

EXAMINING THE MODERATING ROLE OF HIHRP IN THE RELATIONSHIP BETWEEN EXTERNAL INTEGRATION AND PRODUCTIVITY¹

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ABSTRACT

Purpose – Based on the human resource (HR) and supply chain integration (SCI) literature, we argue that high-involvement human resource practices (HIHRP) work as a complementary capability for SCI, and thus, HIHRP moderates the relationship between SCI and firm productivity. This moderating role is analyzed through the following HIHRP dimensions: ability-enhancing, motivation-enhancing, and opportunity-enhancing practices (AMO framework).

Design/methodology/approach – Using empirical data collected from a survey of the agri-food sector (horticultural firms of southern Spain), the moderating effects of HIHRP on the relationship between supply chain external integrations (with customers and suppliers) and productivity are examined. A hierarchical regression analysis is used to test the proposed hypotheses.

Findings – The results support that HIHRP have a moderating effect on the SCI/productivity relationship. However, these results are only significant in the case of supplier integration.

Originality/value – This study analyzes HIHRP as a complementary asset in the context of SCI and makes both theoretical and managerial contributions to the SCI literature by empirically analyzing the role of HR practices in enhancing the relationship between SCI and performance.

Keywords supply chain integration, supplier, customer, AMO model, productivity

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Introduction

The emergence of global markets, rapid changes in technology and intense competition have extended firms beyond their limits and require firms to consider the need to establish integrated collaborative relationships with their supply chain partners. Supply chain integration (SCI) refers to the degree to which a firm strategically collaborates with its supply chain partners “in order to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer” (Flynn *et al.* 2010: 58). Thus, SCI has emerged as a critical capability for business success (Huang *et al.*, 2014; Stevens and Johnson, 2016).

Although some empirical evidence suggests that SCI has a positive direct impact on firm performance (Rosenzweig *et al.*, 2003; Droge *et al.*, 2004; Devaraj *et al.*, 2007; Swink *et al.*, 2007), the results are not conclusive and show different effects on different performance outcomes (Mackelprang *et al.*, 2014). A growing body of literature highlights the relevance of analyzing different contingencies to explain the circumstances under which SCI improves firm performance (Tarifa-Fernandez and de Burgos-Jimenez, 2017). This literature mainly focuses on the importance of moderators, such as competitive intensity or technological and demand uncertainty, in explaining how the level of integration affects subsequent performance due to their unique connection to SCI processes (Abdallah *et al.*, 2014; Tavani *et al.*, 2014; Rosenzweig, 2009; Shou *et al.*, 2018).

These studies provided useful insight into different factors related to firm performance in the supply chain. However, many empirical studies in the SCI literature have paid limited attention to firm internal resources and capabilities, which may moderate the relationship between SCI and performance. By using the notion of “complementary assets” (Teece, 1986; Christmann, 2000), it can be suggested that some specific complementary assets

are required to obtain all benefits associated with SCI. For example, firms' efforts to invest in SCI processes (e.g., information technologies or conjoint planning) may be unproductive if the firms do not possess complementary capabilities, such as absorptive capabilities (Tavani *et al.*, 2014), logistic capabilities (Wiengarten *et al.*, 2014) or IT competences (Li, 2015).

The supply chain is a human chain, and its success relies on the people who manage and collaborate along the supply chain (Sweeney, 2013). According to Scarbrough (2000), the supply chain generates significant demands on human resource (HR) management to obtain the skills and behavioral flexibility necessary to achieve more effective integration. Previous research has analyzed the role of HR management practices in explaining supply chain performance (Hohenstein *et al.*, 2014) or supply chain sustainable performance (Zaid *et al.*, 2018). For example, prior studies revealed that when specific practices are deployed, HR management supports the development of the internal competences needed to improve supply chain management (e.g., Barnes and Liao, 2012). Thus, an adequate set of HR practices represents a critical resource for the successful implementation of SCI and, consequently, a requisite for higher customer satisfaction and improved performance (Ou *et al.*, 2010).

High-involvement human resource practices (HIHRP) are “a system of human resources practices thought to enhance employees' levels of skill, motivation, information, and empowerment” (Guthrie, 2001: 180). HIHRP are considered to constitute a strategic capability related to superior competitive returns at the firm level (e.g., Delery and Doty, 1996; Guthrie *et al.*, 2009) or in the supply chain management context (Huo *et al.*, 2016). Additionally, HIHRP should also lead to better firm performance when they are combined with other practices (Guerrero & Barraud-Didier, 2007). Based on the HR literature and SCI literature, we argue that HIHRP work as a complementary capability for SCI, and

thus, HIHRP moderate the relationship between SCI and firm performance. The main objective of this paper is to analyze this moderating role through the following HIHRP dimensions: ability-enhancing, motivation-enhancing, and opportunity-enhancing practices (AMO framework; Jiang *et al.*, 2012). This objective responds to the call for a closer examination of the mechanisms underlying the process of developing effective external relationships within the supply chain by analyzing the moderating factors (Mackelprang *et al.*, 2014; Tarifa-Fernandez and de-Burgos-Jimenez, 2017) and the need to study HR as a demanding element of SCI, which is a question that has received scant attention (Hohenstein *et al.*, 2014).

Our contribution is twofold. First, we delve into the relationship between SCI and performance through the notion of complementary assets; specifically, we propose that firms may improve their productivity through closer collaboration and integration with supply chain partners (suppliers and customers) and the development of different HR practices. Second, we provide empirical evidence of these relationships in an interesting context to provide useful implications for both theory and practice.

Theoretical background and hypotheses

SCI implies coordination and collaboration between and within firms and requires physical, human, and knowledge resources (Fu *et al.*, 2013). According to Fawcett *et al.* (2008), managers believe that technology, information and measurement systems are major barriers to successful supply chain collaboration, while “people issues”, such as a firm’s culture, trust, aversion to change, and willingness to collaborate, are more intractable.

The research model guiding this study (Figure 1) is theoretically rooted in the resource-based view (RBV; Barney, 1991) and particularly in its notion of complementary assets

(Teece, 1986). According to the RBV, firms can increase their performance by investing in complementary assets. Three elements of the model can be highlighted. First, from the RBV, SCI can be regarded as a strategic capability based on making strategic collaborations with partners, integrating resources and sharing information that leads to competitive advantages (i.e., Huo *et al.*, 2016). Similar to several studies, we focus on supplier integration (SI) and customer integration (CI), “which are external SCIs” (Xu *et al.*, 2014: 1187). External integration refers to the efforts of a firm to integrate with external partners, including both customers and suppliers, because SCI requires companies to simultaneously be integrated upstream and downstream to achieve significant benefits (Danese and Romano, 2011).

Insert Figure 1 about here

An increasing number of research studies have provided useful insights into the positive effect of external SCI implementation on organizational performance (Frohlich and Westbrook, 2001; Fabbe-Costes and Jahre 2008; Mackelprang *et al.*, 2014; Xu *et al.*, 2014; Delic *et al.*, 2019). Recent meta-analyses have found a positive relationship between both CI and SI and firm performance (Chang *et al.* 2016; Ataseven and Nair, 2017), including different measures of performance, such as financial performance, productivity (cost performance), delivery and flexibility performance.

Second, according to the RBV, HR management practices (e.g., HIHRP) may also be considered to constitute a strategic capability that can be a source of competitive advantages based on people-management systems and associated human capital enhancements (i.e., Guthrie *et al.*, 2009). Research concerning HR systems has shown that HIHRP contribute to firm performance (e.g., productivity) by motivating employees

to adopt desired behaviors that collectively contribute to the benefit of the organization (Huselid, 1995; Delery and Doty, 1996). Although the specific HR practices included in HIHRP varied across studies, one commonality among these approaches is focusing on promoting workforce ability to ensure properly skilled employees (via selective hiring or employee extensive training), motivation (via evaluation systems or incentives linked to goal attainment), and opportunity (via the use of internal communication systems and information sharing) to engage in behaviors consistent with organizational goals (Kehoe and Wright, 2013; Martinez-del-Rio *et al.*, 2012).

Complementary assets are resources or capabilities that allow firms to capture profits associated with a strategy, technology, or innovation (Teece, 1986; Christmann, 2000). According to RBV, capabilities are complementary when the development of any one capability increases the marginal performance of each of the other capabilities (see Riley, Michael, and Mahoney, 2017). To manage the complexity of interconnected supply chains in a profitable manner, firms need to access complementary assets on favorable terms. HR management practices, such as training, hiring, or interfunctional teams, contribute to overcoming people-based barriers to supply chain collaboration, increase people's commitment to collaborate with partners (Fawcett *et al.*, 2008) and, therefore, improve the impact of SCI on productivity. As shown in Figure 1, the notion of complementary assets supports the moderating role of HIHRP in the relationship between SCI and performance. This model also recognized that HIHRP might be considered an antecedent of SCI implementation (Huo *et al.*, 2015). The relationship between HIHRP and SCI, a key issue in this study, is discussed below.

Finally, the model depicted in Figure 1 focuses on productivity as the operational performance variable for two main reasons (de Menezes *et al.*, 2010). First, productivity better reflects the direct impact of implementing management practices (e.g., CI and SI

practices). For example, integration with suppliers and customers creates a mutual understanding and facilitates information exchange and task coordination, which helps reduce wastage and effort redundancy in managing supply chain activities across partner firms (Swink et al., 2007). Thus, closer collaboration with supply chain partners becomes a pioneering approach for improving productivity by reducing inventory levels, developing efficient production plans and improving forecasts, lowering product delivery lead times and establishing an information system among the parties involved (Eltantawy et al. 2015). Second, productivity usually reflects the performance of employees and can be considered the direct link between human capital and organizational performance (Datta et al., 2005).

HR practices and SCI

Previous research has highlighted the strong interdependencies between supply chain management practices and HR practices, showing a growing interest in relating both concepts (Gowen and Tallon, 2003; Hohenstein *et al.*, 2014). On the one hand, there are studies that emphasize some essential elements necessary for this relationship to be positive. In this line, Ellinger and Ellinger (2014) discuss the human resource skill sets that are required for effective supply chain management (assuming that supply chain management decisions have a high impact on firms' financial performance). On the other hand, there are arguments that highlight the negative consequences of the absence of some essential HR practices and outcomes. Thus, Thornton *et al.* (2013) emphasize the problems that poor employee behavior has on managing supply chain relationships and its impact on business profitability. Additionally, some studies have found that human capital- and HR-related variables are antecedents of supply chain management practices, although they use different terminology: supply chain effectiveness (Smith-Doerflein, *et*

al., 2011), supply chain orientation (Lengnick-Hall and Lengnick-Hall, 2013) or supply chain management implementation (Gómez-Cedeño *et al.*, 2015).

Recently, some papers have focused on the relationship between HR practices and SCI (Huo *et al.*, 2015, Huo *et al.* 2016, Zhang *et al.* 2019). These studies have pointed out that HR practices are antecedents of SCI. Thus, Huo *et al.* (2015) and Huo *et al.* (2016) used a sample of 317 international companies from 17 different countries to determine how HIHRP (employee skills, incentives, and participation) favor SCI. Siritannun *et al.* (2019) obtained similar results for a sample of 300 company managers in Thailand: HIHRP - skills, incentives, and participation - positively influence SCI. Chen *et al.* (2018) found that managerial (business or political) ties are a significant and positive driving force of SI and CI; Song *et al.* (2019) showed that both Human Capital and Managerial Capital influence SCI. These relationships are confirmed by other studies focusing on green human resource practices and supply chain integration (Yu *et al.*, 2020).

However, the synergies that exist by adopting certain HR practices and SCI are often overlooked (Agyabeng-Mensah *et al.*, 2020). Jurčević *et al.* (2009) argued that logistics and supply chain professionals require two requisites to be consistently effective: integrative vision and human resource ability. The first is referred to the vision to design integrative, cross-functional, and cross-company programs that enable products to flow rapidly and responsively through the company and the channel. The second refers to the ability to harness the power of HR policies to ensure that the programs are implemented effectively throughout the company.

HR practices may support the implementation of different firm strategies based on specific firm capabilities to gain a competitive advantage (Pauwe, 2009) but are not necessarily the driving force of these strategies. In other words, by using the notion of complementary assets, we argue that HIHRP enhance the impact of SCI implementation

on a firm's performance (e.g., productivity), contributing to SCI success. Several arguments support this idea. First, research has shown complementarities between different organizational capabilities (i.e., innovation and marketing activities) and HR capabilities (Riley et al., 2017). In the same vein, previous studies support the role of HR practices as a moderating factor explaining firm performance (e.g., Kostopoulos *et al.*, 2015; O'Donohue and Torugsa, 2015).

Second, although the moderating role of HR practices in the context of supply chain management has not been empirically analyzed in previous studies, different works have considered this role almost implicitly. For example, Gowen and Tallon (2003: 42) suggested that a firm can gain a competitive advantage "by exploiting HRM factors even if competitors have effectively implemented SCM practices". They found that these "HR factors" (e.g., training) enhanced supply chain management practices "added value". Shub and Stonebraker (2009) argued that relationship-based HR practices (e.g., training and compensation strategies) would make an important contribution to supply chain performance. Menon (2012) found that nontraditional HR practices, training, and team structures were associated with successful integration and performance in the supply chain context.

Finally, the consideration of HR practices as a moderating variable is also consistent with the idea that integration between certain operation management practices and HR practices, rather than individual practices, is positively related to firm performance (de Menezes, Wood and Gelade, 2010). The implementation of SCI implies the development of different practices in areas such as supply chain relationships (partnership and coordination), inventory policy, information systems, demand planning, etc. (Childerhouse and Towill, 2011). When these practices are combined with specific HR

practices, synergies that improve performance and enable a sustainable competitive advantage are created.

As noted above, previous studies have provided different arguments to support that HIHRP are drivers or antecedents of SCI. Although these relationships are tested in the empirical section of this work, the next section stresses arguments supporting that the different dimensions of HIHRP operate as a moderator.

Hypotheses

Over time, the implementation of SCI has not always shown the expected positive effects on performance. Some scholars have attributed these results to the neglect of HR issues in SCI (Ellinger and Ellinger, 2014; Shub and Stonebroker, 2009; Tokar, 2010). Inadequate employee management is among the most important barriers to successful SCI both internally and with external supply partners (Fawcett *et al.*, 2008). Therefore, the development of good HR practices may be a key factor explaining the effect of SCI on firm performance in several areas, such as financial or operational performance.

HR practices, such as HIHRP, have a synergistic and performance-enhancing effect (Guthrie, 2001; Prieto and Perez-Santana, 2012). For example, employee training aims to increase employees' knowledge, skills, and abilities. Human resources need to be motivated and empowered to leverage their knowledge and abilities and ensure that internal communication systems and information sharing can play an important role in improving the value of employees' collective contributions (Han *et al.*, 2019). HIHRP also increases employees' commitment to strategy implementation, which can eventually be translated into improvement in firm performance (Combs *et al.*, 2006).

These HR practices create an environment in which actions that improve the performance consequence of being closely related to supply chain partners can be easily developed (Minbaeva, 2005; Huo *et al.*, 2015). This is possible because HIHRP allow real

knowledge transfers, help remove traditional boundaries, melt the bureaucratic structure, and support learning (Gupta and Govindarajan, 2000).

HIHRP consist of the following three sets of practices (Han *et al.*, 2019; Huo *et al.*, 2015): ability-enhancing practices, motivation-enhancing practices and opportunity-enhancing practices. Each set of practices can be related to supply chain integration and productivity. Ability-enhancing HR practices focus on ensuring appropriately skilled employees. They include extensive recruitment programs, trying to ensure a fit between new employees and the organization's objectives, and extensive, multiskill and team-based training to develop more qualified personnel for any contingency. Ability-enhancing practices may improve the impact of external SCI on productivity in several ways. First, skilled employees who continually update their knowledge usually generate valuable ideas to enhance productivity (Shin and Konrad, 2017). By facilitating information assimilation and the generation of new knowledge, employees who possess a wide range of skills are in a better position to use and continually improve techniques and tools associated with integration processes. Thus, they can enhance the productivity associated with effective supplier and customer integration (Gowen and Tallon, 2003; Prajogo and Sohal, 2013). Additionally, these employees can facilitate the comprehension of the operational processes of suppliers and customers such that firms are more prepared to meet their expectations (Ellinger *et al.*, 2010). Second, firms that enhance their employees' abilities (e.g., through extensive learning) produce highly qualified and flexible personnel capable of working in various environments (Huo *et al.*, 2016). In this situation, firms are less concerned about technical or routine issues in the integration process and can easily focus on optimizing the effectiveness of their interorganizational relationships. Similarly, these abilities prepare employees to make independent decisions (Guerci *et al.*, 2017), allowing closeness with customers and suppliers to impact productivity by reducing bureaucracy,

time efficiency, and costs. Finally, according to Jin *et al.* (2010), employees with strong people skills could help supply chain partners identify problems and make correct decisions. By improving supplier and customer productivity, ability-enhancing practices may enhance the positive association between firm integration practices and productivity. Therefore, a wide range of abilities can be a complementary asset in the development of external relationships along the supply chain, which, in turn, could have a more significant effect on productivity. Thus, we propose the following hypotheses:

Hypothesis 1a. Ability-enhancing practices have a positive moderating effect on the relationship between customer integration and productivity.

Hypothesis 1b. Ability-enhancing practices have a positive moderating effect on the relationship between supplier integration and productivity.

Firms need to develop a sense of commitment to employees to obtain well-motivated personnel. Motivation-enhancing practices, such as individual and group performance-based rewards or employee performance appraisals based on long-run results, promote the willingness of employees to contribute their efforts on behalf of their organization (Fu *et al.*, 2017). First, incentives strengthen the link between performance and rewards, motivating employees to identify and act upon inefficiencies (Shin and Konrad, 2017). Thus, motivated employees may strengthen the association between SCI practices and productivity. Second, motivation-enhancing practices may generate a sense of procedural equality by determining rewards according to the results of employee evaluations (Prieto and Perez-Santana, 2012). Through these practices, personnel can feel more engaged and willing to share their individual experiences and experiment with new solutions (Diaz-Fernández *et al.*, 2015). Consequently, employees feel acquainted and comfortable with

knowledge sharing (Ax and Marton, 2008), leading them to establish more productive relationships with other firms to obtain information and knowledge and apply such information to organizational operations (Prieto and Perez-Santana, 2012) to enhance productivity. In sum, having more motivated employees favors the efficiency of information exchange among supply chain partners, using the coordination and planning procedures associated with SCI practices, and increases employees' chances of contributing to achieving organizational goals (Jiang *et al.*, 2012; Chin *et al.*, 2017).

As noted above, improving communication and partnerships with external supply chain partners, such as customers and suppliers, is critical to enhance network-level trust in the supply chain (Barnes and Liao, 2012) and firm competitiveness (Huo *et al.*, 2016). Motivation-enhancing practices generate an alignment between employees' own objectives and the firm's collaboration strategy focused on increasing supply chain trust and facilitating the redirection of employee efforts towards those supply chain management practices that enhance the association between both CI and SI and firm productivity (Huber and Hyer, 1985). However, low levels of moderation-enhancing practices may result in unfocused efforts to CI and SI, pursuing partial objectives and not mutual cooperation, thus causing a detrimental effect. In sum, company investments in SI and CI are more productive when they develop complementary capabilities based on employee motivation. Thus, we propose the following hypotheses:

Hypothesis 2a. Motivation-enhancing practices have a positive moderating effect on the relationship between customer integration and productivity.

Hypothesis 2b. Motivation-enhancing practices have a positive moderating effect on the relationship between supplier integration and productivity.

Opportunity-enhancing HR practices, such as teamwork collaboration, job rotation and flexible work assignments, or participation in decision-making, give employees the authority to act based on new ideas and create a supportive culture within the organization (Waldman, 1994). These practices “are designed to empower employees to use their skills and motivation to achieve organizational objectives” (Jiang *et al.*, 2012: 1267). Thus, they support the contribution of motivated employees with appropriate abilities to the successful implementation, in terms of productivity, of SCI practices. First, these practices reduce the barriers to idea implementation, as employees can identify improvements and report problems more flexibly when carrying out daily tasks (Huo *et al.*, 2015). In doing so, firms are able to exploit the synergies between HR systems and customer and supplier integration strategies to improve organizational performance and productivity. Second, opportunity-enhancing practices increase the intensity of social interactions (Chuang *et al.*, 2016) and the likelihood of employees, including suppliers and customers, in their “social groups” (Jiménez-Jiménez and Martínez-Costa, 2009). Once employees eliminate the barriers to open communication, they can extend their improvements or solutions beyond the limits of the firm to suppliers and customers. The sense of connection among supply chain partners and the execution of joint tasks may increase firm productivity and the efficiency of supplier and customer collaboration. SCI relies on long-term relationships between supply chain partners that share information and values (Fabbe-Costes and Jahre, 2008). Opportunity-enhancing HR practices promote long-term reciprocal interactions among firms in the supply chain network (Lengnick-Hall *et al.*, 2013). Therefore, SCI and these HR practices have a synergistic effect on firm productivity.

A firm maintaining regular opportunity-enhancing practices gives its employees autonomy to perform their tasks, job flexibility and participation in decision-making.

Empowered employees participate in organizational learning processes associated with SCI, making suggestions to improve the development of the integration processes (Alfalla-Luque *et al.*, 2015) and proactively respond to changes (Shin and Konrad, 2017). In sum, opportunity-enhancing practices allow employees to be better prepared and willing to face the process of becoming close to both suppliers and customers, but more importantly, they increase the effectiveness of customer and supplier integration practices and improve the efficiency of operations (productivity) along the supply chain. High levels of opportunity-enhancing practices may encourage a more focused integration effort, in which everyone understands the importance of working together with customers and suppliers to share information and collaborate towards shared objectives. Therefore, the following hypotheses are proposed:

Hypothesis 3a. Opportunity-enhancing practices have a positive moderating effect on the relationship between customer integration and productivity.

Hypothesis 3b. Opportunity-enhancing practices have a positive moderating effect on the relationship between supplier integration and productivity.

Methodology

Questionnaire design and sample

To test the hypotheses, data were collected from a Spanish sample of the agri-food sector. The literature recommends selecting a sample of firms located in a relatively homogeneous environment (geographical, cultural, legal and political space) to minimize the impact of other variables that cannot be controlled in empirical research (Adler, 1983).

Agri-food supply chains have huge economic importance and have increased interest in modern management science (Tsolakis *et al.*, 2014). The agri-food industry is highly industrialized, and its processes have advanced towards mass production (Beske *et al.*, 2014) and internationalization, thus creating a global supply chain (Manning *et al.*, 2005; Roth *et al.*, 2008). These firms are dynamically evolving over time to adapt to their environment and especially to changes in their customers' demands (Trienekens *et al.*, 2012; Wiengarten *et al.*, 2012).

The agri-food firms (fruits and vegetables) of southern Spain included in the sample represent an example of success and growth over the last fifty years and are characterized by their innovations and orientation towards international markets. These firms are part of a model of industrial agriculture based on “a technological system that is institutionally complex and dynamic, closer to the concept of an agricultural ‘factory’ due to the high capital requirement, the high content productive inputs and the scale of labor used and the technological support” (Aznar-Sánchez *et al.*, 2011: 258). They are included in a supply chain comprising multinational and national input providers (i.e., seeds, fertilizer, and phytosanitary products) and other individual agricultural producers as suppliers and mainly multinational purchasing centers and large stores as intermediate customers.

To collect the data, two different sources were used. First, two different questionnaires were carried out. The first questionnaire was completed by the general managers of the firms and included questions regarding SCI. The second questionnaire was completed by the manager with human resources functions and was related to HIHRP. When the general manager developed human resource functions, he or she completed both questionnaires. Second, archival data from the *Sistemas de Análisis de Balances Ibéricos* (SABI) database were used to measure the dependent variable and controls. This database

comprises economic and financial data obtained from the balance sheets and income statements of all Spanish and Portuguese companies.

The questionnaires were assessed in three stages. The first stage consisted of the development of the questionnaire based on the literature and review by academic experts in both the supply chain and agri-food sector. The second stage consisted of the modification of the questionnaire to accommodate the academic experts' comments and suggestions. This updated version was pretested in five firms from the sample, and these firms were personally visited to conduct the interviews. The third stage consisted of the design of the final version by drawing on feedback and the remittance of the form to the rest of the firms in the sample.

The survey was managed by a computer-assisted telephone interview system (CATI), which enabled the researchers to improve the quality of the responses (Couper, 2011). The initial population included 251 firms located in southern Spain. Given the focus of this study, the appropriate respondents were horticultural firms involved in the entire production process from production and transformation to distribution. For each firm selected, two key informants (one if the general manager also performs human resource management functions) were identified, who typically held the title of manager, director, operations manager or human resource manager. We asked general or operations managers questions regarding SCI. Human resource managers (or general managers performing HR functions) completed only the HIHRP questionnaire. Thus, we tried to obtain a response for each firm made up of two informants. Of the initial sample of 251 firms, 36 firms were impossible to locate because their contact information was not up to date and 39 firms refused to participate. A total of 101 firms finally completed the two questionnaires and were included in this study. The average number of employees was

145, and the average turnover was EUR 25 million. Table 1 displays the profile of the respondents.

Insert Table 1 about here

To assess potential late response bias, a test was conducted using the extrapolation method suggested by Armstrong and Overton (1977). According to these authors, people responding late can be assumed to be similar to people who do not respond. Thus, the sample was divided into two groups of firms: early and late respondents. Subsequently, demographic characteristics, assets, annual sales, and number of employees of the two groups were compared. Furthermore, five items on the questionnaire were randomly selected and compared. No significant differences (t-test) were found between the early and late responses. Accordingly, nonresponse bias is unlikely to be a significant concern in this study.

Measures

The measuring instrument, i.e., the questionnaires, was developed based on previously validated measures. The literature was surveyed to identify valid measures of related constructs and adapted existing scales. Thus, the variables used in this research were developed according to the following descriptions (see Table 2):

Dependent variables

Productivity is a commonly used measure of firm performance in strategic HR management (Combs *et al.*, 2006; Shin *et al.*, 2017). At the general level, productivity indicates the extent to which a firm's human capital efficiently creates output (Datta *et al.*, 2005; Guthrie, 2001; Shin and Konrad, 2017). Ultimately, productivity indicates the

suitability to ascertain the effectiveness of HR systems. Moreover, the literature has revealed a consistent connection between external integration and some measures of productivity (Delic *et al.*, 2019). Therefore, productivity is a suitable measure for relating human resources to supply chain integration. Productivity is also a measure previously used in SCI studies that can be obtained from secondary sources (Swink and Schoenherr, 2015). Consistent with the literature (Datta *et al.*, 2005; Huselid, 1995; Konrad and Mangel, 2000), productivity was calculated as the logarithm of the gross operating revenue divided by the number of employees. The data were obtained from the SABI economic and financial database.

Independent variables

SCI was measured according to its dimensions, i.e., SI and CI practices (e.g., Flynn *et al.*, 2010; Narasimhan and Kim, 2002). Regarding external integration, this research follows studies that maintained the supplier and customer elements of integration separately to detect their potentially distinct relationships with performance (Narasimhan and Kim, 2002; Shah *et al.*, 2002). Thus, the respondents were asked to rate the extent to which statements regarding information exchange and involvement with both suppliers and customers applied to their firm.

The measure of HIHRP was adapted from Prieto and Perez (2012). According to the authors, this measure comprises the following three domains of HR practices: ability-enhancing practices, motivation-enhancing practices, and opportunity-enhancing practices. Ability-enhancing practices are used to assess careful staffing and continuous and extensive training practices, including teamwork training. Motivation-enhancing practices include the use of incentive-based compensation to commit employees to the company and performance appraisals to enhance employees' performance. Finally,

opportunity-enhancing practices comprise activities linked to the definition of the job, i.e., work design and the use of extensive employee participation and communication.

The independent variables were considered on a 5-point Likert-scale, where 1 indicates strongly disagree, and 5 indicates strongly agree.

Control variables

The following three control variables that may have an impact on the relationship between supply chain integration and performance were considered: size, age and the internationalization level. Both the firm size and age of the firms were considered dichotomous. The internationalization level was considered because of the inherent characteristics of the sector: firms usually obtain significant revenue from international markets. Therefore, the natural logarithm of the total amount of revenue derived from international markets was used.

Insert Table 2 about here

Common method bias

One of the most frequent sources of common method variance is the use of a single survey respondent to obtain information regarding both the independent and dependent variables (Podsakoff *et al.*, 2003). To mitigate this concern, we collected information from different sources using primary (independent variable) and secondary data (dependent variable). Furthermore, we tried to obtain primary information from two different respondents in each firm. In addition, the respondents' average length of experience in their position was 15 years, which is consistent with previous results. This indicates that significant reductions in concerns regarding bias in a survey require the selection of key informants

with a long tenure in their position (e.g., Terziovski, 2010; Homburg *et al.*, 2012; Kull *et al.*, 2018).

We used Harman's single-factor test to estimate the extent of common method bias. The results of an exploratory factor analysis of all primary data showed eight factors with eigenvalues above 1.0, accounting for 91.26% of the total variance. Indeed, the eight factors have eigenvalues above 2.0. The first factor explained only 13.81% of the variance. All these findings suggest that common method bias does not appear to be a serious concern in this study.

Results

Measurement model

The Cronbach's alpha reliability coefficients corresponding to the different scales ranged from 0.734 to 0.927. The composite reliability (CR) values were also calculated and ranged from 0.701 to 0.928 (Table 3). These values surpass the recommended criterion of 0.7, indicating the reliability of all scales (Hair *et al.*, 2010).

A confirmatory factor analysis (CFA) was conducted to assess the convergent and discriminant validity of the measures. The model with 5 factors showed the following fit statistics: $\chi^2=711.79$; $df=447$; $\chi^2/df=1.592$; $RMSEA=0.072$; $CFI=0.904$; $TLI=0.887$; $SRMR=0.059$. These results suggested that the model achieved minimal conditions to constitute an adequate fit (Schermelleh-Engel *et al.*, 2003; Hair *et al.*, 2010). All factor loadings were greater than 0.50, and all of the t-values were greater than 5.0. The average variance explained (AVE) values ranged from 0.501 to 0.632 (Table 3). These results indicated that the constructs exhibited convergent validity.

Insert Table 3 about here

Table 4 shows the descriptive statistics and correlations among the aggregated constructs. The square root of AVE of each construct was higher than its correlations with the other constructs. It provided initial evidence of the discriminant validity of the constructs (Hair *et al.*, 2010).

Insert Table 4 about here

Hypotheses testing

An ordinary least squares (OLS) regression was used to examine the hypotheses. To test the moderating effects (hypotheses 1, 2 and 3), three sets of hierarchical regressions were carried out corresponding to ability-, motivation- and opportunity-enhancing practices. Initially, the control variables, including customer integration (CI), supplier integration (SI), and HIHRP variables, were first entered into the baseline model. As cross-product (interaction) terms might be highly correlated with their constituent parts, the variables used in the interaction terms were mean centered (Aiken and West, 1991) to increase the possibility of interpreting interactions and avoid multicollinearity. In all models, the variance inflation factors ranged from 1.10 to 2.13. These values were well below the generally accepted threshold of 10 (Hair *et al.*, 2010; Wooldridge, 2012).

Previous studies have shown that an ambivalent relationship exists between CI and performance (Boon-it and Wong, 2011; Danese and Romano, 2011). Similarly, other studies have shown that a positive relationship exists between SI and performance (Cousins and Menguc, 2006; Droge *et al.*, 2004; Flynn *et al.*, 2010). Thus, the results of the baseline-model regression were consistent with those reported in the literature. Table 5 indicates that the relationship between CI and productivity is positive but not

statistically significant (baseline model: $\beta=0.0534$, $p>0.10$). However, the relationship between SI and productivity is positive and statistically significant.

Regarding the moderating effects, the first hypothesis states that ability-enhancing practices positively moderate the relationship among CI, SI and productivity. Thus, the results do not support hypothesis 1a ($\beta=-0.0252$, $p>0.10$). However, the results support hypothesis 1b ($\beta=0.1652$, $p<0.01$). Overall, these results partially support hypothesis 1.

The second hypothesis states that motivation-enhancing practices positively moderate the relationship among CI, SI and productivity. Thus, the results do not support hypothesis 2a ($\beta=-0.0131$, $p>0.10$) or hypothesis 2b ($\beta=-0.0753$, $p>0.10$). Despite these negative effects, the increment in R^2 is not statistically significant.

Finally, the third hypothesis states that opportunity-enhancing practices positively moderate the relationship among CI, SI and productivity. The results do not support hypothesis 3a ($\beta=-0.0626$, $p>0.10$). The results support hypothesis 3b, as they are statistically significant ($\beta=0.1207$, $p<0.05$). Accordingly, these results partially support hypothesis 3.

Additionally, to provide more detailed results, a hierarchical regression was carried out using the HIHRP construct as a grouping of the three dimensions. The results support the notion that HIHRP moderates the relationship between SI and productivity ($\beta=0.2081$, $p<0.01$). However, these results do not support the same effect on the relationship between CI and productivity ($\beta=-0.1542$, $p>0.10$).

Insert Table 5 about here

The predicted relationships between external integration and different levels of HIHRP are plotted in Figure 2 (ability-enhancing practices) and Figure 3 (opportunity-enhancing

practices). In a similar way, the predicted relationship between SI and HIHRP as a whole is plotted in Figure 4.

Figure 2 illustrates the much stronger positive relationship between SI and productivity when ability-enhancing practices are high. Similarly, under low levels of ability-enhancing practices, an increase in SI is associated with slightly lower levels of productivity.

Insert Figure 2 about here

Analogously, Figure 3 illustrates that among firms with high levels of opportunity-enhancing practices, SI is associated with a higher impact on productivity.

Insert Figure 3 about here

Figure 4 illustrates that a higher deployment of HIHRP reinforces the effect of SI on productivity.

Insert Figure 4 about here

Our theoretical model (Figure 1) recognizes that HIHRP can be considered antecedents of external integration (see Huo *et al.*, 2015). To check this possibility and the consistency of our results, we estimated different mediation and moderation models using partial least squares (PLS) regressions. In all cases (7 different models), path coefficients corresponding to HIHRP being antecedents of external integration are nonsignificant (Table A1 in Appendix). Additionally, model selection criteria indices (corrected Akaike information criterion and corrected Hannan-Quinn criterion) indicate that models without

paths from HIHRP to SI and CI are the best-fitting models. The PLS results are also congruent with the regression results reported in Table 5.

Discussion and conclusion

The main aim of this study was to examine the role of HIHRP as moderators of the relationship between SCI and performance. Following previous research analyzing how specific HR management practices are related to integration processes and efficiency along the supply chain, this study argued that a set of interrelated HR management practices is a complementary asset to external supply chain integration. Our findings reveal that HIHRP reinforce the effect of supplier integration on firm productivity. However, this is not true in the case of customer integration.

Overall, the results show that both supplier integration and opportunity-enhancing HR practices have a positive influence on firm productivity. Thus, these results partially confirm the evidence provided by previous studies regarding SCI (e.g., Duhaylongsod and De Giovanni, 2019; Kim and Schoenherr, 2018) and strategic HRM (e.g., Carrière, 2014; Jiang *et al.*, 2012) about the direct effect of these variables on firm performance. However, this study did not find evidence of significant effects of customer integration, ability-enhancing HR practices and motivation-enhancing HR practices on firm productivity. From an RBV point of view, SI and some practices of HR management may be considered strategic capabilities.

This study provided some evidence that HIHRP moderate the relationship between supplier integration and productivity. Firms with higher implementation levels of ability-enhancing HR practices and opportunity-enhancing HR practices exhibit an increased positive effect of supplier integration on productivity. However, the results do not show significant moderation effects in the relationships between customer integration and firm

productivity. Thus, these findings indicate that the moderation of HIHRP in the relationship between external integration and productivity is partial. These results do not fully support the proposed theoretical model: only SI and both ability and opportunity HR practices can be considered complementary capabilities.

As previous studies have noted, close relationships and collaboration with all members in the supply chain are not always cost-effective (Lengnick-Hall *et al.*, 2013). Integration and coordination are particularly useful and benefit both individual firms and the entire supply chain (e.g., productivity) when the interdependencies among members are strong. Power imbalances may exist within the supply chain such that downstream parties exert greater power over upstream parties (Daugherty, 2011). For example, in agri-food supply chains, firms may have a more uneven relationship with customers (e.g., large international retailers) than suppliers. Conflicts between producers and large retailers in aspects such as final product prices hinder trust between parties and integration success in the long term. This imbalance in bargaining power and lack of trust indicate that CI does not have a direct impact on productivity and may explain why the development of HIHRP does not enhance the effect of CI on productivity in our sample.

The moderating role of motivation-enhancing practices in the relationship between SI and firm productivity is not supported. One possible explanation may be that, in our sample, motivation-enhancing practices are not focused on assessing or compensating employees based on supply chain integration. Additionally, these practices are less widespread among firms in the sample than other HR practices (see Table 4). Thus, it is possible that the number of companies with high values in the independent and moderating variables is small. Finally, several studies show that the direct impact of motivation practices on operational outcomes (e.g., productivity) is less significant than their association with financial performance indicators (Jiang *et al.*, 2012).

However, HIHRP as a whole may help firms improve the benefits associated with SCI. According to Ellinger *et al.* (2010), having employees with suitable skills is a crucial element for the development of effective relationships with supply chain partners. Trained, empowered, and committed employees allow for a better comprehension and processing of the information used in internal and external processes. The results of this study show that the HR practices better suited to enhancing the positive relationship between supplier integration and productivity are ability-enhancing practices (e.g., selecting the right person for each position and extensive training programs) and opportunity-enhancing practices (e.g., job rotation and flexible work assignments).

Following previous research, this study has analyzed the role of HIHRP as antecedents of external SCI. Contrary to other studies (Huo *et al.*, 2015), the results did not show significant relationships between the different dimensions of HIHRP and SCI. A possible explanation of these results is that the levels of implementation of both SI and CI are relatively high in the agro-business firms in our sample. In this situation, HIHRP do not act as enablers of SCI capabilities, but these practices reinforce the effect of these capabilities (particularly SI) on productivity in the case of firms with high levels of HIHRP development. According to the RBV and the concept of complementary assets, firm capabilities based on SI may improve company competitive advantage when these practices are combined with other HR capabilities, such as employee skills, participation and collaboration.

Theoretical implications

This study makes several contributions to both SCI and HIHRP research. First, by empirically analyzing the moderating role of HIHRP in the relationship between supply chain external integration and firm productivity, this study identifies an important human contingent factor that should be considered in theoretical models analyzing the effects of

SCI on company performance. Firms' internal capabilities, such as HIHRP, may enhance the effect of SCI (or at least one dimension of SCI) on performance. Thus, this study finds a previously "unknown moderating factor" that may explain the variation in performance effects associated with SCI (Mackelprang *et al.*, 2014).

Second, while other studies support that HIHRP are antecedents of SCI implementation (e.g., Huo *et al.*, 2015), this research considers HIHRP a complementary asset to SCI. In doing so, it stresses the important role played by HR management in the successful implementation of SCI strategies, which deserves more research attention (Hohenstein *et al.*, 2014). By disaggregating HIHRP into three dimensions, this study provided interesting evidence suggesting that different HR management practices directly or indirectly (enhancing the effects of other practices) impact firm productivity. Thus, this work extends the application of RBV to explain the connection between SCI and performance, using the concept of complementary assets, and provides evidence that important synergies exist between HR practices and SCI practices. Alternatively, these results may suggest that suppliers' "integration philosophy" should include both operations practices that facilitate the flow of products, services, and information and these HR practices (e.g., ability-enhancing practices and opportunity-enhancing practices).

Finally, this study contributes to the strategic human resource management literature based on RBV, showing that the development of HR management capabilities through the implementation of HIHRP allows companies not only to improve their productivity but also to significantly amplify the effect of other capabilities (e.g., SCI) on productivity (Paauwe, 2016).

Managerial implications

The findings of this study also have some managerial implications and provide useful insight that may allow firms to better manage and coordinate SCI processes and human capital. This study shows how to improve firm productivity through the following three different ways: (a) investing in SCI (particularly supplier integration); (b) developing HIHRP (specifically opportunity-enhancing practices); and (c) coordinating supplier integration and certain HIHRP (ability- and opportunity-enhancing practices). This finding indicates that HR and supply chain managers should develop strategies and actions together to gain a competitive advantage.

Partnership success requires certain attributes, such as trust, commitment, high-quality communication, and information sharing (Mohr and Speakman, 1994), and certain HIHRP, such as participation and work design-enhancing practices that reinforce such attributes. For example, job rotation and flexible work assignment in different work areas could improve communication quality, information sharing and learning. Such HIHRP could effectively reinforce successful relationships with supply chain partners (supplier in our study); however, such HIHRP had no significant effect when the relationship with supply chain partners (customer) had no direct effect on performance. In the same way, staffing and extensive training practices may contribute to the development of organizational learning capabilities along the supply chain. For instance, the implementation of skilled employees' suggestions about integration processes is likely to contribute to lower production costs for both the firm and its partners.

In sum, SCI requires a cultural change to influence firm performance and competitiveness. Research has shown that a successful cultural change in organizations is difficult to achieve, but it is more likely to be successful when HIHRP are used to enable this change (Molineux, 2013).

Although this seems to justify that companies have to invest in the implementation of HR practices and operational practices associated with supply chain management, managers should be aware that the amount of such investments and their destination should be evaluated taking into account the characteristics of the supply chain itself and its position within it. As noted by Lengnick-Hall *et al.* (2013), the implementation of integration practices or even HR practices is not always associated with an improvement in firm performance. Managers should evaluate external factors such as the level of interdependence with backward or downward firms and internal factors such as the possession or possibility of acquiring other complementary resources and capabilities (e.g., absorptive capacity) to decide the level of integration with their suppliers and customers.

For policy makers, our empirical results imply that their initiatives to enhance firms' competitiveness in a supply chain should give priority to higher job quality, interfirm information sharing and collaboration, and relational practices. Programs and incentives promoting these priorities should be linked to actions that include, on the one hand, operational practices such as innovation in supply chain management processes or implementation of collaborative information technologies and, on the other hand, relational HR practices such as extensive training, job enrichment or empowerment. Policies have to take into account that some HR practices may have a positive effect on firms' productivity, but others may have the downside of increasing job dissatisfaction or anxiety (Wood *et al.*, 2012). Thus, operational and HR practices have to be balanced to enhance both productivity- and human capital-related performance measures in the long range.

Limitations and future research

Notwithstanding its contribution, this study has some limitations that should be addressed in future research. First, the sample used in this study was drawn from firms operating in a specific industry and geographical area. This limitation can hinder the possibility of generalizing the results. For example, the nature of the relationship between the firms in our sample and their main customers (with significant power imbalance) may influence the results. Future research may extend this study to a broader population of firms such that the results can be generalized and detect potential effects at different levels depending on the industry context.

Second, this study focused on a specific type of operational performance variable (productivity) that can be drawn from secondary sources. Future studies should consider other dependent variables representing operational performance, such as delivery, flexibility and quality performance.

Third, we did not control for some variables (e.g., innovation or social capital) and some moderators (e.g., top management influence) that may affect the relationship between SCI and firm performance. Future research examining these variables could contribute to the SCI literature and expand the findings of this study. Moreover, modeling the interactive effects of certain variables, such as organizational structure, information technology, and munificence, can provide more insight for the SCI literature.

Finally, causality effects cannot be inferred from this study, as it is based on cross-sectional data. Future studies should use longitudinal data to assess how the relationship among SCI, HIHRP and performance develops over time.

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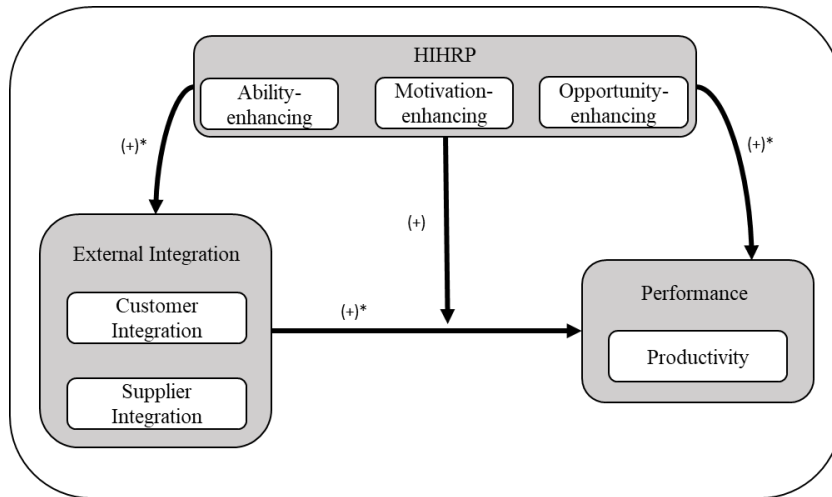
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Figure 1. Research framework



*These positive relationships are supported by previous research and are not hypothesized in this study

Figure 2. Moderating effect of Ability on SI and productivity

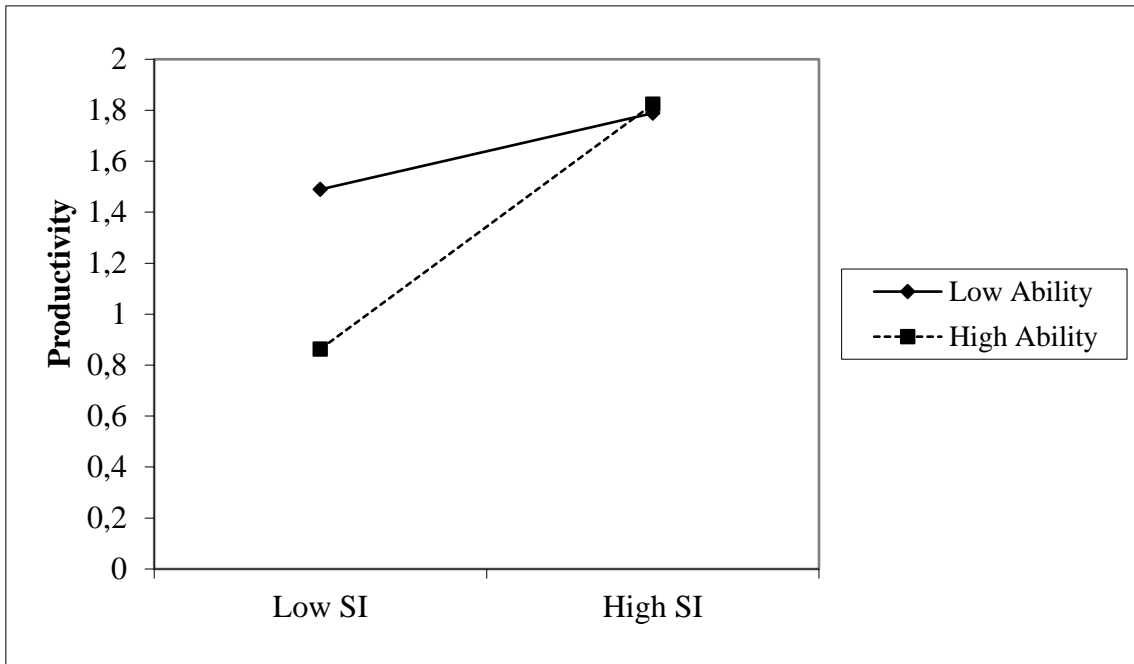


Figure 3. Moderating effect of Opportunity on SI and productivity

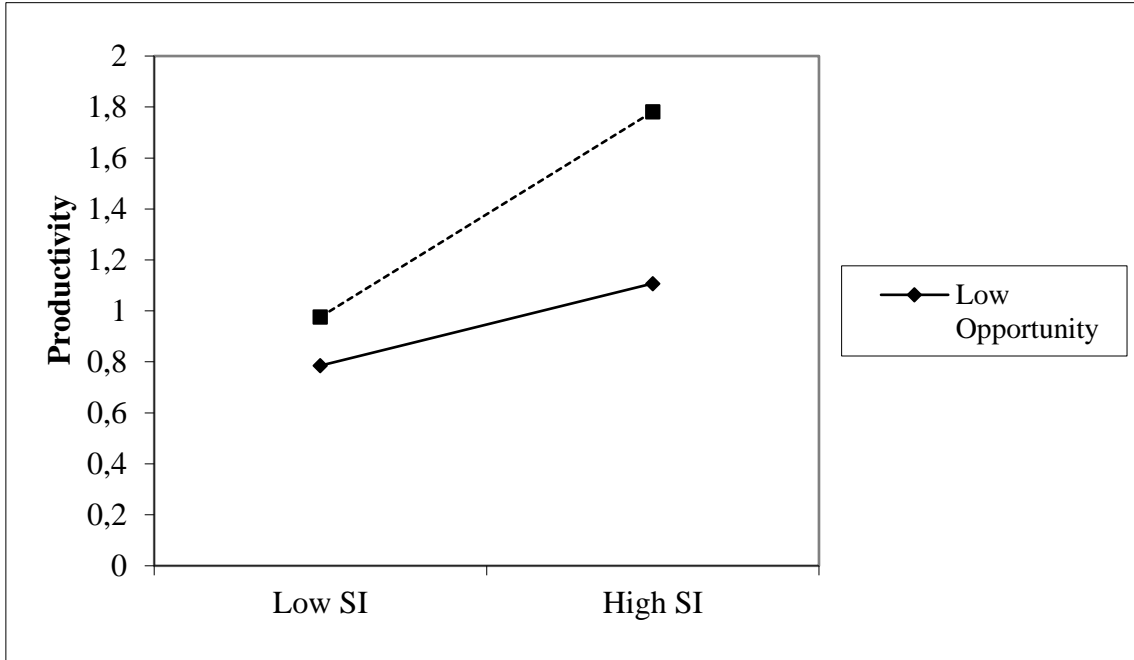


Figure 4. Moderating effect of HIHRP on SI and productivity

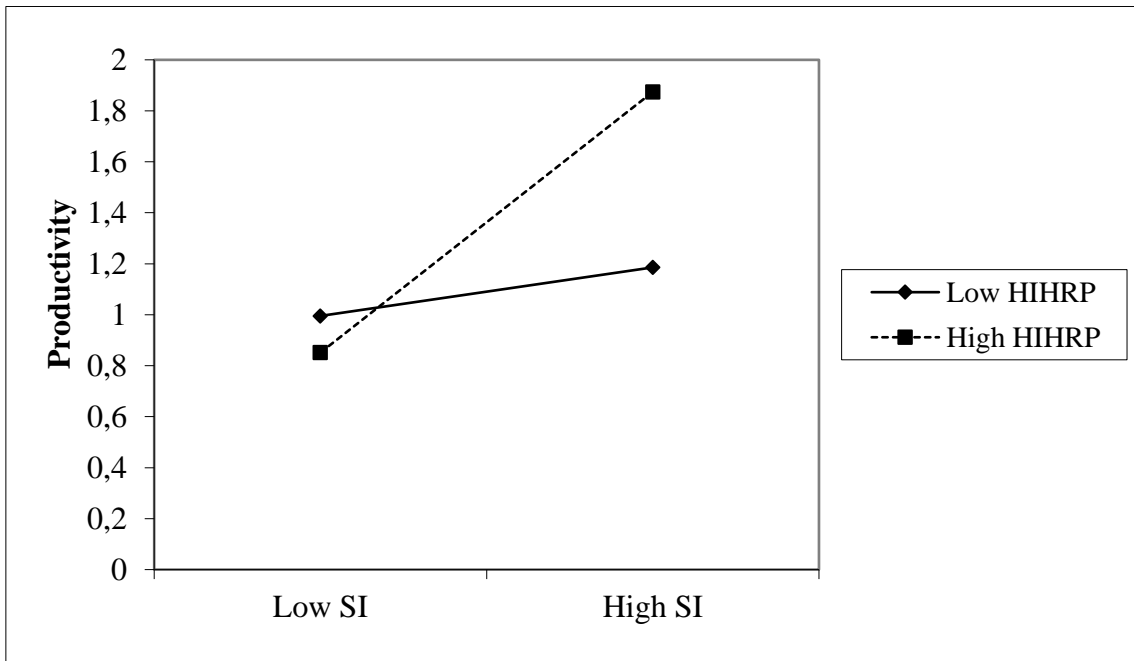


Table 1. Respondents' profile

Size (number of employees)	n=100	%	Sales (EUR Million)	n=100	%
Less than 100	59	59	Less than 10	57	57
100-249	21	21	10-50	36	36
250-500	15	15	51-100	3	3
Over 500	5	5	Over 100	4	4
Respondents' position	n=100	%	Age (years)	n=100	%
CEOs	79	79	Less than 10	10	10
Operation Managers	14	14	10-30	53	53
Other (quality or sales managers)	7	7	Over 30	37	37

Table 2. List of variables

Variable	Source
Productivity	Own elaboration based on SABI data
Supplier integration (SI)	Flynn <i>et al.</i> , 2010; Narasimhan and Kim, 2002
Customer integration (CI)	Flynn <i>et al.</i> , 2010; Narasimhan and Kim, 2002
High-involvement human resources practices (HIHRP)	Prieto and Perez, 2012
Size	Own elaboration based on SABI data
Age	Own elaboration based on SABI data
Export	Own elaboration based on SABI data

Table 3. Confirmatory factor analysis

	Factor Loadings	t-values	Cronbach's α	CR	AVE
Customer Integration			0.734	0.730	0.521
Information networks constantly reinforce the link with our major customers.	0.6766	9.60			
Customer ordering is essentially developed by computerization. ^b	-	-	-	-	-
We carry out exhaustive follow-ups with our major customers.	0.7138	10.46			
We have a high level of periodical contact with our major customers.	0.7441	11.05			
We share reliable information and point of sale information with our major customers.	0.5101	5.10			
Supplier Integration			0.774	0.793	0.511
We maintain long-term relationships with our suppliers.	0.5002	4.99			
We share our production plan with our suppliers.	0.6792	11.18			
We share our demand forecast with our suppliers.	0.8211	17.07			
We help our major suppliers improve their processes to better meet our needs	0.8576	18.76			
Ability			0.927	0.928	0.632
Our company exerts great effort selecting the right person for each position.	0.7361	15.44			
Our company uses extensive procedures in recruitment and selection, including a variety of tests and interviews. ^b	-	-	-	-	-
In recruiting, our company emphasizes the potential of new hires to learn and grow with the company.	0.7608	17.63			
Our company considers its image when recruiting and selecting employees.	0.8288	19.00			

Employees are selected based on their overall fit with the organization.	0.8196	19.67			
Employees normally undergo ongoing training programs. ^b	-	-	-	-	-
The organization provides training focusing on team building and teamwork skills training.	0.8295	21.29			
Managers provide specialized training and development for their employees.	0.7725	18.28			
Managers initiate and provide various types of training and development for their employees.	0.8164	20.31			
Our company has a good mentoring system to support new hires.	0.7893	19.94			
Motivation			0.864	0.701	0.533
Employees in this organization receive monetary rewards based on their individual performance.	0.8770	25.65			
Employees in this organization receive monetary rewards based on their group performance.	0.8604	22.41			
Employees in this organization receive monetary rewards based on the organizational performance.	0.8885	25.96			
Our company's pay system reflects employees' contribution to the company.	0.6367	10.25			
Employees' performance appraisal is based on individual behaviors and attitudes at work.	0.5204	14.23			
Employees' performance appraisal is oriented toward their development and progress at work. ^b	-	-	-	-	-
Employees' performance appraisal emphasizes collective and long-term-based results.	0.6287	15.41			
Employees receive performance feedback on a routine basis.	0.5847	13.22			
Performance appraisals are based on objective quantifiable results	0.5536	12.48			
Opportunity			0.904	0.836	0.501
Our company emphasizes employee job rotations and flexible work assignments in different work areas.	0.8142	23.36			
Our company transfers extensively different tasks and responsibilities to employees.	0.8742	28.81			
Our company emphasizes employee teamwork and network collaboration.	0.8786	30.21			
Employees in this organization have broadly designed jobs requiring a variety of skills.	0.8589	29.41			
Employees in this company are allowed to make decisions.	0.7472	17.17			
Employees are provided the opportunity to suggest improvements in how things are accomplished.	0.5225	7.02			
Employees are invited to participate in a wide range of issues, including performance standards, quality improvement, benefits, etc.	0.5120	6.98			
Employees are invited to participate in problem solving and decisions.	0.5228	7.00			
Employees receive information regarding the relevant concerns of the company (goals, performance, etc.).	0.5010	6.51			
Supervisors keep open communications in this company. ^b	-	-	-	-	-
Model fit statistics: $\chi^2=711.79$; $df=447$; $\chi^2/df=1.592$; $RMSEA=0.072$; $CFI=0.904$; $TLI=0.887$; $SRMR=0.059$					
^b Items dropped after CFA					

Table 4. Descriptive statistics and correlations

	Mean	SD	1	2	3	4	5	6	7	8
1 Product (log)	2.11	0.69								
2 CI	4.29	0.61	0.1189							
3 SI	4.18	1.00	0.3849***	0.3003**						
4 Ability	3.73	0.86	0.1485	-0.1775	0.0659					
5 Motivation	3.05	0.84	0.1362	-0.1470	0.0549	0.3928***				
6 Opportunity	3.65	0.83	0.2721**	-0.1274	0.1201	0.6971***	0.4148***			
7 Export (log)	69.75	33.15	0.0729	-0.3610***	0.1525	0.2576**	0.2707**	0.2361*		
8 Size	n/a	n/a	-0.3612***	-0.2232*	-0.0570	-0.0126	0.1715	0.0370	0.5291***	
9 Age	n/a	n/a	-0.3434***	-0.1825	-0.2478*	-0.1779	-0.0509	-0.1688	0.2022*	0.3210**

***p<0.001, ** p<0.01, * p<0.05

Table 5. Hierarchical regression analysis of productivity

	BASELINE		ABILITY	MOTIVATION	OPPORTUNITY	HIHRP
Export	0.0061**	0.0055*	0.0066**	0.0055*	0.0064**	0.0058*
Size	-0.6421***	-0.6059***	-0.6453***	-0.6284***	-0.6418***	-0.6059***
Age	-0.2391*	-0.2198	-0.2424*	-0.2357	-0.2285	-0.2054
CI	0.0534	0.0716	0.0525	0.0792	0.0834	0.0941
SI	0.2326*	0.2493**	0.3148***	0.2042**	0.2819**	0.3033***
Ability	-0.1344		-0.1479	-0.1351	-0.1161	
Motivation	0.0586		0.0634	0.0548	0.0483	
Opportunity	0.1872*		0.2166**	0.1943*	0.2163**	
HIHRP		0.1069				0.1361*
CIxAbility			-0.0252			
SIxAbility			0.1652**			
CIxMotivation				-0.0131		
SIxMotivation				-0.0753		
CIxOpportunity					-0.0626	
SIxOpportunity					0.1207*	
CIxHIHRP						-0.1542
SIxHIHRP						0.2081**
Constant	2.1196***	2.1422***	2.0648***	2.1535***	2.0737***	2.0921***
Mean VIF	1.61	1.42	1.59	1.55	1.56	1.43
adj_R ²	0.3473	0.3328	0.3967	0.3464	0.3757	0.3690
Increment R ²			0.049**	-0.001	0.028*	0.036*

***p<0.001, ** p<0.01, * p<0.05

Table Anexo 1. Mediation and moderation analysis results

	M1	M2	M3	M1'	M1''	M3'	M3''
Ab -> Productivity	-0.19		-0.16	-0.19	-0.16	-0.23	-0.17
Ab -> CI		-0.26	-0.27			-0.26	-0.26
Ab -> SI		0.05	0.05			0.07	0.05
Mo -> Productivity	0.08		-0.02	0.08	0.07	0.07	0.01
Mo -> CI		-0.11	-0.12			-0.11	-0.12
Mo -> SI		0.01	0.02			0.03	0.02
Op -> Productivity	0.31**		0.34**	0.29**	0.29**	0.30**	0.31**
Op -> CI		-0.02	0.01			-0.01	0.00
Op -> SI		0.03	0.03			-0.02	0.02
CI -> Productivity	0.10	0.08	0.10	0.11	0.09	0.08	0.08
SI -> Productivity	0.23*	0.26*	0.24*	0.29**	0.28**	0.31**	0.29**
Ab * SI				0.16*		0.16*	
Op * SI					0.17*		0.17*
R ² (Productivity)	0.42	0.36	0.42	0.48	0.48	0.47	0.47
R ² (CI)		0.12	0.12			0.11	0.11
R ² (SI)		0.01	0.01			0.01	0.01
AICc	65.51	69.71	66.83	62.13	62.99	64.04	63.89
HQc	-26.07	-25.59	-24.76	-26.84	-25.98	-24.93	-25.08

***p<0.001, ** p<0.01, * p<0.05

Ab: Ability-enhancing practices; Mo: Motivation-enhancing practices; Op: Opportunity-enhancing practices; CI: Customers integration; SI: Suppliers integration