exploring the simultaneous effects (and possible trade-offs) that GHRM and GSCM might exert on financial, environmental, and social performance.

A second set of limitations is related to the test of causal relationships among the considered variables. Indeed, the cross-sectional nature of the data used to test our hypotheses should be further supported by different and

complementary approaches, such as the adoption of longitudinal research designs. In addition, future qualitative research might focus on the processes and mechanisms whereby the relationships under study take place, such as the coordination and integration mechanisms across functions that ensure improved performance results.

A third set of limitations is related to the measurement approach. Indeed, we measured the implementation of GHRM and GSCM practices by examining managers' points of view. Further research could investigate the employees' perceptions, along with the level of coverage or sophistication of such practices. An even more objective assessment on the implementation of GHRM and GSCM practices, as well as the resulting outcomes, might be achieved by triangulating organizational members' perceptions with external audits provided by relevant rating organizations or NGOs. Finally, the sample used for the analysis is focused on Italian firms. Recalling the aforementioned influence of national cultures, institutional settings, and regulatory environments for both GHRM and GSCM practices and for performance, future research could replicate our study in other countries, thus reinforcing the generalizability of our results. Furthermore, future research may consider whether a firm has a more local or global supply chain, those being embedded into different settings that might affect the implementation and outcomes of GHRM and GSCM.

Overcoming these sets of limitations may provide possible directions for future research; in addition, we advance two further suggestions that might support the effective integration of GHRM and GSCM. First, future research could extend our findings by exploring other nuances of the GHRM–GSCM relation, focusing on different sets of practices and/or different types of relationship (such as moderation). We explicitly designed our study to test the effect of general HR practices that target the whole firm workforce and create the pre-conditions for the implementation of GSCM practices. Future studies might investigate more specific HR interventions, targeting for example SC employees who hold GSCM-related roles, and therefore consistent with a moderation mechanism. A second suggestion is the use of different theoretical lenses to study the GHRM–GSCM relationship. For example, a behavioral perspective—rather than a strategic one, such as the RBV adopted in this study—can be a useful way to study the individual-level processes that link GHRM, GSCM, and organizational performance (Jackson et al. 2014; Cantor et al. 2012). Such a research development would be enriched by the adoption of qualitative or multilevel research designs.

Conclusions

The basic assumption of this study is that a key responsibility of the business toward society is the balance between financial, social, and environmental performance. In this study, we specifically target the environmental dimension and investigate how environmental values and principles can be diffused in a firm to improve a full spectrum of environmental concerns. We focus on GHRM as a process that can deploy environmental principles and values among employees and remove people-related barriers to the implementation of GSCM practices. Specifically, the present study (i) tests the relationships between a set of GHRM and GSCM practices and a full spectrum of environmental performance and financial performance and (ii) tests the mediating role that GSCM practices play in the relationships between GHRM and organizational performance. As a result, the study contributes to two ongoing debates in the business ethics literature. First, we provide new insights on how companies can implement cross-functional environmental management systems that fully respond to their ethical responsibilities toward the natural environment. Second, we extend the debate on the effects of environmental management practices on both environmental and financial performance with original empirical evidence. In line with its objectives, the paper first confirms that both GHRM and GSCM positively affect financial and environmental performance, thus supporting the idea that trade-off effects on the two types of performance are not always likely. Second, the study confirms that GHRM and GSCM exert their effects in a joint—rather than in an independent—fashion; indeed, our results support the mediating role of GSCM as a mechanism that explains the relationship between GHRM and environmental and financial performance. Therefore, our findings support the idea that an effective environmental management should not be based on a set of stand-alone management systems, but it requires firms to operate its cross-functional deployment within their different management systems and organizational units.

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