

Greening SCM through SC integration: an exploratory investigation among Italian supply chain managers¹

Received
24th November 2020
Revised
22nd September 2021
Accepted
11th November 2021

Francesco Rizzi - Eleonora Annunziata - Marina Gigliotti

Abstract

Purpose of the paper: *The study contributes to the debate on the nature of links between supply chain integration and green supply chain management (GSCM). In particular, we empirically tested the existence of relations between supply chain integration, organisational culture, and the adoption of GSCM practices.*

Method: *We carried out an online survey on a sample of Italian firms. After building research hypotheses and measurement models through a literature review, we administered an online questionnaire to purchasing managers or directors, logistics managers or directors, and managers in charge of supply chain management.*

Results: *Our results show that internal and external integrations have a multifaceted impact on GSCM practices. Internal integration is an essential condition for their implementation. In particular, technological integration with suppliers is more relevant than informative integration with suppliers in greening the supply chain. The results also show that companies develop different forms of supply chain integration depending on their organisational culture and not on their size.*

Research limitations: *The main limits of this study consist in the use of data from cross-sectional observation (and not longitudinal data) and the collection of data in a single country.*

Practical implications: *This study allows supply chain managers to better understand how to pursue a high level of coherence between supply chain integration, organisational culture and GSCM practices. In particular, our results help supply chain managers select integration pathways that support targeted GSCM practices and are more likely to succeed in their specific organisational context.*

The originality of the study: *This study adopts specific metrics for each component of supply chain integration, organisational culture and GSCM practices, which allows for a detailed analysis of the underlying relationships.*

Key words: GSCM; internal integration; external integration; organisational culture

1. Introduction

Nowadays, companies are increasingly urged to pursue greener production not just by improving efficiency in their operations, but also by unlocking greening potential throughout the supply chain (SC). This

¹ This paper is a result of the project “Metriche e dinamiche di sviluppo della sostenibilità nell’economia e nel management d’impresa”, funded by Fondo Ricerca di Base 2017 e 2019 of the University of Perugia.

fact has led SC managers to strive harder to develop cooperative and collaborative practices aimed at mobilising the necessary resources and competencies both within and outside their organisation. On the grounds of the need to understand which factors determine the success or failure of these efforts, this paper aims to investigate the role of SC integration in implementing green SC management (GSCM).

The literature on these topics is abundant but still fragmented. Companies are becoming increasingly aware of the need to increase their control over direct and indirect environmentally relevant business relations throughout the value chain (Annunziata *et al.*, 2019; Carter and Rogers, 2008). Many scholars and practitioners have made tremendous efforts towards understanding the dynamics that characterise SC management in the green setting, which has led to the emergence of a specialised stream of literature on GSCM (Wu and Pagell, 2011).

In parallel, scholars have paid equal attention to SC integration, a concept that has emerged as particularly useful to describe the evolution of purchase managers towards SC managers. SC integration refers to the involvement of SC managers in vast and complex roles and responsibilities that are necessary to overcome the traditional professional silos and logics of isolation of business functions and enable more effective and flexible logics of inter-functional or inter-organisational coordination.

Besides the abundant scientific evidence that the cross-fertilisation of skills and competencies among SC managers, marketers, operations managers, finance managers, logistics managers and environmental managers might help achieve competitiveness in complex and fast-evolving markets (Armistead *et al.*, 1993; Flynn *et al.*, 2010; Stank *et al.*, 2001), SC integration has been often confused with a universal best practice among practitioners who pursue GSCM. This means that positive prejudices might, therefore, affect the perceived possibility of improving green performance through the mimetic implementation of trendy forms of SC integration.

Recent findings on the links between organisational culture (OC) and GSCM practices (Elbaz and Iddik, 2020) instead suggest that it is worth investigating how SC integration approaches should vary to better suit specific organisational characteristics and green strategies.

In this framework, our study aims to bridge GSCM and OC literature with SC integration literature to provide empirical evidence on their cross-influences. In particular, based on previous contributions that have started to disentangle different forms of integration dynamics in SCM (Frohlich and Westbrook, 2001; Flynn *et al.*, 2010) the paper aims to shed some light on the need to pursue configurational approaches to integration to better achieve GSCM goals, which is a promising yet undeveloped avenue for research.

To this end, the section that follows reviews the extant literature to build the present study's research hypotheses concerning the links between SC integration and, on the one hand, GSCM practices as well as, on the other hand, OC. Next, the Method section describes how we gathered information from 381 Italian SC managers and tested our research hypotheses. After presenting the results, which offer solid evidence that the

way organisations develop SC integration depends on their OC and pursued GSCM practices, the paper expounds on managerial and theoretical implications and concludes by underlying the importance of building comprehensive models to further disentangle the interdependencies among these variables.

2. Literature review and hypotheses development

2.1 GSCM practices and SC integration

GSCM is a multifaceted concept that lacks a univocal definition (Sarkis *et al.* 2011) (Table 1). In this regard, the study adopts the definition by Srivastava (2007), which considers GSCM as a set of practices aimed at improving environmental performance throughout the SC of a product. This definition, compared to others, refers to a life cycle perspective as it encompasses all the different stages that range from design to manufacturing, distribution, consumption and disposal or any other available alternative for end-of-life management. By adopting Srivastava (2007)'s definition, GSCM practices can be under the direct responsibility either of a given manufacturing company (e.g. eco-design, reverse logistics, etc.) or of other companies involved in the related supply chain (e.g. certifications, responsible sourcing, etc.).

Tab. 1: Main definitions of GSCM

Paper	Definition of GSCM
Hervani <i>et al.</i> , 2005	"Green Supply Chain Management (GSCM) = Green Purchasing + Green Manufacturing/Materials Management + Green Distribution/Marketing + Reverse Logistics".
Srivastava, 2007	"Integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life".
Zhu <i>et al.</i> , 2007b	"An important new innovation that helps organisations develop 'win-win' strategies that achieve profit and market share objectives by lowering their environmental risks and impacts, while raising their ecological efficiency".
Sarkis <i>et al.</i> , 2011	"Integrating environmental concerns into the inter-organisational practices of SCM including reverse logistics".
Wee <i>et al.</i> , 2011	"The green-supply chain management (GSCM) that emerged in the last few years has integrated environment considerations into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers, and end-of-life management of the greening products".

Source: Authors' elaboration

The current literature offers a broad view on a continuously increasing variety of practices that organisations can consider if they have the ambition to foster the development of GSCM (Massaroni *et al.*, 2015). However,

this variety can be sorted by identifying the relevant practices that emerge from a literature review of various available papers representing highly influential contributions (according to citation dynamics and visibility within the international scientific community) that cover GSCM topics (Table 2).

Tab. 2: GSCM practices emerging from current literature

GSCM practices	Description	References
Green procurement	Green procurement means purchasing products, semi-products and services with minimal environmental impacts.	Çankaya and Sezen (2018); Rao and Holt (2005); Carter and Carter (1998); Zhu <i>et al.</i> , (2008a); Holt and Ghobadian. (2009); Lee <i>et al.</i> , (2012); Inman and Green (2018); Paulraj (2011); Younis <i>et al.</i> , (2016); Wu <i>et al.</i> , (2012); Zaid <i>et al.</i> , (2018); Zhu <i>et al.</i> , (2008a-b); Zhu <i>et al.</i> , (2007 a-b-c); Zhu <i>et al.</i> , (2012).
Internal environmental management	Internal environmental management is represented by all the practices that support the continuous improvement of green performance within the organisation.	Çankaya and Sezen (2018); Green <i>et al.</i> , (2012); Zhu <i>et al.</i> , (2008a); Holt and Ghobadian (2009); Kirchoff <i>et al.</i> , (2016); Lee <i>et al.</i> , (2012); Inman and Green (2018); Rao and Holt (2005); Zaid <i>et al.</i> , (2018); Zhu <i>et al.</i> , (2008a-b); Zhu <i>et al.</i> , (2007a-b-c); Zhu <i>et al.</i> , (2012); Zhu and Sarkis (2004).
Eco-design	Eco-design refers to the implementation of designing or redesigning products, services, processes or systems to avoid or reduce environmental impacts.	Zhu <i>et al.</i> , (2008a); Green <i>et al.</i> , (2012); Hartmann and Germain (2015); Kirchoff <i>et al.</i> , (2016); Lee <i>et al.</i> , (2012); Mitra and Datta (2013); Younis <i>et al.</i> , (2016); Wu <i>et al.</i> , (2012); Zaid <i>et al.</i> , (2018); Zhu <i>et al.</i> , (2008a-b); Zhu <i>et al.</i> , (2007 a-b-c); Zhu <i>et al.</i> , (2012); Zhu and Sarkis (2004).
Green partnership and cooperation	Green partnership and cooperation consist in sharing information and cooperating along the SC to reduce the environmental impact of the production process.	Zhu <i>et al.</i> (2008a); Green <i>et al.</i> , (2012); Hong <i>et al.</i> , (2009); Lo <i>et al.</i> , (2018); Gimenez and Sierra (2013); Kirchoff <i>et al.</i> , (2016); Lee <i>et al.</i> , (2012); Huo <i>et al.</i> , (2019); Inman and Green (2018); Mitra and Datta (2013); Rao and Holt (2005); Paulraj (2011); Vachon and Klassen (2006); Vachon (2007); Vachon and Klassen (2008); Younis <i>et al.</i> , (2016); Wu <i>et al.</i> , (2012); Yu <i>et al.</i> , (2014); Zaid <i>et al.</i> , (2018); Zhu <i>et al.</i> , (2008b); Zhu <i>et al.</i> , (2007 a-b-c); Zhu <i>et al.</i> , (2012); Zhu and Sarkis (2004)
End-of-life management	End-of-life management represents the systematic approach to identify and implement effective actions for managing the final stages of products by avoiding their final disposal in landfills (if possible).	Zaid <i>et al.</i> , (2018); Younis <i>et al.</i> , (2016); Ageron <i>et al.</i> , (2012); Zhu <i>et al.</i> , (2012); Kirchoff <i>et al.</i> , (2016); Kumar <i>et al.</i> , (2016); Holt and Ghobadian (2009)

Source: Authors' elaboration

The implementation of GSCM practices might be affected by different factors. Therefore, previous studies investigated the factors driving the adoption of GSCM practices (Sarkis *et al.*, 2010; Walker *et al.*, 2008). Moreover, Vachon and Klassen (2006) highlight that GSCM practices resulting from the company's coordination with customers and interactions with suppliers might be affected by these relationships. Nevertheless, there is a scarcity of studies considering the influence of each driver on specific practices (Tachizawa *et al.*, 2015).

SC integration is recognised as an influencing factor (Yu *et al.*, 2019) among the antecedents that affect the adoption of GSCM practices. In this regard, SC integration, referring to “the degree to which a manufacturer strategically collaborates with its SC partners and collaboratively manages intra- and inter-organisation processes” (Flynn *et al.*, 2010), represents a composite concept. Indeed, literature has proposed different types of SC integration (Huo, 2012): internal integration, customers integration, supplier integration, technological integration, etc. However, many studies converge on the definition of SC integration that identifies three dimensions: internal integration, downstream integration with customers, and upstream integration with suppliers (Kim, 2013). In this context, integration with suppliers and customers can be interconnected with another SC integration dimension represented by technological integration with suppliers to share information and knowledge (Vachon and Klassen, 2006).

Moreover, Bae *et al.* (2021) highlight the importance of simultaneously and independently considering the role played by internal and external perspectives of SC integration (i.e., integration with customers, integration with suppliers and technological integration). Because of the dimensionality of SC integration, it is important to investigate the effect of its dimensions on each GSCM practice. Indeed, extant studies have tested the relationship between SC integration and one specific GSCM practice (Liu *et al.*, 2018; González-Benito *et al.*, 2016). On the grounds of this rationale, it is possible to hypothesise that:

H1a: Internal integration has a positive impact on each GSCM practice

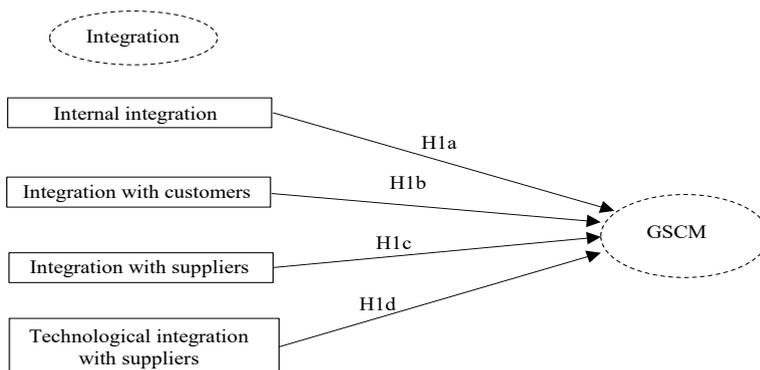
H1b: Integration with customers has a positive impact on each GSCM practice

H1c: Integration with suppliers has a positive impact on each GSCM practice

H1d: Technological Integration with suppliers has a positive impact on each GSCM practice

Figure 1 shows the conceptual model for verifying the relationship between SC integration and GSCM practices.

Fig. 1: Integration and GSCM: the proposed conceptual model



Source: Authors' elaboration

2.2 Organisational culture and supply chain integration

The extant literature has recognised that SC integration requires cultural changes to align all SC partners (Porter *et al.*, 2019). Braunscheidel *et al.* (2010) argue that this cultural alignment benefits firm performance and SC partners. Since OC represents the set of shared assumptions, values, and beliefs about organisational functioning (Deshpande & Webster, 1989), its compatibility among SC partners is needed. Therefore, specific OC types might affect propensity towards SC integration efforts (Porter *et al.*, 2019).

Several studies have adopted the competing values framework (CVF) developed by Quinn and Rohrbaugh (1983) to investigate behaviours associated with OC. The CVF describes four culture types: group, developmental, rational, and hierarchical. These types of culture are characterised by two dimensions: internal versus external focus, and stability/control versus flexibility/change (Naor *et al.*, 2008; Tong and Arvey, 2015). Group culture represents flexible structure and internal focus. Rational culture results from controlled structure and external focus. Developmental culture is based on a flexible structure with an external focus, while the hierarchy culture represents a controlled structure with an internal focus.

By adopting these four types, OC might exert a different effect on SC integration. In this regard, Porter (2019) highlights that few studies investigate the relationship between SC integration and OC. First, empirical evidence has demonstrated that the hierarchical culture promotes specialisation and efficiency within a stable and unchanging business context (Cao *et al.*, 2015). Moreover, Braunscheidel *et al.* (2010) found that hierarchical cultures have a negative impact on internal and external integration. However, further investigation is needed to intersect OC with SC integration efforts to adopt GSCM practices. This leads to the following hypotheses:

H2a: Organisational culture has a positive impact on internal integration

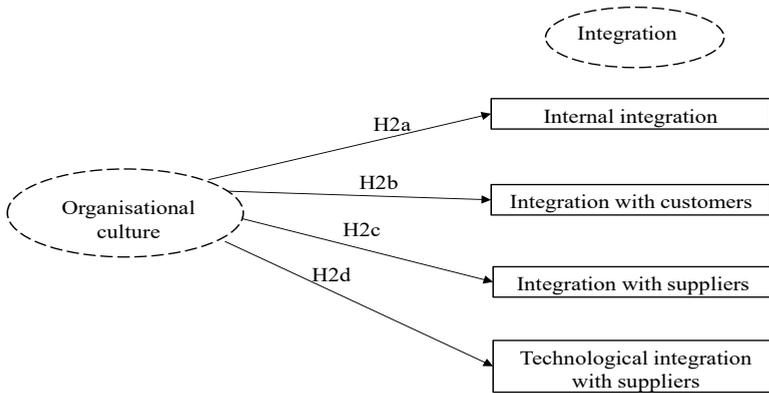
H2b: Organisational culture has a positive impact on integration with customers

H2c: Organisational culture has a positive impact on integration with suppliers

H2d: Organisational culture has a positive impact on technological integration with suppliers

Figure 2 depicts the conceptual model for testing the relationship between OC and SC integration mentioned above.

Fig. 2: Organisational culture and integration: the proposed conceptual model



Francesco Rizzi
 Eleonora Annunziata
 Marina Gigliotti
 Greening SCM through SC
 integration: an exploratory
 investigation among Italian
 supply chain managers

Source: Authors' elaboration

2.3 Company size in relation to implementing GSCM practices and SC integration

The size of companies is traditionally one of the most debated influencing factors among scholars in the sustainability field. Silva *et al.* (2021) point out that larger firms are typically more pressured to address society and stakeholders' demand for greener products and operations. On the other hand, small and medium enterprises (SMEs), representing the backbone of many national economies, should assume an active role in reducing their environmental impacts along with their SC (Lewis *et al.*, 2015). Therefore, several studies have recognised the importance of verifying the role of company size in adopting GSCM practices (Elbaz and Iddik, 2020). Some studies found low adoption of GSCM practices by SMEs (Zhu *et al.*, 2008a). Moreover, Scur and Barbosa (2017) revealed that large firms have positive relationships with the implementation of GSCM practices. This empirical evidence might stem from the presence of more resources for SC activities owned by larger companies.

In this regard, SC integration promoting the sharing of knowledge and collaboration among SC actors might be affected by company size in terms of the availability of implemented resources and efforts for adopting GSCM practices. For example, Zhao *et al.* (2011) found that company size positively impacts supplier and customer integration. However, other studies achieved mixed results in terms of the relationship between SC integration and company size (Frohlich and Westbrook, 2001; Pagell, 2004). Therefore, further investigation is needed in the GSCM field.

Regarding the effect of company size on OC, extant literature has investigated its role in adopting SC integration in larger firms (Cao *et al.*, 2015) or the implementation of quality management and innovation among SMEs (Shuaib and He, 2021). However, previous studies have not investigated the specific effect of company size on the relationship between OC and SC integration.

Therefore, we formulated the following hypotheses:

H3: Company size influences the positive relationship between SC integration and GSCM practices.

H4: Company size influences the positive relationship between organisational culture and SC integration.

3. Method

Research design and the sample

To address our research questions and understand the relationships among GSCM, integration, and culture, we carried out an online survey on a sample of Italian firms. More specifically, we administered an online questionnaire to purchasing managers or directors, logistics managers or directors and managers in charge of supply chain management. We considered these positions as the most suitable for providing the required information about GSCM for two reasons. First, these professionals work on the interface between the organisation and suppliers, which is a privileged condition for observing GSCM dynamics. Second, they are usually formally identified in more structured organisations, where it makes more sense to observe inter-functional collaboration dynamics.

To identify the participants in the research covering the roles mentioned above within their companies, the study consulted the LinkedIn social network and members of the Adaci (Italian Association of Purchasing and Supply Management Directors) Association. This ensured the reliability and specificity of the selection criteria. Out of the nearly 1,300 qualified managers who expressed their interest in the topic of the study and who, therefore, received the questionnaire, 381 self-selected respondents fully completed the online form in the period between January and June 2020.

Variables and measurements

This study considers three main constructs: i. GSCM practices; ii. Integration; iii. Culture. As shown in Table 3, we adopted well consolidated and validated scales for their measurement and, as regards GSCM practices in particular, the measurement model from Zaid *et al.* (2018). In line with the main contributions that emerged from our literature review, they proposed the following GSCM practices: eco-design; internal environmental management; green purchasing; environmental cooperation; end-of-life.

Regarding the level of integration, we measured the four features that emerged from our literature review: internal integration, customer integration, supplier integration, and technological integration with suppliers. More specifically, we adopted the original scale proposed by Zhao *et al.* (2011) for internal integration. For supplier integration, we adopted 12 of the 13 items used in the same manuscript. In addition, we selected the items for measuring customer integration (six-items scale) from Cao *et al.* (2015) and the ones for measuring technological integration with suppliers (four-scale items) from Vachon e Klassen (2006). We adopted the four components considered by Naor *et al.* (2008) for measuring OC: hierarchical culture, group culture, rational culture, and developmental culture. Each component was measured through four items.

All the items were measured by means of a 7-point Likert agreement scale, with “1” for “strongly disagree” and “7” for “strongly agree”.

Francesco Rizzi
Eleonora Annunziata
Marina Gigliotti
Greening SCM through SC
integration: an exploratory
investigation among Italian
supply chain managers

Tab. 3: Variables, labels, scales, and items used for the questionnaire design

Variables	Labels	Scale	N. items
GSCM			
Eco-design	GSCM.Eco	Zaid <i>et al.</i> (2018)	5
Internal environmental management	GSCM.IEM	Zaid <i>et al.</i> (2018)	6
Green purchasing	GSCM.GP	Zaid <i>et al.</i> (2018)	5
Environmental cooperation	GSCM.EC	Zaid <i>et al.</i> (2018)	6
End-of-life	GSCM.EoL	Zaid <i>et al.</i> (2018)	3
Internal integration	Intgr.Intern	Zhao <i>et al.</i> (2011)	9
Customer integration	Intgr.Cust	Cao <i>et al.</i> (2015)	6
Supplier integration	Intgr.Suppl	Zhao <i>et al.</i> (2011)	12
Technological integration with suppliers	Intgr.Tech	Vachon e Klassen (2006)	4
Organisational culture			
Hierarchical culture	OrgCult.Hier	Naor <i>et al.</i> (2008)	4
Group culture	OrgCult.Group	Naor <i>et al.</i> (2008)	4
Rational culture	OrgCult.Ration	Naor <i>et al.</i> (2008)	4
Developmental culture	OrgCult.Devel	Naor <i>et al.</i> (2008)	4

Source: Authors' elaboration

The questionnaire also included the measurement of control variables such as the respondent's age and gender, seniority within the company, and the dimension of the company in terms of the number of employees.

4. Results

Descriptive analysis

Tables 4 and 5 show the main descriptive statistics for the control variables used to identify the respondents' profile.

Tab. 4: Age of respondents: a descriptive analysis

Age	N.	%	Cumulative %
22-34	11	2.89	2.89
35-44	88	23.10	25.98
45-54	112	29.40	55.38
55-64	145	38.06	93.44
65-74	25	6.56	100.00
Total	381	100.00	

Source: Authors' elaboration

Tab. 5: Seniority and number of employees: a descriptive analysis

Variable	Obs	Mean	Std. Dev	Min	Max
Seniority	381	20.61	10.19	1	47
N. of employees	381	614.62	3933.61	4	60

Source: Authors' elaboration

The sample is mainly composed of men (83.7% of the sample), aged between 45 and 64 (67.5%), with seniority within the company equal to 20 years on average. The companies in the sample whose managers were employed in the study are highly variable in size, with an average of 614.6 employees. Such heterogeneity of features allows us also to analyse how the observed variables act differently based on the class of company size described in Table 6, which are: small (≤ 50 employees); medium (> 50 and < 250), and large (> 250) companies.

Tab. 6: Size of the companies: frequencies and percentage

Size	N.	%	Cumulative %
Small	110	28.87	28.87
Medium	203	53.28	82.15
Large	68	17.85	100.00
Total	381	100.00	

Source: Authors' elaboration

Hypotheses testing

Before analysing the relationships between the variables considered in the model, we performed a reliability test, i.e., the Cronbach's α , and a sampling adequacy test, i.e., the KMO (Kaiser-Meyer-Olkin) test. In combination with the tests of convergent validity and discriminant validity that were obtained through the exploratory factor analysis, these results support the construct validity for all the variables. Table 7 shows these results.

Tab. 7: Construct validity tests

Variable	Number of items	Cronbach's α	KMO Test	Factor loadings	Item average	Item stand. dev.
				(min-max)	(min-max)	(min-max)
GSCM.Eco	5	0.97	0.92	0.73-0.77	3.44-3.96	1.96-2.43
GSCM.IEM	6	0.97	0.93	0.86-0.91	4.70-4.83	1.71-1.95
GSCM.GP	5	0.96	0.91	0.67-0.81	4.55-4.92	1.75-1.97
GSCM.EC	6	0.98	0.94	0.72-0.79	3.84-4.16	1.98-2.21
GSCM.EoL	3	0.90	0.74	0.81-0.89	1.96-3.11	1.14-1.73
Intgr.Intern	9	0.99	0.96	0.81-0.85	3.98-4.12	2.15-2.28
Intgr.Cust	6	0.96	0.91	0.80-0.87	2.48-2.85	1.31-1.53
Intgr.Suppl	12	0.98	0.96	0.86-0.91	3.99-4.32	1.98-2.11
Intgr.Tech	4	0.97	0.87	0.81-0.89	3.90-4.06	2.02-2.12
OrgCult.Hier	4	0.94	0.85	0.76-0.87	3.60-4.01	1.68-1.75
OrgCult.Group	4	0.97	0.86	0.80-0.82	3.97-4.04	2.02-2.12
OrgCult.Devel	4	0.98	0.88	0.79-0.81	4.18-4.28	2.03-2.14
OrgCult.Ration	4	0.97	0.88	0.76-0.80	4.07-4.25	2.03-2.11

Source: Authors' elaboration

To test the hypotheses, we first verified the OLS assumptions, namely linearity, normality, homogeneity of variance, and independence for all the relations, including those where potentially irrelevant variables were included. After that, we estimated the effect of the integration variables on

each GSCM practice. Table 8 shows the results of the regression models where, in addition to the first model, which considers the entire sample of respondents, we tested three additional models, one per class of company size (i.e. small, medium, and large, respectively in models 2, 3, and 4).

Tab. 8: GSCM practices and integration: results of the multivariate regression model for the whole sample and based on company size (dependent variables in italics)

Variable	model_1 (whole sample)	model_2 (small size)	model_3 (medium size)	model_4 (large size)
<i>GSCM.Eco</i>				
Intgr.Intern	.31*** [19.43]	-.08 [-.39.23]	.28* [.34.67]	.50*** [.06.50]
Intgr.Suppl	.05 [-.06.16]	.07 [-.20-.35]	-.01 [-.14.13]	.12 [-.11.34]
Intgr.Tech	.53*** [.42.64]	.80*** [.49.1.10]	.44*** [.30.58]	.49*** [.27.71]
Intgr.Cust	.07* [.01.14]	.17* [.03.31]	.01 [-.07.10]	.10 [-.08.29]
cons	.00 [-.04.04]	.05 [-.05.15]	-.03 [-.08.03]	.02 [-.10.13]
n.obs.	381	110	203	68
R-sq.	.80	.73	.84	.82
<i>GSCM.IEM</i>				
Intgr.Intern	.82*** [.57.1.08]	.97*** [.42.1.52]	.70*** [.33.1.08]	.87*** [.41.1.33]
Intgr.Suppl	-.82*** [-1.04-.59]	-.91*** [-1.40-.42]	-.83*** [-1.15-.51]	-.69** [-1.16-.22]
Intgr.Tech	-.00 [-.23.22]	-.02 [-.56.51]	.11 [-.22.43]	-.19 [-.63.26]
Intgr.Cust	-.11 [-.24.02]	-.20 [-.45.05]	-.05 [-.24.15]	-.06 [-.44.32]
cons	-.00 [-.09.09]	-.01 [-.19.17]	.02 [-.10.15]	.02 [-.23.27]
n.obs.	381	110	203	68
R-sq.	.17	.18	.16	.21
<i>GSCM.GP</i>				
Intgr.Intern	.72*** [.46.98]	.76* [.16.1.36]	.69*** [.31.1.05]	.61* [.12.1.10]
Intgr.Suppl	-.70*** [-.93-.47]	-.83** [-1.36-.30]	-.75*** [-1.06-.44]	-.63* [-1.12-.12]
Intgr.Tech	.03 [-.02.026]	.15 [-.43.73]	.12 [-.20.44]	-.13 [-.60.34]
Intgr.Cust	-.22** [-.36-.09]	-.31* [-.58-.04]	-.22* [-.41-.03]	-.03 [-.43.37]
cons	-.00 [-.09.09]	.031 [-.16.22]	.06 [-.07.19]	.15 [-.42.11]
n.obs.	381	110	203	68
R-sq.	.11	.10	.11	.15
<i>GSCM.EC</i>				
Intgr.Intern	-.00 [-.19.18]	-.36 [-.77.06]	.05 [-.23.32]	.14 [-.19.47]
Intgr.Suppl	-.02 [-.19.15]	.10 [-.27.47]	-.16 [-.39.07]	.21 [-.12.54]
Intgr.Tech	.66*** [.49.82]	.82*** [.41.1.21]	.76*** [.52.99]	.27 [-.05.58]
Intgr.Cust	.21*** [.12.31]	.26** [.07.44]	.24** [.09.37]	.27 [-.00.53]
cons	-.00 [-.07.07]	.02 [-.11.15]	-.01 [-.10.09]	.13 [-.04.31]
n.obs.	381	110	203	68
R-sq.	.54	.51	.57	.56
<i>GSCM.EoL</i>				
Intgr.Intern	-.63*** [-.88-.38]	-1.02*** [-1.51-.53]	-.50** [-.87-.13]	-.45 [-.98.07]
Intgr.Suppl	.21 [-.02.42]	.59* [.15.1.02]	.13 [-.18.44]	.14 [-.39.67]
Intgr.Tech	.40*** [.18.62]	.22 [-.25.69]	.42** [.10.74]	.24 [-.26.74]
Intgr.Cust	.34*** [.21.47]	.54*** [.32.76]	.27** [.08.46]	.39 [-.04.82]
cons	-.00 [-.09.09]	-.06 [-.22.09]	-.04 [-.17.09]	.26 [-.03.54]
n.obs.	381	110	203	68
R-sq.	.10	.20	.08	.10

Legend:

Coefficients appear as unstandardised betas [95% C.I. in brackets]

* p<0.05; ** p<0.01; *** p<0.001

model_1= whole sample

model_2 = small size

model_3 = medium size

model_4 = large size

Source: Authors' elaboration

Our findings show how internal integration plays a relevant role in adopting GSCM practices. In fact, there is a positive link with eco-design, internal environmental management and green procurement, and a negative correlation with end-of-life management. However, environmental cooperation is not influenced by internal integration. For this reason, H1a is partially confirmed.

Integration with suppliers seems to have an irrelevant or negative role in affecting GSCM practices. Upstream cooperation oriented towards sharing information is negatively linked to internal environmental management and green purchasing. On the other hand, it is not significantly correlated to eco-design, environmental cooperation and end-of-life management. Thus, H1b is not confirmed.

Technological integration with suppliers positively affects three of the GSCM practices analysed, namely eco-design, environmental cooperation and end-of-life management. In contrast, internal environmental management and green purchasing are not favoured by a technological integration with suppliers. Hence, H1c is partially supported.

Integration with customers has a diversified influence on practices for greening the SC. While it has a positive link with eco-design, environmental cooperation and end-of-life management, it negatively correlates with green purchasing. Finally, integration with customers and internal environmental management are not significantly correlated. According to our results, H1d is partially confirmed.

To answer the second group of hypotheses, table 9 shows the results of the regression models relating to the relationship between the elements of OC and components of SC integration that have been considered. Also in this case, in addition to the model on the entire sample (model_1), we estimated the parameters of the regressions for the models relating to the different company sizes (small, medium, and large).

Tab. 9: Integration and culture: results of the multivariate regression model for the whole sample and based on company size (dependent variables in italics)

Variable	model_1 (whole sample)	model_2 (small size)	model_3 (medium size)	model_4 (large size)
<i>GSCM.Eco</i>				
Intrg.Intern	.31*** [.19 .43]	-.08 [-.39 .23]	.28* [.34 .67]	.50*** [.06 .50]
Intrg.Suppl	.05 [-.06 .16]	.07 [-.20 -.35]	-.01 [-.14 .13]	.12 [-.11 .34]
Intrg.Tech	.53*** [.42 .64]	.80*** [.49 1.10]	.44*** [.30 .58]	.49*** [.27 .71]
Intrg.Cust	.07* [.01 .14]	.17* [.03 .31]	.01 [-.07 .10]	.10 [-.08 .29]
cons	.00 [-.04 .04]	.05 [-.05 .15]	-.03 [-.08 .03]	.02 [-.10 .13]
n.obs.	381	110	203	68
R-sq.	.80	.73	.84	.82
<i>GSCM.IEM</i>				
Intrg.Intern	.82*** [.57 1.08]	.97*** [.42 1.52]	.70*** [.33 1.08]	.87*** [.41 1.33]
Intrg.Suppl	-.82*** [-1.04 -.59]	-.91*** [-1.40 -.42]	-.83*** [-1.15 -.51]	-.69*** [-1.16 -.22]
Intrg.Tech	-.00 [-.23 .22]	-.02 [-.56 .51]	.11 [-.22 .43]	-.19 [-.63 .26]
Intrg.Cust	-.11 [-.24 .02]	-.20 [-.45 .05]	-.05 [-.24 .15]	-.06 [-.44 .32]
cons	-.00 [-.09 .09]	-.01 [-.19 .17]	.02 [-.10 .15]	.02 [-.23 .27]
n.obs.	381	110	203	68
R-sq.	.17	.18	.16	.21
<i>GSCM.GP</i>				
Intrg.Intern	.72*** [.46 .98]	.76* [.16 1.36]	.69*** [.31 1.05]	.61* [.12 1.10]
Intrg.Suppl	-.70*** [-.93 -.47]	-.83*** [-1.36 -.30]	-.75*** [-1.06 -.44]	-.63* [-1.12 -.12]
Intrg.Tech	.03 [-.02 .026]	.15 [-.43 .73]	.12 [-.20 .44]	-.13 [-.60 .34]
Intrg.Cust	-.22** [-.36 -.09]	-.31* [-.58 -.04]	-.22* [-.41 -.03]	-.03 [-.43 .37]
cons	-.00 [-.09 .09]	.031 [-.16 .22]	.06 [-.07 .19]	.15 [-.42 .11]
n.obs.	381	110	203	68
R-sq.	.11	.10	.11	.15
<i>GSCM.EC</i>				
Intrg.Intern	-.00 [-.19 .18]	-.36 [-.77 .06]	.05 [-.23 .32]	.14 [-.19 .47]
Intrg.Suppl	-.02 [-.19 .15]	.10 [-.27 .47]	-.16 [-.39 .07]	.21 [-.12 .54]
Intrg.Tech	.66*** [.49 .82]	.82*** [.41 1.21]	.76*** [.52 .99]	.27 [-.05 .58]
Intrg.Cust	.21*** [.12 .31]	.26** [.07 .44]	.24** [.09 .37]	.27 [-.00 .53]
cons	-.00 [-.07 .07]	.02 [-.11 .15]	-.01 [-.10 .09]	.13 [-.04 .31]
n.obs.	381	110	203	68
R-sq.	.54	.51	.57	.56
<i>GSCM.EoL</i>				
Intrg.Intern	-.63*** [-.88 -.38]	-1.02*** [-1.51 -.53]	-.50** [-.87 -.13]	-.45 [-.98 .07]
Intrg.Suppl	.21 [-.02 .42]	.59** [.15 1.02]	.13 [-.18 .44]	.14 [-.39 .67]
Intrg.Tech	.40*** [.18 .62]	.22 [-.25 .69]	.42** [.10 .74]	.24 [-.26 .74]
Intrg.Cust	.34*** [.21 .47]	.54*** [.32 .76]	.27** [.08 .46]	.39 [-.04 .82]
cons	-.00 [-.09 .09]	-.06 [-.22 .09]	-.04 [-.17 .09]	.26 [-.03 .54]
n.obs.	381	110	203	68
R-sq.	.10	.20	.08	.10

Legend:

Coefficients appear as unstandardised betas [95% C.I. in brackets]

* p<0.05; ** p<0.01; *** p<0.001

model_1 = whole sample

model_2 = small size

model_3 = medium size

model_4 = large size

Source: Authors' elaboration

The results confirm how internal integration is significantly linked to all forms of OC in almost all of the analysed models. Although a group or rational culture seems to encourage more internal integration, a developmental or hierarchical culture also positively influences cooperation within the firm's boundaries. These results fully support H2a.

Integration with customers results stronger in the case of a group culture that allows constructive dialogue among functions on how to relate with customers, which is not only necessary in large companies. The hierarchical culture positively impacts the integration with customers in the entire sample and in small firms, which might depend on the tendency of top management, in these companies, to directly manage business relations with customers. Developmental (except for large companies) and rational cultures do not influence integration with suppliers. Hence, H2b can be partially confirmed.

The integration with suppliers is supported by a culture that is oriented towards hierarchical relationships and company incentive systems in all the estimated models. These two approaches usually entail a clear definition of the procedures and actions to be implemented, thus facilitating strategic relationships with suppliers. Also, the values of belonging and participation, which are typical of a group culture, promote coordination with suppliers. Only a developmental culture is not linked to the integration with suppliers. Thus, H2c is partially confirmed.

Technological integration with suppliers is positively related to group, developmental, and rational cultures. Rational culture allows for a stronger technical and operational integration with suppliers but approaches towards participation (group culture) or flexibility (developmental culture) also seem to encourage it. Hierarchical culture has a significant relationship with upstream technological integration, but it acts, albeit weakly, in a negative way. For this reason, H2d is partially confirmed.

Finally, the empirical research aims at testing whether the company size is relevant in understanding the dynamics between SC integration and GSCM practices and between OC and SC integration. To this end, along with the analysis of the entire sample (model 1), we propose three other models related to the dimension of the firms. At first glance, the results do not reveal a univocal situation. After careful observation, however, the cases in which models 1, 2, 3 and 4 show divergent results are sporadic. This means that, in disentangling the relationships between SC integration and GSCM practices and between OC and SC integration, company size is not a dimension capable of explaining different interactions and dynamics. Therefore, both H3 and H4 are not confirmed.

5. Discussion

The empirical research confirms that both SC integration and GSCM practices are multifaceted constructs that need to be analysed in all their components to disentangle the underlying dynamics.

Although our findings confirm first insights from the extant literature (Yu *et al.*, 2019) on the positive role that SC integration plays in pursuing

green practices throughout the SC, this study highlights diversified influences among their dimensions.

Internal integration is an essential condition for implementing green practices, which are thus strictly connected to coordination among all business functions. While this seems obvious in the case of the adoption of internal environmental management, it provides interesting cues on the necessity of a common internal approach also in the case of practices that go beyond the firm's boundaries. Companies can effectively adopt eco-design and green procurement practices only if shared commitment, coordination, and integration among functions are granted. Internal integration seems to hamper the take-back and remanufacturing logic, probably because of a contingent reduction of the need for inter-functional coordination that deserves further investigation.

Upstream integration is conceptualised both in terms of integration with suppliers and technological integration with suppliers. This breakdown allows us to understand the different influences of sharing information and operational and technical coordination (Vachon and Klassen, 2006). In fact, our research provides interesting results on how these two dimensions act differently in promoting GSCM practices. Our results reveal how exchanging information with suppliers is not the key to ensuring the adoption of GSCM practices. In fact, it sometimes even hinders their implementation, as in the case of environmental management and green purchasing. This latter result may appear counter-intuitive but it might depend on the fact that the more the supplier is strongly connected with the organisation, the less the selection process is based on other formal criteria, including those related to the environmental dimension.

Further investigation might be helpful to verify whether suppliers' environmental performance represents a pre-condition for establishing strong connections throughout the SC. In contrast, technological integration is directly linked to eco-design, environmental cooperation, and end-of-life management, which are typically factual manifestations of integrating environmental thinking throughout the SC. Not surprisingly, upstream coordination on technical issues strongly affects practices that directly involve the product, from its green development to its end-of-life management. Technological proximity with suppliers is therefore an inevitable condition for including intrinsic green characteristics into a company's product.

A similar reasoning also concerns integration with customers. This dimension also positively influences eco-design, environmental cooperation, and end-of-life management practices. Firstly, this result reflects the need to understand customers' needs and attitudes before developing a product. Greater collaboration and information sharing allow for understanding the customer's requests and matching them in the product development stages, also in the case of green features. Moreover, integration with customers supports end-of-life policies because it allows companies to effectively involve customers in this green practice. Practices such as take-back are quite challenging to implement without the customers' cooperation, which facilitates the reverse flow of products.

Our results also show how different forms of organisational culture impact GSCM practices through both internal and external integration dimensions. In particular, the more companies guide and inform the actions of all their members through shared values, expectations, and practices - no matter if this is through a hierarchical, group, developmental or rational culture - the more they are internally integrated.

Interestingly, this convergence of behaviours among internal functions also seems to be linked to integration with suppliers, which is therefore a goal that does not just depend on buyers' intentions. Each organisational approach, except for developmental culture, positively influences informational coordination with suppliers. This fact can be explained as a result of a stability-oriented approach (typical of hierarchical and rational cultures) that facilitates long-term relationships. Additionally, group culture influences integration with suppliers by inducing values of belonging and participation that can be extended to inter-organisational teams. However, these results confirm that organisations are a mixture of subcultures (Braunscheidel *et al.*, 2010)

Technological integration with suppliers is hindered only by a hierarchical culture, which seems to limit the creation of strong technological ties along the upstream supply chain. This kind of cultural approach is oriented towards control and internal focus. As already shown in previous studies (Porter, 2019), this fact means that, while it does not hinder information sharing, it might restrain more engaging cooperation in relation to technical and strategic issues due to the perception of loss of control they can imply. On the other hand, technological integration is favoured by group, developmental and rational cultures which, thanks to their orientation towards flexibility and external focus, are typical of companies that are less rigid in sharing technical and operational assets.

Integration with customers is enhanced by hierarchical and group cultures. In this case, similarly to the integration with suppliers, this interconnection can benefit from a downstream extension of the sense of affiliation and membership that is mainly represented by group culture (Cao *et al.*, 2015; Porter, 2019). Interestingly, the culture that is oriented towards development and that oriented towards incentives do not have significant influence on building strong interactions with customers. This fact might depend on specialisation logics that deserve further investigation (e.g. full control of the marketing function over information flows concerning customers) that are counterbalanced, as discussed above, only by a collaborative culture.

Replying to the call of extant studies (Elbaz and Iddik, 2020), to analyse the role of company size in pursuing green strategies throughout the SC, we performed an analysis that could also provide insight on this topic. Only in some scattered situations did the analysed links vary according to the company's size. Thus, the results do not confirm the role of the dimension in explaining the mutual dynamics among the considered variables. In synthesis, our study reveals how the implementation of single GSCM practices is interconnected to the dimensions of integration, regardless of company size. Once a (small, medium or large) firm can build specific coordination dynamics (internally and externally), it can generate the right

conditions to boost its intention to implement strategies for greening the SC. Finally, our results suggest that establishing internal coordination and solid partnerships along the SC is not a prerequisite of a specific company in terms of size. It is instead linked to the cultural approach the company adopts.

6. Theoretical and managerial implications

This study contributes to the debate on GSCM practices by comparing, through empirical evidence, the factors that explain their adoption within companies. In particular, we proposed an integration perspective to test the role of the dimensions of internal and external integration on the adoption of GSCM practices. At the same time, we offered some insights into the influence of different types of OC on each dimension of the integration. Observing the dynamics behind these two interconnections allowed us to observe the entire phenomenon, analyse it more extensively, and have a clearer vision of the underlying relationships.

On grounds of the ongoing lively debate on which practices can be considered part of this phenomenon, we have included different components of GSCM in our analysis that are thus not necessarily considered as a unitary manifestation of a mono-dimensional phenomenon. This choice was driven by the purpose to contribute to the current GSCM literature with a more detailed and, at the same time, complete vision of the phenomenon.

Moreover, we contributed to the extant literature by providing detailed empirical results on the link between SC integration and GSCM practices and suggesting how this relationship could be further disentangled by considering the cultural approach rather than company size.

From a managerial point of view, our results show that internal and external integration dimensions cannot be reduced to a single, simplified concept, as they have a multifaceted impact on GSCM practice, which means that the creation of enabling conditions for cross-fertilisation and collaborations among competencies in small, medium or large companies should be carefully interpreted from both inter-functional and inter-organisational perspectives. In comparative terms, internal integration seemed to prevail over external integration when focusing on adopting eco-design, internal environmental management, and green purchasing. Instead, internal integration significantly hampered reverse logistics. This is quite obvious for closed-loop SCs, where the functions concerning operations and R&D prevail over the others in the definition of procurement criteria and routines. In contrast, the importance of internal interaction was more revelatory for practices like eco-design, internal environmental management, and green purchasing, which are frequently implemented in open-loop and more complex SCs.

Interestingly, informative integration is generally less relevant than technological integration with suppliers when pursuing GSCM. This suggests that data-sharing along the SC is mainly driven by non-primarily environmental goals, such as product quality, flow and stock control, or

lead-time control, which might divert attention from environmental issues. Moreover, the sharing of environmental information - probably because of its complexity - does not enable GSCM practices as much as technological integration, which instead reduces the cognitive distance between buyers and suppliers by increasing the understanding of how the two organisations might orchestrate their environmental efforts.

According to our results, SC managers, both in small, medium and large firms, cannot ignore the role of the OC in guiding the integration dynamics that, in turn, affect the adoption of one GSCM practice or another.

In summary, this study allows purchasing and supply chain managers to better understand how to adopt GSCM practices depending on the culture of their companies. In particular, the study permits the identification of the integration processes to be favoured to exploit different GSCM practices. In defining the GSCM implementation path, our findings underlined the importance of taking the type and level of integration adopted by the company and its organisational culture into account in order to manage and combine economic and human resources in a targeted way.

7. Limitations and directions for future research

As with any empirical study, this research has some limitations. First, to test the conceptual model, we used data from cross-sectional observation, which does not help further disentangle the dynamics of interaction that determine the adoption of GSCM practices over time. Future studies might benefit from using longitudinal data to increase the understanding of causal relations among the investigated variables. Second, we collected data in a single country from formally appointed SC managers, regardless of the length of their experience and of the market (e.g., national/international) in which they operate. Future studies could compare results among different countries and collect more detailed information about the SC managers' activities. Third, we did not include control variables concerning different industrial sectors. Despite not being a priority according to our literature review, future studies could usefully investigate the differences that might arise between industries (e.g. more or less pollutant). As these features might be associated with differences in both the OC and the structures of the involved SCs, such a comparative approach could further support the potential for generalisation of our findings regarding the relations between integration and GSCM practices.

Fourth, we verified a positive relationship between SC integration and GSCM practices and OC and SC integration. These results suggest the implementation of future studies to test the mediation effect of SC integration between GSCM practices and OC.

Finally, we did not investigate the relations between SC integration and other practices that can potentially contribute to the circulation of knowledge and the activation of skills in the pursuit of greener production. Future studies could search for the convergence between SC integration and other forms of development and orchestration of organisational resources, and especially human resources.

References

- AGERON B., GUNASEKARAN A., SPALANZANI A. (2012), "Sustainable supply management: An empirical study", *International Journal of Production Economics*, vol. 140, n. 1, pp. 168-182.
- ARMISTEAD C.G., MAPES J. (1993), "The impact of supply chain integration on operating performance", *Logistics Information Management*, vol. 6, n. 4, pp. 9-14.
- ANNUNZIATA E., RIZZI F., FREY M. (2019), "How do firms interpret extended responsibilities for a sustainable supply chain management of innovative technologies? An analysis of corporate sustainability reports in the energy sector", *Sinergie Italian Journal of Management*, vol. 37, n. 2, pp. 57-74.
- BAE H.S., GRANT D.B., BANOMYONG R., VARADEJSATITWONG P. (2021), "Investigating the impact of the strength of supply chain integration on cost and responsiveness", *International Journal of Logistics Research and Applications*, pp. 1-19.
- BRAUNSCHEIDEL M.J., SURESH N.C., BOISNIER A.D. (2010), "Investigating the impact of organisational culture on supply chain integration", *Human Resource Management*, vol. 49, n. 5, pp. 883-911.
- ÇANKAYA S.Y., SEZEN B. (2018), "Effects of green supply chain management practices on sustainability performance", *Journal of Manufacturing Technology Management*, vol. 30, n. 1, pp. 98-121.
- CAO Z., HUO B., LI Y., ZHAO X. (2015), "The impact of organisational culture on supply chain integration: A contingency and configuration approach", *Supply Chain Management: An International Journal*, vol. 20, n. 1, pp. 24-41.
- CARTER C.R., CARTER J.R. (1998), "Interorganizational Determinants of Environmental Purchasing: Initial Evidence from the Consumer Products Industries", *Decision Sciences*, vol. 29, n. 3, pp. 659-684
- CARTER C.R., ROGERS D.S. (2008), "A framework of sustainable supply chain management: moving toward new theory", *International Journal of Physical Distribution and Logistics Management*, vol. 38, n. 5, pp. 360-387.
- DESHPANDE R., WEBSTER F.E. (1989), "Organisational culture and marketing: Defining the research", *Journal of Marketing*, vol. 53, n.1, pp. 3-15.
- ELBAZ J., IDDIK S. (2020), "Culture and green supply chain management (GSCM)", *Management of Environmental Quality: An International Journal*, vol. 31, n. 2, pp. 483-504.
- FLYNN B.B., HUO B., ZHAO X. (2010), "The impact of supply chain integration on performance: A contingency and configuration approach", *Journal of Operations Management*, vol. 28, n. 1, pp. 58-71.
- FROHLICH M.T., WESTBROOK R. (2001), "Arcs of integration: An international study of supply chain strategies", *Journal of Operations Management*, vol. 19, n. 2, pp. 185-200.
- GIMENEZ C., SIERRA V. (2013), "Sustainable supply chains: Governance mechanisms to greening suppliers", *Journal of Business Ethics*, vol. 116, n. 1, pp. 189-203.
- GONZÁLEZ-BENITO J., LANNELONGUE G., FERREIRA L.M., GONZALEZ-ZAPATERO C. (2016), "The effect of green purchasing on purchasing performance: the moderating role played by long-term relationships and strategic integration", *Journal of Business and Industrial Marketing*, vol. 31, n. 2, pp. 312-324.

- GREEN K.W., ZELBST P.J., MEACHAM J., BHADARIA V.S. (2012), "Green supply chain management practices: impact on performance", *Supply Chain Management: An International Journal*, vol. 17, n. 3, pp. 290-305.
- HARTMANN J., GERMAIN R. (2015), "Understanding the relationships of integration capabilities, ecological product design, and manufacturing performance", *Journal of Cleaner Production*, vol. 92, pp. 196-205.
- HERVANI A.A., HELMS M.M., SARKIS J. (2005), "Performance measurement for green supply chain management", *Benchmarking: An International Journal*, vol. 12, n. 4, pp. 330-353.
- HOLT D., GHOBADIAN A. (2009), "An empirical study of green supply chain management practices amongst UK manufacturers", *Journal of Manufacturing Technology Management*, vol. 20, n. 7, pp. 933-956.
- HONG P., KWON H.B., ROH J.J. (2009), "Implementation of strategic green orientation in supply chain", *European Journal of Innovation Management*, vol. 12, n. 4, pp. 512-532.
- HUO B. (2012), "The impact of supply chain integration on company performance: an organisational capability perspective", *Supply Chain Management: An International Journal*, vol. 17, n. 6, pp. 596-610.
- INMAN R.A., GREEN K.W. (2018), "Lean and green combine to impact environmental and operational performance", *International Journal of Production Research*, vol. 56, n. 14, pp. 4802-4818.
- KIM D. (2013), "Relationship between supply chain integration and performance", *Operational Management Resources*, vol. 6, pp. 74-90.
- KIRCHOFF J., TATE W., MOLLENKOPF D. (2016), "The impact of strategic organisational orientations on green supply chain management and firm performance", *International Journal of Physical Distribution and Logistics Management*, vol. 46, n. 3, pp. 269-292.
- LEE S.M., KIM S.T., CHOI D. (2012), "Green supply chain management and organisational performance", *Industrial Management and Data Systems*, vol. 112, n. 8, pp. 1148-1180.
- LEWIS K.V., CASSELLS S., ROXAS H. (2015), "SMEs and the potential for a collaborative path to environmental responsibility", *Business Strategy and the Environment*, vol. 24 n. 8, pp. 750-764.
- LIU Y., BLOME C., SANDERSON J., PAULRA A. (2018), "Supply chain integration capabilities, green design strategy and performance: a comparative study in the auto industry", *Supply Chain Management: an International Journal*, vol. 23, n. 5, pp. 431-443.
- LO S.M., ZHANG S., WANG Z., ZHAO X. (2018), "The impact of relationship quality and supplier development on green supply chain integration: A mediation and moderation analysis", *Journal of Cleaner Production*, vol. 202, pp. 524-535.
- MASSARONI E., COZZOLINO A., WANKOWICZ E. (2015), "Sustainability in supply chain management: a literature review", *Sinergie Italian Journal of Management*, vol. 33, n. 98, pp. 331-355.
- MITRA S., DATTA P.P. (2013), "Adoption of green supply chain management practices and their impact on performance: An exploratory study of Indian manufacturing firms", *International Journal of Production Research*, vol. 52, n. 7, pp. 2085-2107.

- NAOR M., GOLDSTEIN S.M., LINDERMAN K.W., SCHROEDER R.G. (2008), "The role of culture as driver of quality management and performance: infrastructure versus core quality practices", *Decision Sciences*, vol. 39, n. 4, pp. 671-702.
- PAGELL M. (2004), "Understanding the factors that enable and inhibit the integration of operations, purchasing and logistics", *Journal of Operations Management*, vol. 22, n. 5, pp. 459-487.
- PAULRAJ A. (2011), "Understanding the relationships between internal resources and capabilities, sustainable supply management and organisational sustainability", *Journal of Supply Chain Management*, vol. 47, n. 1, pp. 19-37.
- PORTER M. (2019), "Supply chain integration: Does organisational culture matter?", *Operations and Supply Chain Management: An International Journal*, vol. 12 n.1, pp. 49-59.
- QUINN R.E., ROHRBAUGH J. (1983), "A spatial model of effectiveness criteria: Towards a competing values approach to organisational analysis", *Management Science*, vol. 29, n. 3, pp. 363-377.
- RAO P., HOLT D. (2005), "Do green supply chains lead to competitiveness and economic performance?", *International Journal of Operations and Production Management*, vol. 25, n. 9, pp. 898-916.
- SARKIS J., GONZALEZ-TORRES P., ADENSO-DIAZ B. (2010), "Stakeholder pressure and the adoption of environmental practices: the mediating effect of training", *Journal of Operations Management*, vol. 28, n. 2, pp. 163-176.
- SARKIS J., ZHU Q., LAI K.H. (2011), "An organisational theoretic review of green supply chain management literature", *International Journal of Production Economics*, vol. 130, n. 1, pp. 1-15.
- SCUR G., BARBOSA M.E. (2017), "Green supply chain management practices: Multiple case studies in the Brazilian home appliance industry", *Journal of Cleaner Production*, vol. 141, pp. 1293-1302.
- SHUAIB K.M., HE Z. (2021), "Impact of organisational culture on quality management and innovation practices among manufacturing SMEs in Nigeria", *Quality Management Journal*, vol. 28, n. 2, pp. 100-116.
- SILVA G.M., GOMES P.J., CARVALHO H., GERALDES V. (2021), "Sustainable development in small and medium enterprises: The role of entrepreneurial orientation in supply chain management", *Business Strategy and the Environment*, pp. 1-17, doi: 10.1002/bse.2841.
- SRIVASTAVA S.K. (2007), "Green supply-chain management: A state of the-art literature review", *International Journal of Management Reviews*, vol. 9, n. 1, pp. 53-80.
- STANK T.P., KELLER S.B., CLOSS D.J. (2001), "Performance benefits of supply chain integration", *Transportation Journal*, vol. 41, n. 2, pp. 31-46.
- TACHIZAWA E.M., GIMENEZ C., SIERRA V. (2015), "Green supply chain management approaches: drivers and performance implications", *International Journal of Operations and Production Management*, vol. 35, n. 11, pp. 1546-1566.
- TONG Y.K., ARVEY R.D. (2015), "Managing complexity via the competing values framework", *Journal of Management Development*, vol. 34, n. 6, pp. 653-673.
- WALKER H., DI SISTO L., MCBAIN D. (2008), "Drivers and barriers to environmental supply chain management practices: Lessons from the public and private sectors", *Journal of Purchasing and Supply Management*, vol. 14, n. 1, pp. 69-85.

- VACHON S. (2007), "Green supply chain practices and the selection of environmental technologies", *International Journal of Production Research*, vol. 45, n. 18-19, pp. 4357-4379.
- VACHON S., KLASSEN R.D. (2006), "Extending green practices across the supply chain: The impact of upstream and downstream integration", *International Journal of Operations and Production Management*, vol. 26, n. 7, pp. 795-821.
- WEE H.M., LEE M.C., JONAS C.P., WANG C.E. (2011), "Optimal replenishment policy for a deteriorating green product: Life cycle costing analysis", *International Journal of Production Economics*, vol. 133, n. 2, pp. 603-611.
- WU G.C., DING J.H., CHEN P.S. (2012), "The effects of GSCM drivers and institutional pressures on GSCM practices in Taiwan's textile and apparel industry", *International Journal of Production Economics*, vol. 135, n. 2, pp. 618-636.
- WU Z., PAGELL M. (2011), "Balancing priorities: decision-making in sustainable supply chain management", *Journal of Operations Management*, vol. 29, n. 6, pp. 577-590.
- YOUNIS H., SUNDARAKANI B., VEL P. (2016), "The impact of implementing green supply chain management practices on corporate performance", *Competitiveness Review*, vol. 26, n. 3, pp. 216-245.
- YU W., CHAVEZ R., FENG M., WIENGARTEN F. (2014), "Integrated green supply chain management and operational performance", *Supply Chain management: An International Journal*, vol. 19, n. 5-6, pp. 683-696.
- YU Y., ZHANG M., HUO B. (2019), "The impact of supply chain quality integration on green supply chain management and environmental performance", *Total Quality Management & Business Excellence*, vol. 30, n. 9-10, pp. 1110-1125.
- ZAID A.A., JAARON A.A.M., TALIB BON A. (2018), "The impact of green human resource management and green supply chain management practices on sustainable performance: An empirical study", *Journal of Cleaner Production*, vol. 204, pp. 965-979.
- ZHAO X., HUO B., SELEN W., YEUNG J.H.Y. (2011), "The impact of internal integration and relationship commitment on external integration", *Journal of Operations Management*, vol. 29, n. 1-2, pp. 17-32.
- ZHU Q., SARKIS J. (2004), "Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises", *Journal of Operations Management*, vol. 22, n. 3, pp. 265-289.
- ZHU Q., SARKIS J., LAI K.H. (2007a), "Initiatives and outcomes of green supply chain management implementation by Chinese manufacturers", *Journal of Environmental Management*, vol. 85, n. 1, pp. 179-189.
- ZHU Q., SARKIS J., LAI K.H. (2007b), "Green supply chain management: pressures, practices and performance within the Chinese automobile industry", *Journal of Cleaner Production*, vol. 15, n. 11, pp. 1041-1052.
- ZHU Q., SARKIS J. (2007c), "The moderating effects of institutional pressures on emergent green supply chain practices and performance", *International Journal of Production Research*, vol. 45, n. 18-19, pp. 4333-4355.
- ZHU Q., SARKIS J., LAI K.H. (2008a), "Confirmation of a measurement model for green supply chain management practices implementation", *International Journal of Production Economics*, vol. 111, n. 2, pp. 261-273.

ZHU Q., SARKIS J., LAI K.H. (2008b), "Green supply chain management implications for 'closing the loop'", *Transportation Research Part E: Logistics and Transportation Review*, vol. 44, n. 1, pp. 1-18.

ZHU Q., SARKIS J., LAI K.H. (2012), "Examining the effects of green supply chain management practices and their mediations on performance improvements", *International Journal of Production Research*, vol. 50, n. 5, pp. 1377-1394.

Academic or professional position and contacts

Francesco Rizzi

Associate Professor of Management
University of Perugia - Italy
e-mail: francesco.rizzi@unipg.it

Eleonora Annunziata

Assistant Professor of Management
Sant'Anna School of Advanced Studies Pisa - Italy
e-mail: eleonora.annunziata@santannapisa.it

Marina Gigliotti

Assistant Professor of Management
University of Perugia - Italy
e-mail: marina.gigliotti@unipg.it



sinergie

italian journal of management

ISSN 0393-5108

DOI 10.7433/s116.2021.10

pp. 189-210



Italian Society of
MANAGEMENT