Journal of Knowledge Management

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Abstract

Purpose – *Based on the knowledge-based theories of the MNC, this research aims to develop and test a holistic model to analyse the relationship between the strategic knowledge management (SKM) processes undertaken by subsidiaries and MNC performance. Additionally, it focuses on determining the impact that the relational context can have on knowledge creation and transfer inside the internal network of an MNC.*

Design/methodology/approach – *The research hypotheses are tested by partial least squares (PLS) with data from a sample of Spanish subsidiaries of foreign multinational firms belonging to high-technology and knowledge-intensive sectors.*

Findings – *The results confirm that: the implementation of a SKM by a subsidiary positively impacts on knowledge creation; the knowledge created by a subsidiary positively influences knowledge transfer, increasing the knowledge existing in the MNC; the knowledge transfer across all MNC units has a positive impact on MNC performance; the subsidiary's relational context arises as a mediating variable between the knowledge created by a subsidiary and its transfer to the rest of the MNC.*

Originality/value – *The research proposes a holistic model that contemplates the joint interaction of the variables knowledge creation, knowledge transfer and performance. In addition, the proposed model contemplates the variable SMK of the subsidiary as the beginning of the knowledge creation-knowledge transfer-performance process. Finally, the mediating role of the relational context in the relationship between knowledge creation and transfer is analysed.*

Keywords *Knowledge creation, Knowledge transfer, Strategic knowledge management, Subsidiary, MNC performance, Relational context*

Paper type *Research paper*

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Introduction

The importance given to knowledge since the 1990s can hardly be denied, as shown by the fact that it arises as a key source of sustainable income and wealth creation (Spender, 1996; Grant, 1996). The knowledge-based view assumes that knowledge creation and transfer are of paramount importance when facing market mechanisms (Kogut and Zander, 1993; Conner and Prahalad, 1996). Knowledge originates from unique experiences and organisational learning. Resulting from the interaction between individuals and organisations, it is a dynamic concept specific to its context, which configures knowledge as a strategic resource. Some authors argue that, of all the resources that a firm can hold, knowledge has the greatest potential to become a source of sustainable competitive advantage (Griffith *et al.*, 2012; Filipescu *et al.*, 2013; Fletcher *et al.*, 2013; Crespo *et al.*, 2014; Ferreira *et al.*, 2015).

Almeida *et al.* (2002), Kogut and Zander (1993) and Zander and Kogut (1995) state that firms are social communities which behave as efficient knowledge creation and transfer

Received 26 July 2017
Revised 23 October 2017
Accepted 24 November 2017

mechanisms in both products and services, thus undertaking knowledge combinations which markets cannot assume. Firms which can recognise the role of knowledge and to develop the mechanisms needed for its creation, transfer and implementation are, therefore, likely to become innovative, entrepreneurial (Carayannis and Campbell, 2009; Ferreira *et al.*, 2016) and able to generate products and services with a higher added value for customers.

Despite the importance of knowledge, the increasing globalisation has caused a growing number of corporations to cross their national borders, and at times, to establish subsidiaries in other countries. In this sense, the multinational corporation (MNC), which has the ownership of scattered resources in a variety of countries as its main characteristic, appears as a diversified-knowledge corporation owning intellectual resources that must be broadened and exploited for the purpose of obtaining sustainable competitive advantages. Sharing the view of Crespo *et al.* (2014, p. 994), our conceptualisation of an MNC describes it as a corporation "formed by multiple knowledge units, where each subsidiary serves as a key knowledge node capable of acquiring, converting, and transferring knowledge throughout the MNC".

Competitive advantages in the multinational environment result from a process involving every corporation unit. This justifies the change occurred in the literature on multinationals, which had traditionally focused on the parent firm as its unit of analysis and as the source of competitive advantages, which were later implemented in subsidiaries. The emphasis has shifted towards the latter in recent years, as subsidiaries often have internal capabilities and knowledge which become the source of competitive advantages and innovations not only for the subsidiary itself but also for the whole multinational (Ghoshal and Bartlett, 1990; Birkinshaw, 1996; Ambos *et al.*, 2006; Tippmann *et al.*, 2012; Colakoglu *et al.*, 2014). A trend consequently exists towards the integration of added-value-generating activities which are scattered worldwide (Porter, 1986; Prahalad and Doz, 1987).

Subsidiaries are in a unique position that allows them to acquire and combine knowledge coming either from the internal network (parent firm and subsidiaries) or from the external host local environment (Ferraris *et al.*, 2017). Knowledge creation in subsidiaries along with its transfer to other MNC units helps to generate value-creation opportunities for MNCs (Asakawa and Lehrer, 2003; Meyer *et al.*, 2011). However, even though these topics have already been studied in the literature, some gaps continue to exist. For example, Colakoglu *et al.* (2014) consider that relatively little research emphasis has been placed on how the knowledge-creation capabilities of subsidiaries can be enhanced, and particularly on whether subsidiaries would benefit from intra-MNC knowledge flows in knowledge creation at a local level. Authors such as Kotabe *et al.* (2007) or Crespo *et al.* (2014) point out that the research about the measurement of knowledge and its value for firm performance still remains evasive. Monteiro *et al.* (2008) claim that only a few studies in the knowledge transfer literature actually measure performance. Along the same line of reasoning, Williams (2007) highlights that, despite scholars' widespread assumption according to which knowledge transfer constitutes a key source of competitive advantages, the hypothesised link between knowledge transfer and performance has rarely been tested.

Based on the knowledge-based theories of the MNC and seeking to fill the gaps which still exist in the literature, the present paper develops and tests a holistic model to analyse the relationship between the strategic knowledge management (SKM) processes undertaken by subsidiaries and MNC performance. More specifically, its aim consists in assessing the extent to which an SKM process influences knowledge creation by a subsidiary, its subsequent transfer to the rest of the MNC (subsidiary or parent firm) and the way in which such transfer can affect that MNC's performance. Our interest additionally focuses on determining the impact that relational context can have on knowledge creation and transfer processes inside an MNC's internal network.

Two main research questions are posed from this perspective:

RQ1. Does the process through which knowledge is created in a subsidiary and transferred to other MNC units influence the performance of the MNC as a whole?

RQ2. Is the process through which knowledge arises within a subsidiary and later reaches other MNC units influenced by an SKM process and mediated by relational context?

Several contributions are made with this paper. From a theoretical point of view, our study firstly tries to add to the currently prevailing research stream which links knowledge and MNCs showing that the competences created in subsidiaries and their transfer to other units contribute to the competitive advantages obtained by the whole MNC. Moreover, unlike previous studies, we consider not only technological knowledge but also that related to production and marketing areas. Secondly, even though knowledge management has been widely treated in the literature, our work introduces and measures the *SKM* variable – seldom used in the extant literature. Thirdly, the present paper provides the incorporation of a model to examine relational context – very important because it mediates the link between knowledge creation and transfer processes. In managerial terms, this research sheds light on the relevance of undertaking an SKM process, which allows us not only to know the value of the knowledge coming from the top managers but also to create the infrastructure required to make the most of this resource. The results obtained can help the headquarters management to recognise the value of subsidiaries, not only when it comes to leveraging the whole corporation's competitive advantages and creating an adequate environment for knowledge creation and transfer, but also in terms of fostering a relational context through high degrees of subsidiary leadership and frequent communications between all MNC units.

Literature review

Strategic knowledge management and knowledge creation

Because knowledge is of great importance to firms, knowledge management (KM) becomes a fundamental task and one of the main challenges of our time. Wiig (1997) and Shariq (1997) claim that the overall purpose sought with KM is to maximise the firm's efficiency and income from its knowledge assets, and to constantly renew them.

According to Bater (1999) and Snyman and Kruger (2004, p. 5), "firms need to ensure that their knowledge strategy and knowledge programme is consistent with corporate ambitions, and that techniques, technologies, resources, roles, skills, culture, etc. are not only aligned with the business objectives but also support them. When such alignment between KM strategy and business strategy is clearly established, the KM system moves in a direction that holds promise for long-lasting competitive advantage". The idea that KM can constitute a potential source of competitive advantage has gained strength during the past few years, and particularly so in multinationals, because the fact that their resources are distributed across several countries provides a perfect scenario to implement KM processes. In fact, Ferraris *et al*. (2017) point out that KM processes may help subsidiaries in efficiently using the internal knowledge so that external knowledge can be leveraged and exploited by creating value, and in turn, improving innovative performance.

Nevertheless, as pointed out by Snyman and Kruger (2004), the absence of a generic model incorporating knowledge strategy formulation within the business strategy formulation process makes managers continue to see KM as being separate from business strategy formulation. It leads to an inability to align KM goals with corporate ones. In these authors' opinion, an SKM plan should contain a set of longer-range goals where the movement towards knowledge vision and knowledge architecture is documented, together with the most important associated initiatives which must be undertaken to achieve such goals.

In accordance with the previous ideas and following Dayan *et al.* (2017), for whom KM acts as a necessary factor for the formulation and implementation of an organisation strategy, it seems to us that an SKM process should include a knowledge vision and diagnosis, together with the formulation of knowledge strategies and the infrastructure required to support their implementation.

Vision and diagnosis. Von Krogh *et al.* (2000) stress the need to instil a *vision of knowledge* that requires emphasising knowledge creation as an activity, which should form part of the senior management's agenda, and given their support, to build an appropriate context for the creation and transfer of knowledge flows between subsidiaries. It also becomes essential to perform a *knowledge diagnosis* to reveal the strengths and weaknesses of the knowledge available to each one of the MNC units located in different regions.

Formulation. Strategic diagnosis must be followed by the formulation of a knowledge strategy which, according to Zack (1999), describes the global approach adopted by an organisation to align its knowledge resources and capabilities with the intellectual requirements linked to its strategy. Knowledge strategies are integrated into knowledge creation and knowledge transfer, both of them particularly necessary in the context of an MNC, to which must be added that the knowledge creation and transfer intensity will most probably be influenced by the specific international competitive strategy chosen by the corporation.

Implementation. Once the knowledge strategy has been formulated, a compelling need will arise to provide the company with mechanisms that allow for its efficient application. In this respect, it is worth highlighting that:

- *Corporate culture* is defined by Schein (1999, p. 29) as "a pattern of shared basic assumptions learned by a group through its experience." To put a KM programme into practice, an MNC must have a corporate culture based on the principles of continuous learning, fluid communications and the appreciation of errors as a means of improvement. It must be configured as a catalyst for knowledge generation and transfer, promoting the values of confidence, interaction and dialogue amongst corporation members.
- *Human resource practices* must definitely be taken into account in KM, as individuals are the ones who have the required knowledge, and it is their time in the company that permits the creation of an organisation's memory. Soliman and Spooner (2000) consider it essential to facilitate staff meetings to build trust between and to create an effective learning environment. This implies the recruitment, selection and hiring of workers who have leadership skills and are resourceful, ready and willing to take on new challenges and share their knowledge. The role played by managers is also quite important, because a change must be made from supervision and control to delegation and learning. In this regard, the parent company's management needs to make the most of the firm spirit that remains latent in the operations of its subsidiaries, instead of stifling it; it must also show a more open attitude towards new ideas coming from the organisation's periphery (Birkinshaw and Fry, 1998).
- According to Foss and Pedersen (2002), the problem with *organisational design* lies in choosing organisational instruments related to control, motivation and context in such a way that subsidiaries can not only access but also produce knowledge, that communication exists between those who need knowledge and those who own it, and that relevant knowledge from the subsidiary is available to any other multinational units in need of it. How a firm is organised determines the degree to which knowledge circulates internally and externally, it being advisable to adopt horizontal structures, as opposed to bureaucratic ones, so that maximum knowledge transfer and creation will be achieved (Lei and Slocum, 1992; Kanter, 1994).

- A *technological platform* which facilitates and accelerates the flow of information and communication between units is needed too. Information and communication technologies (ICTs) make this task easier, insofar as activities can be undertaken and knowledge transfer is possible without the need for a physical space dedicated to this task.

Based on the works of Alegre *et al.* (2011) and Villar *et al.* (2014), practices related to vision, diagnosis and implementation of knowledge could be divided into knowledge dissemination practices (KDP) and knowledge storage practices (KSP). HDP deals with knowledge application and distribution inside the firm, while KSP supports the knowledge retrieval and storage process. Adapting the ideas of these authors to our aims, KDP would include knowledge vision, human resources practices and organisational culture. As for KSP, they would comprise knowledge diagnosis, organisational structure and ICTs.

SKM processes support knowledge creation, transfer and implementation within organisations (Alavi and Leidner, 2001), their main goal being a simultaneous improvement of productivity and competitiveness. Therefore, the establishment of SKM processes by subsidiaries is expected to impact positively on their knowledge creation, which leads us to propose the following hypothesis:

H1. SKM processes have a positive impact on knowledge creation in subsidiaries.

Knowledge creation, knowledge transfer and relational context

The dynamism and complexity that characterise their business environment force firms not only to develop new capabilities that move away from the current ones but also to translate them into new processes, products and services (Tidd, 2006). The creation of relevant knowledge is one of the main dynamic capabilities available to firms when it comes to developing new assets that can allow them to remain competitive in the long term (Teece *et al.*, 1997; Eisenhardt and Martin, 2000; Wang and Ahmed, 2007).

Knowledge-creation strategies are designed to create new knowledge or to acquire existing knowledge (internally or externally), and also to leverage the existing intellectual resources. Knowledge creation entails both individual and shared reflection on new work processes and also on the products and services developed by a firm. Thus, when faced with unstable or uncertain environments, and seeking to maintain their competitive advantage over time, firms in general, and more specifically multinationals, must progressively acquire and develop new knowledge and capabilities; this will allow them to better understand and adapt to the ever-changing market conditions.

Because new knowledge creation in multinationals may take place either in the parent firm or in any of the subsidiaries, one of the main advantages that MNCs have is their ability to access local knowledge in multiple locations. Furthermore, because of the diversity between countries, each subsidiary must create relatively unique knowledge with the aim of exploiting the market opportunities provided by each local environment. It is what Cantwell and Mudambi (2005), together with Blomkvist *et al.* (2010), refer to as *competence-creating subsidiaries*. Ha and Giroud (2015, p. 607) point out that these subsidiaries "generate new competences (new capabilities and resources) to achieve sustainable competitive advantage across the entire MNC. New competences often have a technological nature, but they may cover a broader spectrum from market competences to supply ones". In keeping with these ideas, and drawing also on the contributions made by Andersson *et al.* (2005) and Colakoglu *et al.* (2014), subsidiary knowledge creation will focus on the generation of capabilities for innovation and development in three functional areas – R&D, production and marketing – for the purposes of this paper.

Subsidiary knowledge creation *per se* does not improve the results of an MNC, though. Frost and Zhou (2005) recognise that the knowledge created needs to be shared with other

MNC units. Knowledge transfer across units creates opportunities for mutual learning and cooperation, which in turn reinforces the MNC's ability to innovate.

Andersson and Forsgren (2006) highlighted the dual role of subsidiaries, based on the search for new knowledge in their local context and the subsequent transfer of such knowledge to their "sister" units within the corporation. This idea fits in with the *knowledge leveraging model* (Almeida *et al.*, 2002), in turn linked to the organisational network model, assuming multiple experience centres around the world, greater strategic roles for subsidiaries and flexible management (Birkinshaw, 1996; Michailova and Mustaffa, 2012, Crespo *et al.*, 2014; Peltokorpi and Vaara, 2014). Knowledge creation takes place anywhere and every subsidiary contributes to the maximum possible acquisition and generation of knowledge, later transferred to the rest of the multinational – which benefits from this joint integration. This is the approach typically adopted by multinationals, as flows of knowledge between subsidiaries acquire particular significance, in addition to asset and capital flows (Gupta and Govindarajan, 1991).

The above argument points at the need to transfer the knowledge created by the subsidiary to other MNC units so that knowledge can be leveraged and its benefits exploited by the whole MNC. More formally:

H2. Knowledge creation in a subsidiary positively impacts knowledge transfer to the rest of the MNC.

Relational context

The quality of the relationship between a subsidiary and the rest of an MNC is likely to influence the level of inter-unit knowledge transfer (Park *et al.*, 2015). Interactions are facilitated by strong two-way communications and the management's commitment to remove cultural obstacles, as well as through constant monitoring and quick resolution of any impediments to interaction and communication between units (Park *et al.*, 2012). Relational context, which comprises the leadership exercised by the subsidiary and the socialisation achieved with other MNC units, thus, represents a major input in the process through which knowledge is created in subsidiaries and subsequently transferred and shared (Foss and Pedersen, 2002; Lane and Lubatkin, 1998; Dyer and Singh, 1998). We agree with Alegre *et al.* (2011) and Villar *et al.* (2014) on the fact that internal knowledge development could be a dynamic capability for subsidiaries to undertake knowledge creation in a specific subsidiary and to achieve the subsequent transfer of that knowledge to other MNC units (subsidiaries or the parent firm).

Subsidiary's leadership, illustrated by the top management giving their support and fostering employees' initiatives, has to do with obtaining international responsibilities or mandates, which reinforces the subsidiary's contributory role as well (Birkinshaw, 1996; Birkinshaw *et al.*, 1998). This leadership visibly stems from its top managers' efforts aimed at proving not only their experience but also their willingness to create knowledge and assume additional responsibilities. Such knowledge created by the subsidiary results into strategic knowledge being incorporated into routines and capabilities of a highly social and tacit nature, which means that knowledge can only be successfully created and transferred through an atmosphere of unhampered relationships between units which enables them to acquire, integrate and use all this tacit knowledge (Andersson and Forsgren, 1996; Foss and Pedersen, 2002; Frost and Zhou, 2005).

In this context, and regardless of the formal organisational structure that the MNC may adopt (usually determined by the degree of centralisation in relevant decision-making), informal lateral relationships emphasise a more voluntary, personal and intensive cooperation mode. In the opinion of Junnarkar and Brown (1997), contact between people with explicit knowledge does not suffice for the generation of tacit knowledge, interactions between individuals through which judgments and intuitions can emerge being required as

well. Therefore, teams and networks, combined with the interaction between different subsidiaries, become the catalysts for the necessary trust in inter-unit knowledge creation and transfer. Jiménez-Jiménez *et al.* (2014) refer to these internal relationships as *internal social capital*. Such lateral mechanisms result in more responsibility being delegated by the top corporate management to subsidiary managers – a phenomenon labelled by Van Maanen and Schein (1979) as 'corporate socialisation'. According to these authors, corporate socialisation can be defined as organisational mechanisms facilitating the development of interpersonal ties inside the multinational, and its purpose partly coincides with that of corporate culture: it seeks to establish a set of values, aims and beliefs common to all subsidiaries (Nohria and Ghoshal, 1994; Schein, 1999) for the purpose of making easier both the generation of innovation and the exchange of knowledge across units (Tsai and Ghoshal, 1998; Tsai, 2000).

Socialisation between firm members is a prerequisite to acquire the most specific knowledge. Precisely because tacit knowledge cannot easily be transferred from one person to another, employees with valuable knowledge in a certain field can teach or train others through conferences, meetings, presentations and so one, showing them how to do things and influencing their knowledge development processes and giving them additional information or useful tips on how to approach a certain task (Bender and Fish, 2000).

In the light of the above, knowledge transfer in MNCs occurs within a shared social context where various organisational units have mutual links and form part of a network coordinated by teams and processes, such processes being based on transferring knowledge and pooling resources (Tsai, 2001). As a result, social capital becomes especially important for this type of organisation (Tsai and Ghoshal, 1998).

Based on the arguments explained above, the following hypothesis can be posed:

H3. Relational context mediates the link between knowledge creation in the subsidiary and its transfer to the rest of the MNC (subsidiary or parent firm).

Knowledge transfer and performance

Transfer strategies focus on transmitting the knowledge created between two or more units, trying to cover existing gaps and improving the initial knowledge base. In the specific case of MNCs, because the resources are scattered geographically, knowledge transfer arises as one of the key activities facilitating the creation of knowledge-based value. Hence, why several authors have pointed out that the main reason for the existence of multinationals is their ability to transfer knowledge more efficiently than the market (Kogut and Zander, 1993; Almeida, 1996; Almeida *et al.*, 2002).

Gupta and Govindarajan (1991, p. 773) define *intracorporate knowledge flow* as "the transfer of either expertise (e.g. skills and capabilities in product and process design or marketing know-how) or external market data (information on customers, competitors or suppliers) of strategic value". In their opinion, knowledge flows can be divided into *knowledge inflow* (the extent to which the subsidiary attracts knowledge from the rest of the corporation) and *knowledge outflow* (the extent to which the subsidiary sends knowledge to other corporation units). The relationships between units inside MNCs consequently become important, insofar as they are the channels enabling the flow of useful knowledge and information (Hansen, 1999).

Multinationals should adopt asset dynamics aimed at developing, upgrading and extending their activities, as this will allow them to improve their chances to harness internal resources, as well as their capabilities, for the purpose of identifying and shaping new business opportunities (Schiuma *et al.*, 2008; Schiuma, 2009). Frequent communication in vertical and horizontal MNC relationships can create support in knowledge flows and increase

managers' motivation to learn and increase the perceived capabilities of other units (Monteiro *et al.*, 2008; Crespo *et al.*, 2014).

International knowledge exchange in multinationals is not essentially characterised by knowledge dissemination from units specialising in its creation or implementation. Rather, it entails a more complex process where units are simultaneously and interactively involved both in the creation and in the implementation of such knowledge, ultimately seeking to further improve the performance of the MNC as a whole. As each unit of the MNC network faces unique market conditions and owns different knowledge competences, knowledge transfers between the headquarters and its subsidiaries can benefit the MNC as a whole (Luo, 2003).

Crespo *et al.* (2014, p. 996) point out that "as MNC subsidiaries transfer knowledge horizontally, other subsidiaries are able to build their knowledge stores and learn from peer experiences, thus making the subsidiary more effective, which when aggregated, increases the MNC's performance too. As for vertical knowledge flows, because a subsidiary engages in vertical knowledge outflows, the knowledge that it shares with its headquarters can help the MNC to develop strategies that are more effective across its global operations, thus enhancing its overall performance". These ideas serve as the basis to suggest our next hypothesis:

H4. Knowledge transfer between the units of an MNC (subsidiary or parent firm) positively impacts the performance of the MNC as a whole (Figure 1).

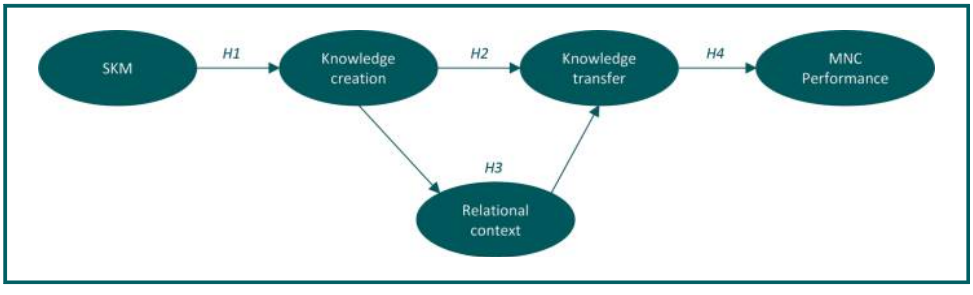
Methodology

Sample and data collection

The population under study comprised *Spanish subsidiaries of foreign multinational firms belonging to high-technology and knowledge-intensive sectors.* There were two reasons for this choice: firstly, our emphasis on the subsidiary – rather than on the parent firm – is justified by the importance recently assigned to subsidiaries as a source of competitive advantages for the whole MNC. This led us to assess the extent to which Spain-based subsidiaries contribute to the competitive advantage of their respective global corporations. Secondly, our focus was placed on high-technology and knowledge-intensive sectors because subsidiaries in these sectors usually show greater commitment to new knowledge generation due to the dynamic environment where they operate.

The lack of databases explicitly including multinational firms located in the Spanish territory, and consequently, their subsidiaries, made it necessary for us to search through a variety of directories and databases in an effort to identify those firms which had to shape our study population. After consulting them all, and in view of the information which they supplied, the SABI database was found to be the best option for our research work. The population finally included 1,291 Spanish subsidiaries of foreign multinationals.

Figure 1 Proposed model



The data collection procedure consisted in sending a mail questionnaire-based survey to the Chief Executive Officer (CEO) or the subsidiary's top manager, because these are the persons who tend to have the widest and deepest understanding of the whole organisation – moreover, using single key organisational informants has proved to be an effective approach in numerous research contexts (Gold *et al.*, 2001; Norman, 2004; Lee *et al.*, 2005; Liao, 2007). Following the recommendations made by Podsakoff *et al.* (2003), a number of measures were adopted with the aim of reducing the potential risk of common method biases due to a single respondent as much as possible.

The preparation of a survey questionnaire went through several stages. Firstly, previous studies associated with KM, relational context, knowledge creation and transfer, along with other issues linked to multinationals, were thoroughly reviewed. Secondly, content validity was ensured through the careful discussion of a preliminary draft with some experts in the field. And, thirdly, a pilot test took place during which personal interviews were held with the CEOs of five firms; the final questionnaire was sent after completing this stage. When one month had elapsed since the initial mailing, a follow-up mailing was sent in an attempt to increase the response rate (Dillman, 2000). The questionnaire was also e-mailed and faxed to those firms which so preferred. In the end, 102 duly completed questionnaires were obtained, which represents a response percentage of 7.9 per cent.

Even though the response percentage lies at 7.9 per cent, the number of observations obtained suffices to reproduce the population's characteristics, thus permitting to generalise the results. The studies on non-response bias confirmed sample representativeness – indicating that the values for the variables 'number of employees' and 'turnover' were situated within the same intervals (Student's *t*-test was used for means comparison) for the group of companies which did not answer the questionnaire and for those which did.

The implementation of Harman's one-factor test (Podsakoff and Organ, 1986) – a technique often adopted by researchers to examine the common method bias – followed. All study variables were entered into an exploratory factor analysis. The results revealed that no single factor emerged from such an analysis; nor was there a general factor that could account for the largest proportion of variance in these variables. The above evidence suggests that the common method bias did not represent a major problem in our study.

Variance-based structural equation modelling (PLS) served to test the proposed relationships. Three reasons made us deem it appropriate to use such structural equations (Sosik *et al.*, 2009):

1. it is an emergent theoretical approach (no studies have so far jointly analysed the relational context to explain the link between knowledge creation and knowledge transfer in MNCs);
2. the work is carried out with a small sample; and
3. subjective construct assessment constitutes our starting point.

Measures

Strategic knowledge management. This measure derives from the insights developed within a multiple-case study undertaken previously. The same as Hill and Birkinshaw (2014) did in their paper, because no other studies (to our knowledge) had used items to measure SKM until then, we decided to develop the measures for SKM drawing on prior literature, as well as on constructs emerging from the exploratory interviews performed in earlier case studies. This decision was made due to the absence of any widely accepted SKM measures.

The present paper sees SKM as a second-order construct shaped by two first-order reflective constructs: KDP and KSP. These first-order constructs were based on the works of Alegre *et al.* (2011) and Villar *et al.* (2014).

KDP was measured by means of a seven-point Likert scale with three items (KDP1, KDP2 and KDP3). Respondents had to express their degree of agreement or disagreement with the following statements:

- the subsidiary's general vision recognises the need and commitment to create and transfer knowledge;
- the subsidiary's staff are characterised for being enterprising, willing to innovate and committed to sharing their knowledge with other MNC units; and
- the subsidiary's organisational culture tends to be more open to new initiatives, as well as to experimentation, and oriented to continuous learning.

(1 = I completely disagree; 7 = I completely agree).

KSP was also measured using a seven-point Likert scale with three items (KSP1, KSP2 and KSP3). Respondents had to express their degree of agreement or disagreement with the following statements:

- the subsidiary has an inventory of its most critical or essential competences;
- the subsidiary's organisational structure is becoming increasingly horizontal, thus fostering multifunctional work teams; and
- the subsidiary owns ICTs to store the most valuable knowledge and transfer it to all its members and to the rest of the MNC (1 = I completely disagree; 7 = I completely agree).

Knowledge creation. This variable was treated as a first-order construct which comprised three first-order formative indicators (CID, CMK and CPR). These three items, which combine and adapt the measures and ideas provided in the studies carried out by Frost *et al.* (2002), Schmid and Schurig (2003), Andersson *et al.* (2005) and Alegre *et al.* (2012), were measured using a seven-point Likert scale. They reveal the extent to which the Spanish subsidiary develops useful capabilities for itself – as well as for the whole corporation – within three functional areas, namely, R&D, production and marketing (1 = to a very small extent; 7 = to a very large extent).

Knowledge transfer. This variable was considered a second-order construct made up of two first-order formative constructs (inflow and outflow).

Bearing in mind the definitions provided by Gupta and Govindarajan (2000) together with the measures used in the works of Björkman *et al.* (2004) and Colakoglu *et al.* (2014), inflow is measured as the degree to which the capabilities developed by other MNC units in the R&D, production and marketing areas are actually implemented by the Spanish subsidiary (INF1, INF2 and INF3). Instead, adapting the contributions made by Gupta and Govindarajan (2000) and Crespo *et al.* (2014) leads us to measure outflow as the degree to which the same capabilities are developed by the Spanish subsidiary and utilised by the rest of the MNC (OUT1, OUT2, OUT3). A three-item scale ranging from 1 to 7 (1 = very low extent; 7 = very high extent) served to measure both variables.

Relational context. This variable was seen as a second-order construct formed by two first-order formative constructs: subsidiary's leadership and socialisation.

Subsidiary's leadership, based on Birkinshaw *et al.* (1998), was measured by means of a seven-point Likert scale with three items (LD1, LD2 and LD3). Respondents had to express their degree of agreement or disagreement with the following statements:

- the firm has leaders of internationally recognised prestige;
- the top management's credibility is high; and
- the CEO works in close collaboration with managers focusing all efforts on achieving the firm's goals (1 = I completely disagree; 7 = I completely agree).

Socialisation was also measured using a seven-point scale with three items (SOC1, SOC2 and SOC3) which resulted from combining the measures from Ghoshal *et al.* (1994) and the previous research undertaken by Gupta *et al.* (1999), Björkman *et al.* (2004) and Hill and Birkinshaw (2014). Respondents were asked to report on the frequency with which R&D, production and marketing executives interacted with other executives or representatives from different units of the MNC in the following ways: interunit trips and visits to other units, committees, international teams and meetings and conferences (1 = very low frequency, 7 = very high frequency).

MNC performance. In this study, as well as in the works of Andersson *et al.* (2002), Dhanaraj *et al.* (2004) and Kawai and Strange (2014), perception measures served to capture organisational performance. More specifically, the respondent had to assess the impact that the creation of knowledge in the Spanish subsidiary and its transfer to the rest of the MNC had on the competitive advantages for the MNC in terms of profitability (1 = very low impact; 7 = very high impact).

Control variables. Size: measured through the number of employees in the Spanish subsidiary.

Sector: firms are classified according to a dummy variable which takes the following two values: 0, corresponding to high- and medium-technology manufacturing sectors, and 1, for high-technology manufacturing sectors and services.

Analysis and results

As the PLS method does not allow for a direct representation of second-order factors, we first calculated the factor scores of first-order constructs, which were subsequently treated as the indicators of second-order factors (Chin *et al.*, 2003; Bock *et al.*, 2005). Thus, in the first stage, those first-order factors (KDP, KSP, subsidiary's leadership, socialisation, outflow and inflow) which constituted the second-order model (SKM, knowledge transfer and relational context) were separately included in the model with their respective indicators.

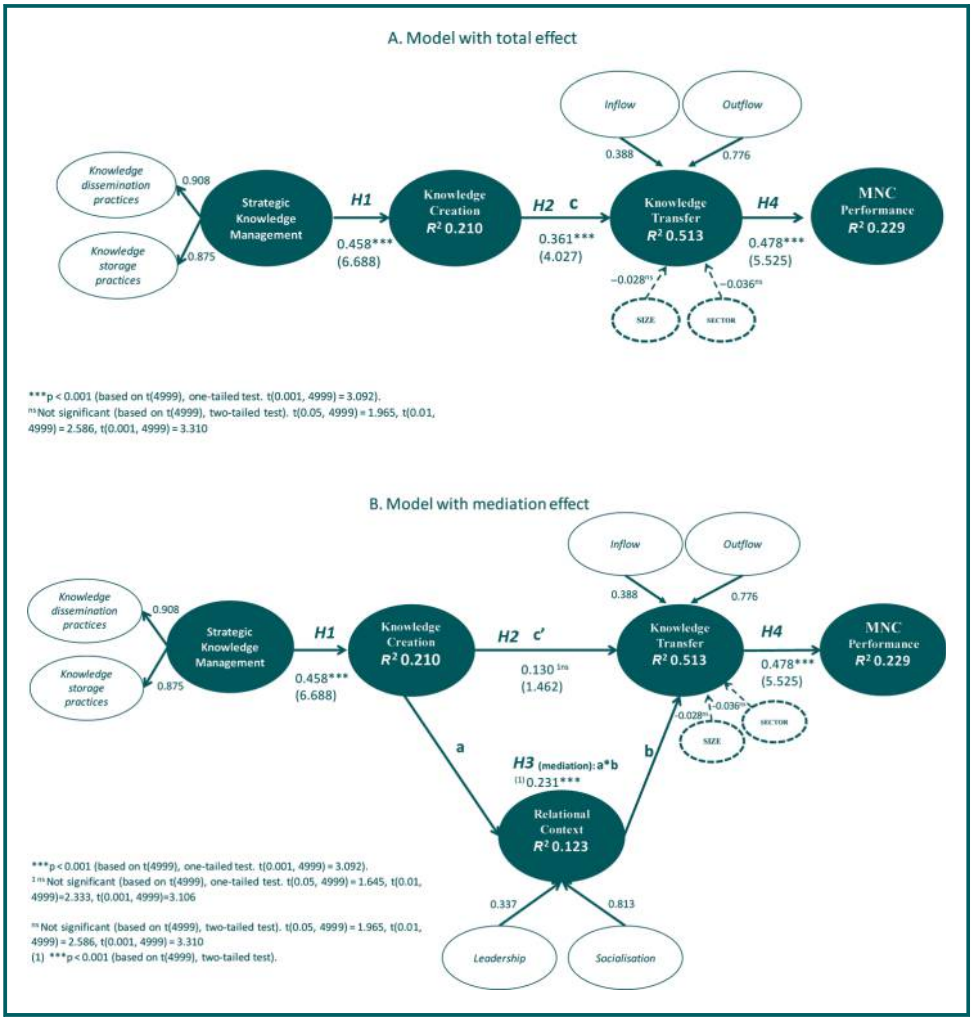
In a second step, we estimated a model that used the latent variable scores calculated in the first step for each first-order component. The construction of second-order variables was followed by an evaluation of the measurement model based on the two steps suggested by Hair *et al.* (2011): measurement model assessment and structural model assessment. Figure 2 describes both the theoretical model and the main results obtained.

Measurement model assessment

This first stage was evaluated analysing both the individual reliability of indicators and the reliability and validity of the scale as a whole for reflective constructs in the PLS context. The evaluation of individual reliability in indicators was performed through the value of their loadings (λ). In this sense, all loads exceeded the value of 0.7 – as recommended in the literature (see Table I). This first phase should also include the evaluation of scales according to Cronbach's α index and the composite reliability index, together with Dijktra-Hernseler's (rho_A) indicator.

The existence of convergent validity could also be verified through the analysis of extracted mean variance (AVE). As shown in Table I, both the alpha value and that of composite

Figure 2 Theoretical model and results



reliability, as well as rho_A, exceeded the critical value of 0.7 in every variable, AVE being situated above 0.5 (Fornell and Larcker, 1981).

The heterotrait–monotrait ratio (HTMT) criterion with a 0.90 threshold was considered too (Gold *et al.*, 2001). Table II provides the results obtained when verifying discriminant validity.

In relation to formative indicators, construct discriminant validity must be checked (the correlation between the construct and the other constructs should be less than 0.7, see Table II). It is also necessary to assess multicollinearity – through VIF (less than 3.3) and the weights and their significance – at the level of the indicator. An indicator (KSP2) had a significance level below than 0.05 (Table I) in our study, but taking the advice of Henseler *et al.* (2015), a decision was made not to eliminate the indicator despite its small significance for not showing multicollinearity.

Structural model assessment

The evaluation of the structural model took place through the observation of R^2. In this case, the R^2 obtained for the MNC performance variable was 0.229, with 0.513 for knowledge transfer and 0.210 for knowledge creation (see Table III).

Table I Measurement model evaluation

Constructs	*Cronbach's α*	*Loading (λ)*	*Weight*	t-*value*	*Composite reliability*	*AVE*	*VIF*	*rho_A*
SKM (Mode A)	0.743				0.886	0.795		0.754
KDP (formative indicators)		0.908					1.539	
KDP1			0.427***	3.513			1.321	
KDP2			0.313***	3.008			1.286	
KDP3			0.576***	8.725			1.158	
KSP (formative indicators)		0.875					1.539	
KSP1			0.231***	2.093			1.075	
KSP2			0.101^{ns}	1.306			1.079	
KSP3			0.892***	8.725			1.091	
Knowledge creation (formative indicators)								
CID			0.513***	4.281			1.201	
CMK			0.484***	3.057			1.070	
CPR			0.447***	2.666			1.128	
Relational context (Mode B)								
Leadership (reflective indicators)	0.741		0.337***	8.477 3.168	0.851	0.657	1.208	0.774
LD1		0.878		15.024				
LD2		0.734		5.448				
LD3		0.814		12.120				
Socialisation (reflective indicators)	0.793		0.813***	10.321	0.878	0.706	1.206	0.802
SOC1		0.850		25.891				
SOC2		0.825		17.964				
SOC3		0.844		18.546				
Knowledge transfer (Mode B)								
Outflow (formative indicators)			0.776***	8.524			1.204	
OUT1			0.202***	5.078			1.559	
OUT2			0.244***	3.293			1.133	
OUT3			0.761***	14.078			1.549	
Inflow (formative indicators)			0.388***	3.066			1.204	
INF1			0.320***	2.554			1.124	
INF2			0.779***	5.844			1.339	
INF3			0.202***	2.714			1.080	

Notes: ***$p < 0.001$; ^{ns}Not significant

The algebraic sign, magnitude and significance of path coefficients show the estimates for structural model relationships, i.e. the hypothesised relationships between constructs. To assess the significance of those coefficients, the non-parametric bootstrapping technique of 5,000 samples was used to obtain *t* statistics and confidence intervals (see Table III). The three direct effects described in Figure 2B turned out to be significant because they exceeded the minimum level of a Student's *t*-distribution with a tail and n–1 (*n* = number of resamples) degrees of freedom. The same result appeared at 95 per cent confidence intervals. Therefore, SKM favours knowledge creation, which confirms *H1*. This result supports the theory according to which the implementation of KDP (knowledge vision, human resources practices and organisational culture) and KSP (knowledge diagnosis,

Table II Discriminant validity and correlation between constructs

Fornell–Larcker criterion

	Knowledge creation	*Relational context*	*SKM*	*MNC performance*	*Knowledge transfer*	*Sector*	*Size*
Knowledge creation	1.000						
Relational context	0.350	1.000					
SKM	0.458	0.546	*0.892**				
MNC performance	0.249	0.489	0.341	1.000			
Knowledge transfer	0.359	0.605	0.341	0.478	1.000		
Sector	0.031	–0.010	0.110	–0.016	–0.037	1.000	
Size	0.031	0.063	–0.021	0.072	0.019	–0.057	1.000

*HTMT confidence intervals with corrected bias***

	Original sample	*Sample mean*	*Bias*	*5%*	*95%*
MNC performance → SKM	0.397	0.397	–0.001	0.182	0.566
Sector → SKM	0.132	0.161	0.028	0.020	0.272
Sector → MNC performance	0.016	0.082	0.066	0.000	0.045
Size → SKM	0.075	0.099	0.024	0.012	0.192
Size → MNC performance	0.072	0.095	0.023	0.001	0.184
Size → Sector	0.057	0.086	0.029	0.000	0.161

Notes: *AVE square root; **If the bootstrap confidence interval at 90% of the HTMT ratio does not include the value one, discriminant validity arguably exists

Table III Effects on endogenous variables

Effects on endogenous variables	*Direct effect*	t-*value (bootstrap)*	*95% confidence interval (bias-corrected)*	*Confirm hypotheses*
Knowledge creation $R^2 = 0.210/Q^2 = 0.086$				
SKM	0.458***	6.688	[0.421;0.647]	
H1. SKM > Knowledge creation				*Yes*
Knowledge Transfer $R^2 = 0.513/Q^2 = 0.299$				
Knowledge Creation	0.361***	4.027	[0.311;0.605]	
H2. Knowledge creation > Knowledge transfer				*Yes*
MNC performance $R^2 = 0.229/Q^2 = 0.209$				
Knowledge transfer	0.478***	5.525	[0.425;0.709]	
Size	–0.028^{ns}	0.081	[–0.067;0,174]	
Sector	–0.036^{ns}	0.131	[–0.078;0.162]	
H4. Knowledge transfer > MNC performance				*Yes*

Notes: $t(0.05, 4999) = 1.645$; $t(0.01, 4999) = 2.327$; $t(0.001, 4999) = 3.091$. *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; ^{ns}Not significant (based on $t(4999)$, two-tailed test). $t(0.05, 4999) = 1.965$, $t(0.01, 4999) = 2.586$, $t(0.001, 4999) = 3.310$

organisational structure and ICTs) helps knowledge creation by the subsidiary, improving its productivity and competitiveness.

Our findings additionally show that knowledge creation positively impacts on knowledge transfer between subsidiaries, thus corroborating *H2*. This result reinforces the assumption that the knowledge created by a subsidiary does not always improve the results of the MNC as a whole. It will be necessary for this knowledge to be shared with other MNC units so that it can be leveraged. Moreover, this finding shows the dual role played by subsidiaries, based on the search for new knowledge in their local context and the subsequent transfer of that knowledge to the other units within the corporation.

Finally, we verified that knowledge transfer between subsidiaries contributes to MNC performance, which validates *H4*. According to this outcome, vertical and horizontal knowledge flows between units contribute to improve MNC performance. As each unit of the MNC network owns different knowledge competences, knowledge transfers between the headquarters and its subsidiaries can benefit the MNC as a whole.

The structural model was also evaluated using the Stone–Geisser test (Q^2) through a blind folding procedure (Chin, 1998). A Q^2 greater than zero implies that the model has predictive relevance. The findings shown in Table III confirm that the suggested model has a satisfactory predictive relevance for all dependent variables.

As for control variables, neither the size of subsidiaries nor the sector to which they belong significantly influences knowledge transfer.

The mediation analysis

According to the research model (Figure 2B), *H3* represents a mediation hypothesis which posits how, or by what means, an independent variable (knowledge creation) affects a dependent variable (knowledge transfer) through a mediator variable (relational context) (Preacher and Hayes, 2008). Figure 2A describes the total effect of knowledge creation on knowledge transfer, *c* being the path coefficient. This total effect may be reached via several direct and indirect forces. More precisely, the total effect of knowledge creation on knowledge transfer shown in Figure 2B can be expressed as the sum of the direct effect and the indirect one, the latter being estimated multiplying path coefficients by each one of the paths in the mediational chain. Therefore, c = c' + ab, the last term representing the specific indirect effect, while *c'* stands for the direct effect of knowledge creation on knowledge transfer (*H1*), controlling for the mediator (relational context). The bias-corrected bootstrap served to test indirect effect significance (Hayes and Scharkow, 2013). The results are collected in Table IV.

Both the total effect (*c*) and the direct effect (*H1*: *c'*) of the independent variable (knowledge creation) on the dependent variable (knowledge transfer) were examined. Chin (2010) proposes a two-stage process to test mediation in PLS:

1. using the specific model with the inclusion not only of the direct effect but also of the indirect one, performing *N* bootstrap resampling, and explicitly calculating the product of the direct paths that form the indirect path under assessment; and
2. estimating significance by means of percentile bootstrap bias-corrected (Hayes and Scharkow, 2013).

Table IV Summary of mediating effect test

Total effect of knowledge creation on knowledge transfer (c)		*Direct effect of knowledge creation on knowledge transfer*		*Indirect effect of knowledge creation on knowledge transfer*			
						Percentile bootstrap *95% + bias confidence interval*	
Coefficient	t-*value*		*Coefficient*	t-*value*		*Estimated point*	*Lower*	*Upper*
0.361***	4.027	*H2 = c'*	0.130^{ns}	1.462	Total	0.130^{ns}	–0.057	0.292
					H3= a_1b_1	*0.231****	0.153	0.369

Notes: $^{***}p < 0.001$; $t(0.05, 4999) = 1.645$, $t(0.01, 4999) = 2.327$), $t(0.001, 4999) = 3.091$; ^{ns}Not significant (based on $t(4999)$, one-tailed test. $t(0.05, 4999) = 1.645$, $t(0.01, 4999) = 2.333$, $t(0.001, 4999) = 3.106$

This generates a 95 per cent confidence interval for the mediator variable (relational context). If the interval for a hypothesis does not contain the value zero, it means that the indirect effect largely differs from zero at a 95 per cent confidence level.

Figure 2A and Table IV allow us to see that knowledge creation significantly influences knowledge transfer. However, when the mediator variable – relational context (Figure 2B) – is introduced, knowledge creation no longer has a significant effect on the dependent variable knowledge transfer (*H2*: *c'*). Total mediation consequently exists because, when the mediator variable (relational context) is introduced, the direct relationship between knowledge creation and knowledge transfer no longer has a statistical significance (Nitzl *et al.*, 2016).

The result obtained for the relational context as a mediating variable supports the considerations made above from the theoretical point of view. As the knowledge created by the subsidiary results into strategic knowledge being incorporated into routines and capabilities of a highly social and tacit nature, such knowledge can be successfully transferred only through an atmosphere of unhampered relationships between units, which in turn enables them to acquire, integrate and use all this tacit knowledge. Relational context, which comprises the leadership exercised by the subsidiary and the socialisation achieved with other MNC units, consequently represents a major input in the process through which knowledge is firstly created in subsidiaries and subsequently transferred and shared to the rest of the MNC.

Conclusions

The integration of added-value-generating activities scattered worldwide is very important for MNCs. Therefore, the contribution of subsidiaries as a source of competitive advantages for the whole MNC can no longer be denied at present. Knowledge creation in subsidiaries, as well as its transfer to the other MNC units, helps generate value-creation opportunities for these MNCs. Our intention with this research work has been to make progress in these issues, introducing and analysing the impact that additional variables can have on this relationship.

As pointed out in the introduction, and on the basis of the knowledge-based theories applied to MNCs, the present paper has tried to answer the following two research questions:

RQ1. Does the process through which knowledge is created in a subsidiary and transferred to other MNC units influence the performance of the MNC as a whole?

RQ2. Is the process through which knowledge arises within a subsidiary and later reaches other MNC units influenced by an SKM process and mediated by the relational context?

We applied a quantitative methodology on a sample of Spanish subsidiaries of foreign multinational firms belonging to high-technology and knowledge-intensive sectors, and the findings allowed us not only to answer the two research questions posed but also to confirm the hypotheses formulated. Four important findings emerged from this research:

1. the implementation of an SKM process constituted by two kinds of knowledge practices (KDP and KSP) by a subsidiary positively impacts on that subsidiary's knowledge creation;
2. due to the knowledge leverage model and through intracorporate knowledge flows, the knowledge created by a subsidiary positively influences knowledge transfer, increasing the MNC's already existing knowledge;
3. knowledge transfer across all MNC units has a positive impact on MNC performance; and

4. the subsidiary's relational context, materialised in its leadership and socialisation, arises as a mediating variable between the knowledge created by a subsidiary and its transfer to the rest of the MNC.

Both theoretical and practical contributions derive from the above findings.

Theoretical contributions

First, even though the topics of knowledge creation, knowledge transfer and performance have been previously studied in the literature on MNCs, this research offers a holistic model which formulates a relationship between the three aforementioned topics. In fact, evidence has been provided that every MNC unit (subsidiary or parent firm) benefits from knowledge flows associated with the creation of knowledge by subsidiaries. In particular, this study supports empirical evidence about the importance of *reverse knowledge transfer* (the transfer of knowledge from subsidiaries to the parent firm) for the MNC performance (Jiménez-Jiménez *et al.*, 2014). Most studies had so far focused mainly on the knowledge transfer from the parent firm to its subsidiaries (Monteiro *et al.*, 2008; Kumar, 2013). The literature about reverse knowledge transfer has been emerging lately as a topic of increasing interest to academics and researchers (McGuinness *et al.*, 2013; Rabbiosi and Santangelo, 2013). Moreover, the results enhance our understanding of the way in which the knowledge transfer literature measures performance, thus filling an important gap which still exists in this field. Second, KM goals have been aligned with corporate goals in this paper, thus trying to fill another gap existing in the literature in relation to seeing KM as a process that is independent from business strategy formulation (Snyman and Kruger, 2004). Seeking to achieve that aim, we created a new variable – SKM – constituted by KDP and KSP. In our view, the extant literature about knowledge and MNCs can be enriched, thanks to this unusual approach to a variable which, despite being frequently used in theoretical terms, had hitherto never been measured from an empirical point of view. Due to the absence of any widely accepted SKM measures, a decision was made to develop such a measure drawing on prior literature, as well as on constructs emerging from the exploratory interviews performed in earlier case studies. The third contribution comes from the fact that the study shows how the subsidiary's relational context is an important antecedent of MNC performance. The total mediating effect obtained by means of this variable might add some empirical evidence about the relevance of inter-unit relationships within an MNC. Our study provides fresh insights on the mediation that the subsidiary's relational context exerts on the knowledge creation-knowledge transfer link. This variable, which comprises subsidiary's leadership and socialisation, was created specifically for this research, and as shown by statistical tests, it has proved highly useful for our research.

Practical contributions

On the one hand, the findings shed light on how important it is for subsidiary managers to undertake SKM processes, creating the necessary infrastructure to disseminate and storage knowledge practices (KDP and KSP, respectively). Putting in place an SKM process will;

- allow subsidiary members to become aware of the need and commitment to create and transfer knowledge;
- provide the subsidiary with an enterprising staff;
- promote a culture based on experimentation and continuous learning;
- have an inventory of the most critical competences owned by the subsidiary;

- develop a flexible organisation structure; and
- invest on ICTs with the aim of storing the most valuable knowledge and transferring it between firm members.

On the other hand, headquarters managers should recognise the value that subsidiaries have when it comes to leveraging the competitive advantages of the whole corporation, improving the availability of excellence centres. Finally, these managers should foster subsidiary's leadership and promote frequent communications between all MNC units, as relational context has emerged as a fundamental variable to mediate in the knowledge creation-knowledge transfer link. Our findings have also shown that MNC performance benefits from larger and stronger relationships not only between parent firm employees but also between them and those of subsidiaries.

Limitations and further research

Some important limitations had to be faced in our work, but future research efforts will surely help to cope with them. Firstly, we chose to measure MNC performance through perceptual measures despite our awareness of the fact that other studies use more objective variables such as ROA (return on assets) (Ruigrok and Wagner, 2003; Crespo *et al.*, 2014; Benito-Osorio *et al.*, 2016) or sales growth (Zhou *et al.*, 2012; Wu and Voss, 2015). Perhaps, a comparison between perceptual measures and objective ones would represent a useful option to improve this measure. Secondly, it is our contention that extending our study to firms outside high-technology and knowledge-intensive sectors could result in new and complementary insights. And, thirdly, although the easy access to Spanish subsidiaries led us to structure the present study around them, we are currently working to deal with foreign subsidiaries and broaden our study with such firms, as this will definitely provide a more comprehensive understanding of the model proposed.

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