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Abstract

Purpose – The purpose of this paper is to demonstrate that human resource management (HRM) has an impact on supply chain management (SCM), which in turn has a significant impact on customer satisfaction (CS) and organisational performance (OP), playing a mediating role in the relationship between HRM and SCM outcomes (SCMO).

Design/methodology/approach – The model is first validated and the hypotheses formulated are tested using the partial least squares structural equation model (SEM), based on five constructs: HRM, SCM implementation (SCMI), SCMO, customer satisfaction and organisational performance, taken from an existing model tested previously in a different geographical context. To do this, a survey was conducted and 231 valid responses were obtained.

Findings – The empirical results reveal that HRM had significant direct and indirect impacts on SCMO, and SCMI, which in turn played a mediating role in the relationships between HRM and SCMO. CS also played a mediating role in the relationships between SCMO and OP. This finding suggests that the successful implementation of SCM not only directly improves SCMO, but it also indirectly increases CS and OP.

Research limitations/implications – A firm's human resource practices need to be aligned with its SCM to foster the involvement of the members of the supply chain (SC), promote the integration of the SC and, consequently, ensure better business outcomes.

Originality/value – The study provides an original analysis not only in terms of the measurement of the relationship between HRM and SCM, but also with regard to its examination of the mediating effects, thus shedding light on the mechanisms by which these relationships are produced, and how this impacts CS and OP. This has allowed us to obtain more insightful results than those reported in the literature to date.

Keywords Supply chain management, Structural equation modelling, Customer satisfaction, Human resource management, Human resource management in the supply chain, Organisational performance

Paper type Research paper

1. Introduction

Supply chain management (SCM) is the integration of key business processes from suppliers, which provide products, services and information that add value, through to the end user. SCM has, as a result, an essential human dimension that emphasises the

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communication and cooperation that takes place between all parties making up the supply chain (SC). Tracey (2005) concludes that SCM is an integrated business approach based on collaboration, not only across all the functional areas of a firm, but also across all the members in the chain itself. It is this approach based on collaboration that gives SCM its human dimension (Kumar, 2003).

Human resources (HR) and the SC as fields of study have traditionally been treated separately, despite their being "intimately linked" in almost all business environments (Barnes and Liao, 2012). In fact, Taylor and Taylor (2010) propose the importance of human resource management (HRM) related to the area of operations as a new research theme[1].

To ensure the success of their SCM, firms need to commit themselves fully to promoting this human dimension. Many firms focus their attention on improving and investing in technology and in infrastructure, but they need to dedicate the same attention to the people that manage and operate the SC. For Ou *et al.* (2010) an adequate HR system is a key element in the implementation of a SC and, consequently, for greater customer satisfaction (CS) and an improved operational performance.

Indeed, the evidence indicates that SCM research has focussed on the study of the integration of manufacturing and marketing processes, concerning itself above all with the performance measurement of SCM practices, above all with regard to a firm's operational systems, including resource efficiency and cost reduction, and marketing questions, such as customer service. Furthermore, according to the literature (Shub and Stonebraker, 2009; Alfalla-Luque *et al.*, 2014), SCM studies have targeted the structural or hard areas (technology, information or measurement systems, JIT and IT purchasing, among others) at the expense of the so-called non-structural or soft areas (HR, cultural organisation and trust, among others).

In this sense, few empirical studies have measured the causal relationships between HRM, SCM performance and a firm's success (Smith-Doerflein *et al.*, 2011; Vanichchinchai and Igel, 2011; Fu *et al.*, 2013), although there are clear indications that HRM improves the performance of SCM.

Therefore, this paper raises the following research question:

RQ1. What is the effect of HRs on SCM and what impact does this have on CS and organisational performance (OP)?

This paper is structured as follows. First, it undertakes a review of the literature on human resource management in the supply chain (HRSC), establishing the research model and justifying the hypotheses to be tested to respond to the question presented. The methodology is then described and the results obtained from the empirical model are presented and discussed. Finally, we present our conclusions, the implications of our study for academics and practitioners and future lines of research.

2. Literature review

Given the importance of the study of HRSC, and given the scarcity of publications in this combined field (as traditionally these fields, HRM and SCM, have been studied separately), we first conducted an analysis of the state of the art of HRSC to shed light on existing research and to identify the key contributions made to date.

Giunipero *et al.* (2008) analyse trends in SCM research over a ten-year period (1996-2006), by conducting a literature review based on the classification of themes

proposed by the Institute for Supply Chain Management. This paper shows how research has tended to focus on certain themes, while ignoring others – the case of the field of HRM, targeted in just 2 percent of SCM studies.

According to Tracey (2005), the synchronisation of the SC depends on the individuals involved in it since they play a role in the processes and the technology used. Moreover, a competitive advantage is achieved not only through investment in information technology as there are many situations that require the application of human judgment. In this sense, Scarbrough (2000) argues, the SC generates a significant demand in the HRM to obtain the necessary skills and flexibility of behaviour to achieve a better integration.

Due to its complexity, there is no universally accepted definition of HRM. However, most scholars consider it to be a field of study and practice that aims to enhance learning and to facilitate change at the individual, group/team, organisation, and societal levels with the overall objective of improving both performance and effectiveness, and of building capacity and expertise at each of these levels (McLean and McLean, 2001). In general, HRM refers to the various practices, commonly grouped into the subdisciplines of selection, training, appraisal, and rewards, used to manage people in organisations (Wright and McMahan, 1992). According to Ellinger and Ellinger (2014), although the potential contribution of HR systems and employee development approaches to SC performance is under-explored in the literature (Gowen and Tallon, 2003; Smith-Doerflein *et al.*, 2011; Lengnick-Hall and Lengnick-Hall, 2013; Nils-Ole Hohenstein and Hartmann, 2014; Alfalla-Luque *et al.*, 2014), research suggests that HRM interventions in SCM contexts are associated with beneficial outcomes.

Despite this, few studies have analysed the relationship between HRM and SCM performance (Giunipero *et al.*, 2008; Shub and Stonebraker, 2009; Fisher *et al.*, 2010). The evidence shows that SCM research has been oriented to the study of the integration of manufacturing and marketing processes, focussing on the performance measurement of SCM practices, above all with regard to a firm's operational systems, including resource efficiency and cost reduction, and customer service. However, the HRM with the aim of improving SCM practices has not yet been examined formally, although some research suggests that such efforts would improve the performance of SCM (Gowen and Tallon, 2003).

Thus, given that to date no study of the state of the art of HRSC has been undertaken, we previously undertook (Gómez-Cedeño *et al.*, 2013) a bibliometric analysis (1996-2012) with the intention of contributing to the incipient body of research linking HR practices and SCM. All in all, we identified 46 articles examining HRSC, located in just 29 journals across various disciplines (see Figure 1).

A frequency analysis of these articles dedicated to the subject of HRSC allowed us to identify all studies published between 1997 and 2012, indicating that the interest of researchers in this subject emerged only 15 years ago. As for the methodologies used in these publications, the case study is the most frequently used research method (46 percent of the articles) followed by surveys (24 percent), while 30 percent can be classed as theoretical studies. The high percentage use of the case study as the analytical methodology can be attributed to the relative youth of this field of research (although this association needs to be explored in greater depth).

Among the empirical contributions based on surveys we were able to identify the work of Gowen and Tallon (2003), Smith-Doerflein *et al.* (2011). In this sense, the objective of this study is to perform a causal-predictive analysis based on the model developed by Smith-Doerflein *et al.* (2011) and on the results of a survey conducted in

Figure 1.
Number of articles on HRSC published in journals (1996-2012)

a distinct geographical area. As such, our study represents a valuable contribution to the emerging field of the HRSC.

3. Conceptual model and development of hypotheses

As mentioned above, this study seeks to expand the widely referenced model of Smith-Doerflein *et al.* (2011). This model posits a relationship between HR strategies and SCM implementation (SCMI) and SCM outcomes (SCMO), through a path analysis comprising a complete set of variables and equations that test possible causal relationships. In their study, the authors recommend that these relationships be re-examined under a variety of different conditions, including with different types of industry and in different cultural areas of the world.

Thus, we empirically tested the model of Smith-Doerflein *et al.* (2011) for the case of Spanish industrial firms. In addition, we sought to take our analysis one step further by measuring the relationship between HR and the SC. To do this, we conducted a causal-predictive analysis with a structural equation model (SEM), in which HRM has a positive influence on SCMI and on SCM outcomes (SCMO), and in turn on OP, via CS.

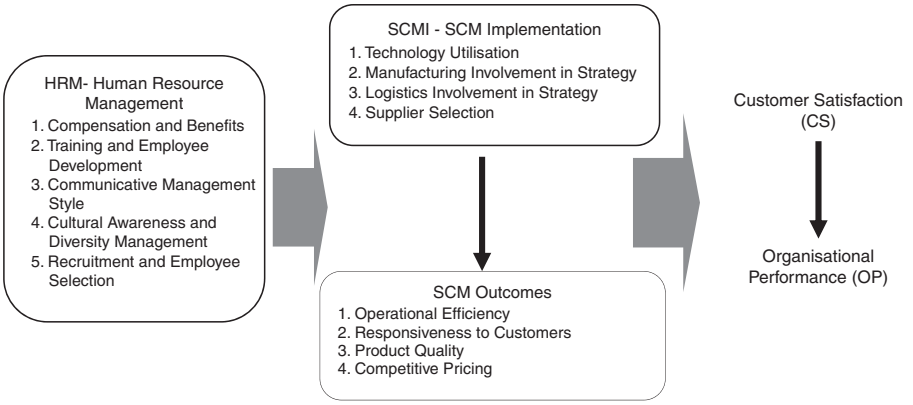
The constructs used are the following.

3.1 HRM

The success of SCM depends on the actions of individuals within the firms that form part of the SC. Some authors propose that HRM plays a key role as a support and as a mechanism for operationalizing responsibilities and relationships within the SC (Lengnick-Hall and Lengnick-Hall, 2013).

In this sense, Menon (2012) identified that specific HRM practices, including flexible job descriptions, team organisation, training in teamwork and the use of performance indicators, are significantly related to the performance of the SC. Based on previous empirical and theoretical studies, in this study we represent HRM practices as a five-dimensional construct (Smith-Doerflein *et al.*, 2011; Fisher *et al.*, 2010) (see Figure 2).

The first four dimensions are variables commonly used to represent the HRM (Smith-Doerflein *et al.*, 2011; Fu *et al.*, 2013): first, compensation and benefits; second,



Source: Smith-Doerflein *et al.* (2011)

Figure 2.
Model, construct and dimensions

training and employee development; third, communicative management style; and fourth recruitment and employee selection. The fifth dimension is that of cultural awareness and diversity management, which is based on what Shub and Stonebraker (2009) categorise as a variable of "cultural homogeneity." The different members of the chain operate in a similar way to sub-cultures that have an influence on a range of factors and which are present in many large firms (Lengnick-Hall and Lengnick-Hall, 2013).

3.2 SCM

The SCM is considered a principal source for improving business performance. According to Carr and Smeltzer (2000), the direct measurement of performance and other outcome variables of the SC is not straightforward, so researchers often have to use indirect measures. Yet, a reading of the literature indicates that there is no consensus on how best to measure SCM (Smith-Doerflein *et al.*, 2011).

In this study, the SCM concept was measured in keeping with Smith-Doerflein *et al.* (2011) (see Figure 2) and so we delimited two related, yet different, aspects: practices for implementing the supply chain (SCMI), and results derived from this implementation (referred to as SCMO).

3.3 CS and OP

It is by no means new to state that the role of individuals is critical for the successful implementation of SCM, ensuring CS (Smith-Doerflein *et al.*, 2011), which in turn contributes to better business performance. All this translates into improved competitiveness, growth of market share and an enhanced financial performance (Ou *et al.*, 2010).

In line with the model proposed by Smith-Doerflein *et al.* (2011) (see Figure 2), we used the constructs of CS and OP.

Based on this model, we determine that the elements of measurement are composed of five constructs, three of which are of second order (multidimensional): HRM, SCMI and SCMO, and two of first order: CS and OP.

Control variable. For this study we used firm size as our control variable, measured by number of employees. In line with most studies, we opted to employ the European Union's standard classification (2006), according to which a small business is considered to have fewer than 50 workers, a medium-sized business has between 50 and 250, and a large firm has more than 250. Some authors (e.g. Singh *et al.*, 2012) consider that the impact of this should be taken into consideration because it is a good control variable.

Hypotheses formulated. The interactive role of employees in activities of management, support and training help overcome barriers to the successful implementation of SCM practices. Organisations that have effective SCs are largely those that provide continuous training for employees (Smith-Doerflein *et al.* 2011). Menon (2012) also states that a commitment to learning and knowledge management can help improve SCM processes.

A good HR policy is one that treats the employee as a long-term investment. Seen this way, emphasis should be placed on the development of high performance skills, training, ongoing performance feedback and compensation above the market average (Menon, 2012). Likewise, a participative management style, which emphasises both formal and informal communication (Smith-Doerflein *et al.*, 2011 and Zsidisin *et al.*, 2005) should have an impact on the implementation of the SC.

Iles *et al.*, 1990 conclude that organisations must ensure that recruitment and selection are consistent with company practices. In this regard importance should be attached to developing a good recruitment process for selecting workers involved in

SCM, given the specific nature of the profile of competences required, including flexibility and the adaptability to change that these jobs require. SCM should ensure that a firm's members are willing and able to interact effectively with people of many different styles. Therefore, based on the literature, the five dimensions of HRM have an impact on the implementation of the SC.

Tracey and Smith-Doerflein (2001) considers that the synchronisation of the SC depends on the people involved, since they play a role in the processes and the technology used. According to Manheim (1999), information technology is the key to unlocking opportunities for competitive advantage in the SC, but it is vital that there is proper integration between technology and people.

In addition, there is a need to guarantee the implementation of the components of technology, comprehensive procedures for selecting suppliers, and participatory processes of manufacturing strategy (McAfee *et al.*, 2002). Furthermore, Smith-Doerflein *et al.* (2011) believe that achieving this requires HRM practices that can guarantee the skills and behaviours needed for SCM.

Furthermore, Pagell and LePine (2002) consider that senior executives together must support the work structures to encourage the creation of value, including participatory approaches to the formulation of logistic and manufacturing strategies.

Consequently, the HRM has an impact on the four dimensions of the implementation of the SC (Smith-Doerflein *et al.*, 2011). Vanichchinchai and Igel (2011) found that participation and HRM are important for the implementation of the SC. Similarly, Smith-Doerflein *et al.* (2011) found that HRM has a significant positive direct effect on the implementation of the SC. Therefore, the following hypothesis is proposed:

H1. HRM has a direct positive effect on SCMI.

According to Shub and Stonebraker (2009), employee engagement, work motivation, adaptability, shared norms, empowerment and leadership (McAfee *et al.*, 2002; Othman and Ghani, 2008; Scarbrough, 2000; Shub and Stonebraker, 2009) can contribute to the success of the SC.

Smith-Doerflein *et al.* (2011) emphasised that people undertake activities and adopt behaviours for which they are rewarded and motivated because they receive fair compensation and benefits. They are also willing to cooperate with all the firm's employees as well as with suppliers, customers and other external parties; to engage in the processes and products that help the firm's SC to achieve higher levels of operational efficiency, responsiveness to customers, product quality and competitive pricing (Chen and Paulraj, 2004; Pagell, 2004).

Successful SCM programs require an understanding on the part of the employees of the philosophy and principles behind SCM (Ou *et al.*, 2010). Furthermore, Vanichchinchai and Igel (2011) found that the effective participation of individual workers is important for improving the performance of the SC.

The selection of competent employees favours an effective SC, through the recruitment and retention of capable workers who are adaptable to dynamic and customer-oriented environments (Dischinger *et al.*, 2006).

Gowen and Tallon (2003) considers training as being statistically relevant for successful SCM. Similarly, McCarter *et al.* (2005) consider that education and training about the SC provide employees with a vision and understanding of SCM and how to produce profits.

According to McCarter *et al.* (2005) the compatibility of cultures should be taken into account because it can directly and indirectly affect SC performance.

Delaney and Huselid (1996) identified a positive association between HRM practices and performance measures. Furthermore, Smith-Doerflein *et al.* (2011) found that HRM is significantly related to SC outcomes irrespective of the level of implementation of the SC. Therefore, the following hypothesis is proposed:

H2. HRM has a direct effect on SCMO.

The success of SC processes and their management depend on the behaviour of people within organisations (Lengnick-Hall and Lengnick-Hall, 2013). Recent trends in SC research emphasise that the potential benefits of collaboration between the members of the SC (Smith *et al.*, 1995).

The importance of HRM for guaranteeing the necessary skills and for maximising employee performance and achieving a successful SC has been recognised in the literature (Hunter *et al.*, 1996; Sandelands, 1994; Scarbrough, 2000).

Hamister (2012) states that improvements in operational performance are dependent on the level of implementation of the SC. It has also been shown that SCM practices improve performance at a range of levels (Li *et al.*, 2006). Thus, Smith-Doerflein *et al.* (2011) identified a significant indirect influence of HRM on SCMO according to their level of implementation. Based on the above, the following hypothesis is suggested:

H3. SCMI mediates the relationship between HRM and SCMO.

There is preliminary support for the indirect effects of HRM on CS and the firm's results via the SCMO. Smith-Doerflein *et al.* (2011) consider that improvements in operational efficiency (responsiveness to customers, product quality and competitive pricing) lead to higher levels of CS and business performance.

The strategic vision of SCM requires that internal business processes are designed to support and contribute to CS, which is reflected in the measures of a firm's performance (Tan, 2001).

Some authors consider there to be a relationship between CS and OP (Heskett *et al.*, 1994 and Smith-Doerflein *et al.*, 2011). Thus, they believe that in recent years satisfied customers represent a significant proportion of sales and this has generated a growth in company profits.

Furthermore, Ou *et al.* (2010) suggest that the successful implementation of SCM improves operational performance, indirectly increasing CS and financial performance. In this way, an enhanced financial performance is also attributable to better customer value thanks to increased CS. Therefore, they conclude that a successful SCM is expected to improve the relationship between suppliers and end customers, thereby increasing CS and business performance.

Thus, we can formulate the following hypotheses:

H4. SCMO mediate the relationship between HRM and CS.

H5. SCMO have a positive effect on OP via CS.

HR systems that foster collaborative relationships of the SC foster higher levels of profit and competitiveness (Lengnick-Hall and Lengnick-Hall, 2013), as they contribute

to increase the SC's capacity of resilience and strength. In addition, they allow for greater competitiveness in terms of speed, quality and flexibility (Niezen *et al.*, 2007).

Based on this, we propose the following hypothesis:

H6. SCMO mediate the relationship between HRM and OP.

Figure 3 is a diagrammatic representation of the above hypotheses. *H1* and *H2* establish relationships of "direct effect," while *H3*, *H4*, *H5* and *H6* capture the "the effect of mediation" (direct+indirect), to use the terminology proposed by Bollen (1989). As described above, firm size is used as the control variable.

4. Methodology

4.1 Research design

To test the hypotheses proposed in this paper we adopted the model developed by Smith-Doerflein *et al.* (2011). As these authors recommended, their analysis needs to be replicated in different circumstances (with different types of industry and in different geographical areas of the world). Thus, the study we conduct here is applied to the case of Spain's industrial firms.

As part of the adaptation process, the questionnaire was first translated into Spanish. We then proceeded to conduct the pre-test and structured interviews with a panel of experts, consultants and academics of HRM and SCM (logistics, operations, information systems, marketing, etc.), who validated the questionnaire (see Table AI).

To measure the constructs we designed an electronic survey, the responses to which were measured on a five-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree) with the N/A (not applicable, do not know) choice also available. For the statistical treatment of these results we used the partial least squares (PLS) method.

4.2 Data collection

The population of interest for this study comprised senior executives with responsibility for SCM practices and HRs in Spain's industrial firms. As such, they can be considered to have a good understanding of the variables of interest. The study was undertaken with 800 firms, all members of the *Institut Català de Logística* (ICIL) Foundation, and representing a range of different industrial sectors: food, automobiles, logistics operators, textiles, logistics equipment, pharmaceuticals, chemicals, logistics consulting, special transportation and metallurgy. The ICIL Foundation has been the Spanish leader in logistics research, training, information, and business applications

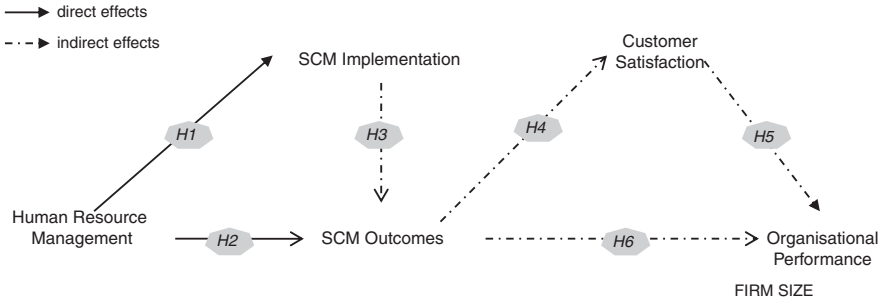


Figure 3.
Diagrammatic representation of the hypotheses proposed

since 1980. It is a national reference point in applied logistics providing specialised solutions to the business world.

We obtained 271 responses (giving a response rate of 34 percent) and a final total of 231 valid questionnaires. The questionnaires were sent out between April and November 2013 followed up by three reminders. This sample size is adequate given the model's conditions. First, it satisfies the so-called "rule of thumb," according to which the sample size should be at least ten times greater than the number of predictors (Barclay *et al.*, 1995). In this study, the number of predictors is the largest number of structural paths directed at a particular dependent latent variable. Since OP and SCMO receive three paths the minimum size required is 30 cases. Second, since this rule has been frequently criticised, we followed Chin and Newsted's (1999) suggestion of specifying the effect size for each regression analysis and consulted the power tables provided by Cohen (1988) and Green (1991). In keeping with this suggestion, the sample size requirement for this model is 76 for a medium size effect (Roldán and Sánchez-Franco, 2012). Third, following Reinartz *et al.* (2009), 100 observations can be considered sufficient for achieving acceptable levels of statistical power. Consequently, considering our model's characteristics, we believe that our sample size is adequate for PLS estimations. Indeed, some studies have found that PLS produces more accurate path coefficient estimates when sample sizes are below 500 (Hulland *et al.*, 2010).

Of the respondents, 16 percent were senior company managers (presidents, CEOs or managers), 42 percent were directors of functional areas (such as logistics or HRs), while the rest occupied intermediate positions (mostly related to logistics). By size, 28 percent of companies in the sample had fewer than 100 employees, 36 percent between 100 and 500 workers and 36 percent had more than 500 employees.

4.3 Common method bias assessment

Drawing on only one respondent from each organisation may give rise to bias related to common method variance. To test the potential existence of this bias, procedural and statistical methods were applied (Podsakoff *et al.*, 2003, 2012). In the case of the former, confidentiality and anonymity were guaranteed as the respondents were managers with positions of maximum responsibility. This reduced the possibility that individuals responded artificially or dishonestly (Podsakoff *et al.*, 2003, 2012). Besides, the design of the survey sought to ensure that the respondents could not establish cause-effect links between the dependent and independent variables. In the case of the statistical procedures, all the constructs originally included in the questionnaire were subjected to exploratory factor analysis with SPSS 18.0. This revealed the existence of 14 distinct factors with a maximum variance explained by one single factor of 19 percent, suggesting that the variables did not load on one general factor accumulating most of the variance. The Harman test was also performed by means of confirmatory factor analysis with EQS. This test showed that the goodness of fit for a measurement model in which all the variables loaded on a single factor was substantially lower than the goodness of fit for a model in which every item loaded on its corresponding latent variable. We conclude, therefore, that common method bias does not seem to represent a major problem in this study.

4.4 Empirical analysis

The analytical method used to empirically test the hypotheses proposed is the structural equation modelling technique using PLS (Ringle *et al.*, 2005). This methodology has

become particularly relevant in multivariate analyses and its use has been extended to the field of SCM (Gimenez *et al.*, 2005).

PLS is the most suitable technique for this study because it is a tool that seeks to undertake a causal-predictive analysis (Fornell *et al.*, 1990) in situations of high complexity and with little theoretical knowledge. This is the case of research in the field of HRs and the SC. In addition, PLS is suitable for data analysis during the initial stages of development of a theory, where theoretical models and variables measurement have yet to be consolidated (García *et al.*, 2010). Additionally, in comparison with traditional covariance-based structural equation modelling, PLS is especially useful in studies in which the number of observations is below 250 (Reinartz *et al.*, 2009). In addition, PLS is particularly suitable as it provides opportunities for the study of mediating effects (Chin, 1998). Since this study reported requires the estimation of interaction effects based on mediation, the method can be deemed especially suitable.

For these reasons, in this specific study, we believe that PLS is the most suitable method to assess the proposed model.

PLS methodology is developed in two steps (Hair *et al.*, 1998): first, the validation of the scales and the verification of the measurement model and second, the assessment of the structural model that describes the relationships between the different latent variables. Thus, in the case of this study, the first step involved the assessment of the reliability and validity of the first- and second-order constructs. To treat the multidimensional constructs (second-order) in the model, the hierarchical component model procedure was used (Chin, 2001). In the second step, the model's structural paths were assessed by implementing a bootstrap resampling technique with 5,000 subsamples.

As regards to the analysis of the mediating effects, this is undertaken when an independent variable, X, has an impact on a third variable, Z, which then influences the dependent variable, Y. Some authors identify "bootstrapping" resampling as the best method for testing these indirect effects. Based on the recommendations of Preacher and Hayes (2008), we applied a bootstrapping method that specifically used the method of percentiles as in the work of Chin (2001). A confidence interval for the mediating effect is calculated using a bootstrapping process for 5,000 subsamples with a margin of confidence of 95 and 99 percent. In the absence of a formal guideline on how to use PLS to test the mediating effect, we used Baron and Kenny's (1986) proposal with path coefficients estimated by PLS and the following three conditions: first, the independent variable affects the mediator, second, the mediating variable affects the dependent variable, and third, that the total effect of the dependent variable on the independent variable is significant.

5. Analysis and results

5.1 Evaluation of the measurement model: first-order model

To check the internal consistency, we first analysed the items' factor loadings on their respective latent variable. Some authors, including Carmines and Zeller (1979), recommend a factor loading value equal to or higher than 0.707 for an item to be accepted as an indicator of a construct. However, other authors, including Roldán and Sánchez-Franco (2012), consider that this general rule should not be so rigid in the early stages of scale development (Chin, 1998) or when the scales are applied in contexts that have not previously been analysed (Barclay *et al.*, 1995), which is the case of our study.

Since the theoretical model in this study contains multidimensional (second-order) constructs, we measured the individual reliability of each of the items of the first-order model. All item loadings were higher than 0.70, with eight exceptions (pq3 = 0.614

rc1 = 0.326, cp1 = 0.656, cp2 = 0.698, c&b1 = 0.697, c&b4 = 0.659, r&s1 = 0.640 and tu4 = 0.630) which were removed from the model (Table AII). Once these items were discarded, we assessed the first-order constructs' reliability (see Table I) by calculating the composite reliability (CR), the average variance extracted (AVE) and Cronbach's α (Chin, 1998). Fornell and Larcker (1981) proposed 0.8 as a threshold for CR, 0.7 for Cronbach's α and 0.5 for AVE. Therefore, the measurement demonstrates that the first-order model is internally consistent and reliable (Table I).

Discriminant validity (Barclay *et al.*, 1995) assesses the extent to which the measures of a construct differ from those other constructs included in the same model. To evaluate discriminant validity, we first examined the items' cross loadings (Table AIII). This analysis showed that each item's loading was substantially higher in the construct to which it had been assigned than in the other model constructs. A more rigorous method for assessing discriminant validity consists in verifying that the square root of the AVE for each individual construct is greater than the correlation between such construct and any other construct (Fornell and Larcker, 1981). Table II lists the squared correlations between constructs and the AVE values on the diagonal. All of the diagonal values exceed the squared interconstruct correlations; hence, the test for discriminant validity is acceptable.

5.2 Evaluation of the measurement model: second-order model

The second-order model was built using non-standardized latent variable scores after deleting measurement items and dependency, which are not significant in the outer loading test of the first-order model. The reliability and validity of the second-order model can be measured as above for the first-order model.

Table IV presents the factor loadings of all constructs. All indicators have loadings higher than 0.70 except for three dimensions (C&D; MIS; CP). In this regard, some authors (Roldán and Sánchez-Franco, 2012; Chin, 1998) consider that this empirical rule should not be so strict in exploratory scales or when applied in different contexts, so that factorial loadings equal to 0.5 or 0.6 can be considered acceptable. Here, Roldán and Sánchez-Franco (2012) note that the weak indicators can sometimes be retained as long as their contribution to the content validity is justified. However, all authors agree that the variables presenting very low loadings (i.e. $\leqslant 0.4$) have to be eliminated. Moreover, as they are second-order constructs we retain dimensions with loadings below 0.7, because it is assumed that the first-order constructs will not have such a strong relationship with them. On the other hand, the factor loadings of these items is not detrimental to the CR of the construct, or the extracted variance, or the discriminant validity of the construct, as discussed below, so we decided to retain them to preserve the content validity. Therefore, we conclude that the second-order measurement model is internally consistent and reliable.

Furthermore, this study calculates the CR, AVE and Cronbach's α (Chin, 1998). Table III presents the values of CR, AVE and Cronbach's α, showing that all the variables exceed the threshold of 0.8 for CR and 0.5 for AVE.

The discriminant validity for the second-order model was tested in the same manner as for the first-order model, where the AVE for each individual construct is greater than the squared correlation between constructs. Table IV shows that all of the diagonal values exceed the squared inter-construct correlations. Therefore, we conclude that the second-order measurement scales have sufficient construct validity.

5.3 Estimation of the structural model

After validating the measurement model, we tested the hypotheses by estimating the structural model. First, we evaluated the predictive value of the endogenous constructs

Table I.
Evaluation of the first-order measurement model (after to remove items)

Gestión de Recursos Humanos (HRM)							Implementación de la Cadena de Suministro (SCMI)							Resultados de la Cadena de Suministro (SCMO)						
Constructo	Item	Loading	Valor (t)	CR	AVE	Cronbach's α	Constructo	Item	Loading	Valor (t)	CR	AVE	Cronbach's α	Constructo	Item	Loading	Valor (t)	CR	AVE	Cronbach's α
C&D	c&d1	0.882	48.86	1	0.82	0.93	TU	tu1	0.862	4.05	0.9	0.65	0.89	OE	oe1	0.839	27.21	0.9	0.73	0.87
	c&d2	0.917	36.42					tu2	0.846	35.38					oe2	0.874	35.95			
	c&d3	0.925	50.86					tu3	0.872	44.46					oe3	0.862	25.71			
	c&d4	0.89	29.33					tu5	0.702	12.16					oe4	0.831	2.63			
CMS	cms1	0.898	63.25	1	0.82	0.93		tu6	0.791	22.52				CP	cp3	0.891	46.47	0.9	0.78	0.72
	cms2	0.912	64.79					tu7	0.732	16.68					cp4	0.877	19.21			
	cms3	0.902	7.14				MIS	mis1	0.971	164.43	1	0.95	0.97	RC	rc2	0.884	24.26	1	0.79	0.93
	cms4	0.902	47.72					mis2	0.984	301.83					rc3	0.885	24.95			
T&D	t&d1	0.889	53.92	0.9	0.76	0.85		mis3	0.964	10.06					rc4	0.908	3.56			
	t&d2	0.895	46.86				LIS	lis1	0.913	51.52	0.9	0.75	0.83		rc5	0.886	24.98			
	t&d3	0.836	31.1					lis2	0.916	69.01					rc6	0.871	17.29			
C&B	c&b2	0.741	16.32	0.9	0.66	0.87		lis3	0.76	13.42				PQ	pq1	0.897	33.96	0.9	0.78	0.91
	c&b3	0.823	20.31				SS	ss1	0.942	57.6	1	0.86	0.92		pq2	0.89	32.43			
	c&b5	0.892	52.05					ss2	0.951	8.96					pq4	0.846	24.88			
	c&b6	0.83	37.7					ss3	0.884	28.99					pq5	0.893	3.88			
	c&b7	0.776	20.63																	
R&S	r&s2	0.81	25.94	0.9	0.73	0.81														
	r&s3	0.885	49.5																	
	r&s4	0.865	40.89																	

Table II.
Discriminant validity of the first-order model

	C&D	PQ	RC	OP	CMS	OE	T&D	CP	MIS	LIS	C&B	R&S	SC	SS	TU
C&D	0.816														
PQ	0.04	0.778													
RC	0.022	0.166	0.786												
OP	0.068	0.083	0.054	0.703											
CMS	0.155	0.175	0.124	0.154	0.816										
OE	0.021	0.109	0.098	0.11	0.106	0.726									
T&D	0.145	0.145	0.133	0.106	0.449	0.093	0.763								
CP	0.015	0.152	0.052	0.071	0.084	0.226	0.053	0.782							
MIS	0.001	0.026	0.034	0.045	0.075	0.219	0.042	0.199	0.976						
LIS	0.031	0.59	0.213	0.061	0.238	0.062	0.163	0.114	0.083	0.901					
C&B	0.183	0.185	0.17	0.145	0.408	0.092	0.42	0.071	0.035	0.263	0.715				
R&S	0.142	0.134	0.121	0.11	0.413	0.064	0.485	0.095	0.059	0.182	0.399	0.729			
SC	0.032	0.163	0.214	0.252	0.24	0.11	0.193	0.065	0.06	0.116	0.171	0.172	0.692		
SS	0.075	0.148	0.184	0.025	0.152	0.036	0.141	0.097	0.022	0.156	0.172	0.204	0.126	0.953	
TU	0.087	0.169	0.315	0.097	0.224	0.123	0.194	0.152	0.053	0.376	0.227	0.168	0.155	0.144	0.842

Notes: Figures in the diagonal present the AVE values. Off-diagonal figures represent the constructs' squared correlations

Construct	Variable	Loading	*t*-value	CR	AVE	Cronbach's α
Human resource management (HRM)	C&B	0.862	29.26	0.90	0.65	0.86
	T&D	0.861	45.20			
	CMS	0.855	46.26			
	C&D	0.559	9.07			
	R&S	0.852	41.98			
SCM implementation (SCMI)	TU	0.843	38.82	0.82	0.55	0.71
	MIS	0.504	6.65			
	LIS	0.832	30.53			
	SS	0.732	18.95			
SCM outcomes (SCMO)	OE	0.717	13.93	0.81	0.52	0.69
	RC	0.721	15.84			
	PQ	0.740	16.41			
	CP	0.697	12.63			
Customer satisfaction (CS)	cs1	0.754	12.41	0.92	0.69	0.78
	cs2	0.889	27.51			
	cs3	0.848	23.87			
Organisational performance (OP)	op1	0.829	28.63	0.87	0.7	0.9
	op2	0.848	39.28			
	op3	0.844	26.68			
	op4	0.811	24.69			
	op5	0.860	40.80			
Firm size	No. employees	1	0	1	1	1

Table III.
Evaluation of the second-order measurement model

	CS	HRM	OP	SCMI	SCMO
CS	*0.692*				
HRM	0.251	*0.651*			
OP	0.253	0.178	*0.703*		
SCMI	0.218	0.396	0.107	*0.548*	
SCMO	0.266	0.290	0.149	0.476	*0.516*

Notes: Figures in the diagonal present the AVE values. Off-diagonal figures represent the constructs' squared correlations

Table IV.
Discriminant validity of the second-order model

using the R^2 value. This index varies between 0 and 1 and the closer it is to 1 the greater the explained variance of the variable analysed. Although there is no consensus on the minimum level that this index should reach, Falk and Miller (1992) recommend a minimum value of 0.1, which ensures that at least 10 percent of the construct variability is due to the model. The R^2 values of the endogenous constructs used greatly exceed this recommended minimum value, so that SCMI has an R^2 of 0.41, SCMO of 0.49, CS of 0.27 and OP of 0.28. As such, the model has an adequate predictive power. To evaluate the predictive relevance of the model, we used the Stone-Geisser test where if $Q^2 = 1-(\text{SSE}/\text{SSO}) > 0$ the model is considered to have predictive validity with regard to these dependent variables. In this sense, the Q^2 value of this test for the dependent variables was positive (SCMI = 0.21, SCMO = 0.21, CS = 0.17 and OP = 0.17). Thus, we assume that the dependent variables can be predicted by the independent variables.

Additionally, we calculated the goodness of fit proposed by Tenenhaus *et al.* (2005). This index emerges from the comparison of PLS technique and other structural equation methods. No quality thresholds for this index varies between 0 and 1, although it is recommended that they be greater than 0.31. The model analysed showed a value of 0.46, which can be considered a high value according to Cohen (1988).

The direct effects. To test the first hypothesis, we assessed the direct effect of HRM on SCMI with the control variable "firm size." The results, which can be seen in Table V, show that HRM has a significant direct influence on SCMI, as shown by the value of the *t* statistic of 12.428 ($p = 0.001$). This allows us to corroborate hypothesis 1 (*H1*: $\beta = 0.621$, $p < 0.001$). The control variable introduced was significant ($\beta = 1.07$, $p < 0.05$), indicating that the larger the firm, the higher the level of implementation of the SC. Based on these results, we can consider that the HRM promotes the use of technology and the better selection of suppliers and favours the greater involvement of managers in logistical and manufacturing strategies.

If employee selection and recruitment are conducted in accordance with the skills needed for the implementation of the SC, while training and development programmes seek to promote continuous learning, then this should result in a better use of the technology and, in turn, ensure workers adapt easily to the complex situations that arise in the SC. Similarly, a communicative management style, cultural awareness and diversity management should foster a good working environment, a motivated work force and a ready flow of information that promotes the greater involvement of managers in the logistics strategy and a closer relationship with suppliers.

The second hypothesis refers to a direct effect of HRM on the efficiency of the SC (SCMO). Here, Table V shows that HRM has a significant influence on SCMO, since the *t* statistic is equal to 2.245 ($p = 0.05$). This value allows us to corroborate *H2* (*H2*: $\beta = 0.168$, $p < 0.05$). Therefore, the dimensions of HRM (compensation and benefits, training and employee development, communicative management style, cultural awareness and diversity management and recruitment and employee selection) have a significant direct impact on SCMO. The control variable ("firm size") was not significant in this case ($\beta = -0.010$ n/s).

The development and implementation of HRM allow firms to be more effective and efficient in providing their services or products and, thus, in enhancing their overall performance. Greater efficiency allows a firm to obtain better outcomes with fewer (or better employed) resources, which in turn allows it to obtain a higher quality product, better responsiveness to customers and more competitive pricing. HR practices help firms to improve their collaboration with and integration of their employees, which ensures greater involvement in the provision of services or solutions to customers.

The mediating effects. *H3*, *H4*, *H5* and *H6* represent indirect, mediating or total effects. Table VI shows the results of the analysis. In those instances in which the zero

Table V.
Results of the measurement model. Direct effects

Hypothesis	Coefficient	*t*-value
H1: HRM→SCMI	0.621	12.428****
H2: HRM→SCMO	0.168	2.245**

Notes: *t*-value in parentheses. Statistical significance levels: ****$p < 0.001$, ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table VI.
95 and 99 percent confidence intervals for the significance of the indirect effects

Hypothesis	Indirect effect	β	95% confidence interval		99% confidence interval		Results
H3	HRM-SCMI-SCMO	0.365	0.27101181	0.480546784	0.245045401	0.480546784	Significant 95 and 99%
H4	HRM-SCMO-CS	0.086	0.008707129	0.184422176	−0.018137496	0.216213856	Significant 95%
H5	SCMO-CS-OP	0.213	0.13472108	0.312503138	0.109827179	0.345444584	Significant 95 and 99%
H6	HRM-SCMO-OP	0.028	−0.000856254	0.086474515	−0.006252736	0.110900753	Non significant

value lies within the confidence intervals, we can conclude that the mediating effect is significant.

In the case of *H3*, the results show (see Table VI) that HRM has an indirect effect on SCMO via SCMI (HRM-SCMI-SCMO) ($\beta = 0.583$). This allows us to corroborate *H3*, which indicates that HR practices have an indirect effect on operational efficiency, responsiveness to customers, product quality and competitive pricing via SCMI. The effect of HRM is greater via SCMI than it is directly (that is, HRM-SCMO), which suggests that HRM facilitates SCMI and ensures better SCMO.

The results for *H4* confirm the indirect effect of HRM on CS via SCMO (HRM-SCMO-CS) ($\beta = 0.086$), which might suggest that a company concerned with implementing an adequate HR policy will obtain better SCMO and that this will ensure higher levels of CS.

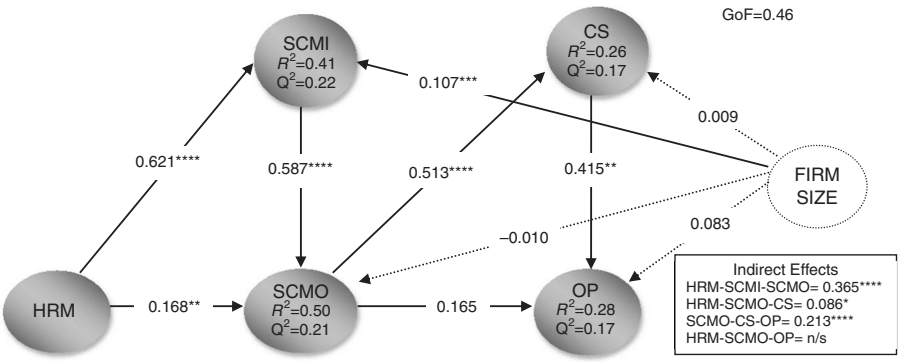
In the case of *H5*, that SCMO has an indirect effect on the OP via CS (SCMO-CS-OP) was estimated and confirmed, as $\beta = 0.213$. This means that the level of SCMO ensures higher levels of CS and that this will impact the OP.

Finally, our results reject *H6* (HRM- SCMO-OP) (n/a). However, the testing of *H4* (HRM-SCMO-CS) and *H5* (SCMO-CS-OP) suggests that HRM promotes greater CS via the SCMO, and this ensures good OP.

Figure 4 provides a summary of the final model estimated including both direct and indirect effects.

6. Practical implications

The information obtained from the various analyses and comparisons reported here, and the academic contributions derived from the results of this study, have certain implications for professionals and academics alike.



Hypothesis	*Outcomes of the hypothesis*
H1: HRM → SCMI	Accepted
H2: HRM → SCMO	Accepted
H3: HRM → SCMI → SCMO	Accepted
H4: HRM → SCMO → CS	Accepted
H5: SCMO → CS → OP	Accepted
H6: HRM → SCMO → OP	Rejected

Figure 4.
Results of the structural model

Notes: The dashed lines indicate statistically non-significant relationships and the continuous lines indicate those that are statistically significant. ****, ***, **, *Statistically significant at $p < 0.001$, $p < 0.01$, $p < 0.05$, and $p < 0.1$ levels, respectively

In the professional arena, this study provides HR managers with evidence of the benefits of SCM. For example, companies need to be sure they include adaptations of the HR strategy oriented toward the SC. This is best seen from two perspectives: first, from that of the intra-firm, with a particular emphasis on the development of human capital within the company, as this is essential for achieving a competitive advantage and ensuring the success of the SC; and second, from that of the inter-firm, with the emphasis on the promotion of activities between the firms that make up the chain. The latter points to the need to adopt HRM strategies and practices that recognise the importance of the relationship between the chain's members.

For Fisher *et al.* (2010), HR practices can be used to leverage human capital in all inter-firm endeavours. However, these authors also point out that, at the level of research as well as that of business, such practices have been developed almost exclusively within individual firms.

Thus, the results of this study suggest that certain HR practices should be adopted at the inter-firm level to promote cooperative behaviour and the exchange of knowledge, since this would ensure a more efficient functioning of the SC. This suggestion is consistent with a number of existing studies, including Fisher *et al.* (2010) and Koulikoff-Souviron and Harrison (2008). In this regard, it would appear crucial that the partners in the SC collaborate to develop and coordinate HR systems for the SC as a whole.

7. Conclusions

This study has sought to provide a better understanding of the impact of HRM on the success of the SC. In this sense, the main objective of this paper has been to analyse the effect of HR practices on the SC and, in turn, how this impacts CS and OP. Given the little research published to date in this regard, the study can be considered as providing new insights into the field.

The SEM used here is based on one employed previously in another context, so that this study represents a step forward in relation to this earlier statistical approach. Our study can be considered an original analysis of the interactions between HRM and SCM, insofar as it contributes to the study of mediating effects, providing us with a better understanding of the mechanisms via which these relationships are produced. This has allowed us to obtain more insightful results than those reported in the literature to date, while presenting firms with options with regard to how they might best manage these relationships and, so, benefit from their effects. In other words, we have sought to demonstrate how the management of HRs impacts on the SC and more specifically the factors it affects in the chain, so firms might determine the best direction for their HR strategies.

This study provides empirical evidence for academics and professionals alike with regard to the importance of HRM in the SC, findings that are in line with those of Smith-Doerflein *et al.* (2011) and Alfalla-Luque *et al.* (2014). As demonstrated by the tests conducted on the hypotheses formulated in this paper, the orientation of HR practices toward the successful undertaking of SC activities ensures greater CS and an enhanced OP, which enables us to formulate a response to the research question raised at the beginning of this paper.

All too often the functional areas of a firm focus solely on achieving their internal goals and do not concern themselves with the promotion of interaction and integration between areas, unless the company's management has a specific commitment to a culture of collaboration (Gómez-Cedeño *et al.*, 2013). Thus, given the complex web of relationships in

a SC, the role played by individuals and their integration within the organisation are critical. Based on the results of this paper, we recommend that HR practices in firms be aligned with the SCM, as this will facilitate the involvement of the members of that SC, promote the integration of the chain and, consequently, ensure better business outcomes.

According to Smith-Doerflein *et al.* (2011), the robustness of the model should be re-examined under various conditions, including, for example, with different types of industry and in different cultural areas of the world. In this sense, one of the contributions of this study is the application of the Smith-Doerflein *et al.* (2011) model to a new geographical context (the Spanish case), thereby providing additional results to those obtained from studies conducted in the USA. However, although in this respect it can be considered a novel contribution, it might also be seen as a limitation, given that the unit of analysis is the Spanish firm, and the results cannot be generalised. Yet, this same model can be applied in other countries in future lines of research, which would provide this under-researched field with new contributions.

In this sense, much work remains to be done to determine in greater detail individual and combined HR practices, so that they might be more suitably managed to guarantee the efficiency of the SC. As such, a possible new line of research would involve the disaggregation of the variables making up the model's constructs in this paper, with the aim of determining which specific HRM practices impact the success of SCM. An additional line might usefully reconsider sample sizes, since recent developments suggest calculating sample size requirements via the pre-analysis of causal path estimations (Kock, 2014).

These results reveal that HRM not only has indirect effects on SCMO, but also a direct impact via SCMI. Likewise, they show that CS plays a mediating role in the relationship between SCMO and OP. This finding suggests that the successful implementation of SCM not only improves the results of the SC directly, but it also indirectly increases CS and OP. Furthermore, the successful implementation of SCM is the product of a HR policy that is closely aligned with SCM objectives.

Despite this, it is typical that firms implement HR programmes that are only aligned at the firm level, and that they do not do so from the broader perspective provided by the SC. Consequently, the results of this study suggest that HR practices should also be directed toward the management of the SC, as this will facilitate the greater involvement of all the chain's members, the greater integration of the SC and, ultimately, better outcomes.

Note

1. They provide a list of research themes and methods in the 310 articles published in the *International Journal of Operations and Production Management* between 2004 and 2009.

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Appendix

Construct	Items	Indicator
Human resource management (hrm)		
Cultural Awareness and Diversity Management (C&D)	c&d1	Our organisation is prepared to deal with cultural diversity in our workforce
	c&d2	Our employees interact effectively with individuals from different cultural backgrounds
	c&d3	Our employees understand the values and beliefs of different cultural backgrounds
	c&d4	Our employees understand and respect the values and beliefs of different cultural backgrounds
Communicative management style (CMS)	cms1	Our managers' communications with employees are effective and timely
	cms2	Managers give feedback and evaluate performance in a manner that positively encourages improvement
	cms3	Our organisation shares information effectively within the company/division
	cms4	Managers provide feedback on job performance promptly
Training and employee development (T&D)	t&d1	Our organisation has regularly scheduled training based on job responsibilities
	t&d2	The training provided is based on employees' needs
	t&d3	Information used in training is readily available
Compensation and benefits (C&B)	c&b1	Our organisation offers competitive wages and benefits within our industry
	c&b2	Our organisation fairly administer wages and benefits
	c&b3	Our employees are satisfied with the completeness of our benefits programs
	c&b5	Our organisation offers high quality benefit packages to our employees
	c&b6	Pay and promotions are administered fairly and objectively
	c&b7	Wage rates are tied to achieved personal and company goals
Recruitment and employee selection (R&S)	r&s1	The input of HR managers is an integral part of the organisation's strategy formation process
	r&s2	HR is seen primarily as a source of value for the firm (vs. a cost to be minimised)
	r&s3	Our organisation's recruitment and selection strategy is highly integrated with our company's overall strategy
	r&s4	Our organisation selects and evaluates applicants effectively
Supply chain management implementation (scmi)		
Technology utilisation (TU)	tu1	Our organisation incorporates the latest information system technologies into inventory management
	tu2	The information used to manage logistics activity is readily available to employees

(*continued*)

Table AI. Description of the variables analysed

Construct	Items	Indicator
	tu3	Our organisation incorporates the latest information system technologies into logistics management
	tu4	Our organisation has incorporated real-time process control into our production systems
	tu5	Our organisation takes advantage of computer-enhanced technology to manage transportation
	tu6	Our information technology has provided cost and productivity savings
	tu7	Our information technology enables effective complex data analysis to meet our needs
Manufacturing involvement in strategy (MIS)	mis1	The input of manufacturing plant managers is an integral part of the strategy formulation process
	mis2	Manufacturing plant managers are involved in strategic decisions that affect company/divisional growth
	mis3	Manufacturing plant managers have a good understanding as to how company/divisional strategy is formed
Logistics involvement in strategy (LIS)	lis1	Our logistics strategy is highly integrated with our company's overall strategy
	lis2	Logisticians are involved in strategic decisions that affect company/divisional growth
	lis3	Our logistics function provides meaningful information regarding the competitive environment
Supplier selection (SS)	ss1	Our organisation selects and evaluates suppliers based on product quality
	ss2	Our organisation selects and evaluates suppliers based on product performance
	ss3	Our organisation selects and evaluates suppliers based on delivery reliability
Supply chain management outcomes (scmo)		
Operational efficiency (OE)	oe1	Our organisation meets production schedules
	oe2	Our organisation has effective and accurate production scheduling to meet customers' needs
	oe3	Our organisation has a flexible design process that allows us to adapt our products to satisfy customer demand
	oe4	Our organisation runs a production programme that allows us to develop new products to satisfy customer demand
Competitive pricing (CP)	cp1	Our organisation offers competitive pricing
	cp2	Our organisation is able to compete based on our prices
	cp3	Innovation in the manufacturing process allows our organisation's production costs to be reduced
	cp4	Product innovation allows our organisation to offer competitive pricing
Responsiveness to customers (RC)	rc1	The invoices we issue are usually accurate
	rc2	Our customers are pleased with our frequency of delivery

Table AI. (*continued*)

Construct	Items	Indicator
	rc3	Our customers are satisfied with our level of completeness for routine shipments
	rc4	Orders submitted to us are delivered on-time, as defined by the customer
	rc5	Products shipped meet or exceed customer expectations
	rc6	Customers are satisfied with the quality of delivered products
Product quality (PQ)	pq1	Our products are highly reliable
	pq2	Our organisation offers high quality products to our customers
	pq3	Our products are very durable
	pq4	Our organisation incorporates quality into everything we do
	pq5	Customers are satisfied with our product quality
Customer satisfaction (CS)		
Customer satisfaction (CS)	cs1	Customers view us as business partners
	cs2	Customers are satisfied with our firm
	cs3	Our organisation is rated high in customer satisfaction surveys
Organisational performance (OP)		
Organisational performance (OP)	op1	Our growth in sales is satisfactory
	op2	Our return on assets is acceptable
	op3	Our market share gain is acceptable
	op4	Our organisation is satisfied with our overall competitive position
	op5	Stakeholders are satisfied with our firm's performance

Source: Adapted from Smith-Doerflein *et al.* (2011)

Table AI.

Table AII.
Evaluation of the first-order measurement model (before to remove items)

	Gestión de Recursos Humanos (HRM)						Implementación de la Cadena de Suministro (SCMI)							Resultados de la Cadena de Suministro (SCMO)						
Constructo	Item	Loading	Valor (*t*)	CR	AVE	Cronbach's	Constructo	Item	Loading	Valor (*t*)	CR	AVE	Cronbach's	Constructo	Item	Loading	Valor (*t*)	CR	AVE	Cronbach's
C&D	c&d1	0.882	47.76	0.95	0.82	0.93	TU	tu1	0.862	41.11	0.91	0.6	0.89	OE	oe1	0.839	27.21	0.91	0.73	0.87
	c&d2	0.917	35.36					tu2	0.846	35.23					oe2	0.874	35.95			
	c&d3	0.925	51.45					tu3	0.872	42.93					oe3	0.862	25.71			
	c&d4	0.89	3.2					tu4	0.63	1.17					oe4	0.831	2.63			
CMS	cms1	0.898	63.25	0.95	0.82	0.93		tu5	0.702	11.60				CP	cp1	0.656	11.88	0.83	0.55	0.73
	cms2	0.912	64.79					tu6	0.791	21.95					cp2	0.698	11.29			
	cms3	0.902	7.14					tu7	0.732	15.59					cp3	0.891	16.44			
	cms4	0.902	47.72				MIS	mis1	0.971	164.43	0.98	0.95	0.97		cp4	0.877	22.30			
T&D	t&d1	0.889	53.92	0.91	0.76	0.85		mis2	0.984	301.83				RC	rc1	0.326	3.70	0.95	0.66	0.88
	t&d2	0.895	46.86					mis3	0.964	10.06					rc2	0.884	27.04			
	t&d3	0.836	31.1				LIS	lis1	0.913	51.52	0.9	0.75	0.83		rc3	0.885	25.59			
C&B	c&b1	0.697	17.87	0.91	0.58	0.88		lis2	0.916	69.01					rc4	0.908	29.60			
	c&b2	0.741	16.60					lis3	0.76	13.42					rc5	0.886	25.58			
	c&b3	0.823	22.31				SS	ss1	0.942	57.6	0.95	0.86	0.92		rc6	0.871	18.86			
	c&b4	0.659	12.98					ss2	0.951	8.96				PQ	pq1	0.897	33.96	0.92	0.69	0.89
	c&b5	0.892	42.24					ss3	0.884	28.99					pq2	0.89	32.43			
	c&b6	0.83	3.73												pq4	0.846	24.88			
	c&b7	0.776	17.20												pq5	0.893	3.88			
R&S	r&s1	0.640	1.232	0.87	0.62	0.8														
	r&s2	0.810	23.634																	
	r&s3	0.885	38.338																	
	r&s4	0.865	41.75																	

	HRM	SCMI	SCMO	CS	OP	Firm size
C&B	0.862	0.587	0.504	0.425	0.377	0.115
C&D	0.559	0.292	0.215	0.177	0.261	0.126
CMS	0.855	0.567	0.483	0.489	0.393	0.079
R&S	0.852	0.537	0.444	0.414	0.332	0.001
T&D	0.860	0.491	0.449	0.440	0.326	0.042
TU	0.547	0.843	0.619	0.400	0.335	0.098
LIS	0.508	0.832	0.487	0.364	0.258	0.153
MIS	0.253	0.505	0.442	0.251	0.228	0.078
SS	0.504	0.731	0.486	0.347	0.138	0.139
CP	0.305	0.518	0.696	0.252	0.260	0.031
OE	0.342	0.426	0.717	0.331	0.330	0.079
PQ	0.460	0.409	0.736	0.403	0.288	0.059
RC	0.422	0.611	0.721	0.463	0.234	0.102
cs1	0.344	0.366	0.345	0.753	0.362	−0.016
cs2	0.481	0.418	0.492	0.889	0.468	0.118
cs3	0.412	0.381	0.432	0.848	0.417	0.027
op1	0.324	0.176	0.262	0.382	0.829	0.073
op2	0.395	0.343	0.394	0.471	0.848	0.073
op3	0.297	0.254	0.280	0.352	0.843	0.117
op4	0.297	0.219	0.276	0.404	0.811	0.055
op5	0.427	0.342	0.367	0.473	0.860	0.079
Firm size	0.083	0.159	0.097	0.059	0.094	1.000

Table AIII.
Cross loading of the first-order model

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