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## A resource-based analysis of realized knowledge relatedness in diversified firms

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## ABSTRACT

The competitiveness of related diversified firms depends upon their ability to exploit knowledge relatedness by using the internal knowledge transfer processes within the organizational network. However, most existing studies deal with *potential* knowledge relatedness at the *corporate* level, rather than focusing on *realized* knowledge flows among divisions at the *business unit* level. Little is consequently known about the very essence of related diversifiers, i.e., the management of knowledge flows within the corporate knowledge network. This study therefore attempts to bridge this research gap by distinguishing four knowledge roles within related firms and analyzing their relative performance outcomes. Based on a sample of 116 product divisions, results indicate that divisions playing a knowledge provider role outperform those that not play that role, thus signaling unique resource endowments in the formers. On the contrary, those divisions which plays a knowledge receiving role do not benefit from the internal accumulation of resources.

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## 1. Introduction

The increasing relevance of knowledge resources as regards firms remaining competitive in the global economy signifies that the sharing and transference of knowledge across and within firms' boundaries have attracted more and more interest from researchers and practitioners (van Wijk, Jansen, & Lyles Marjorie, 2008; Kumar & Ganesh, 2009; Ribi re & Walter, 2013). The external transfer of knowledge across firm boundaries is best exemplified by mergers and acquisitions (Azan & Sutter, 2010) and strategic alliances (Khamseh & Jolly, 2014), whereas the internal transfer of knowledge has been extensively studied in multinational corporations (Gooderham, 2007).

The internal transfer of knowledge is particularly vital for related diversified firms, since the exploitation of knowledge relatedness is the cornerstone of this corporate-level diversification strategy (Breschi, Lissoni, & Malerba, 2003; Kor & Leblebici, 2005). Although many empirical studies analyze knowledge relatedness in multi-business firms (Lemelin, 1982; Markides & Williamson, 1994; Robins & Wiersema, 1995; Farjoun, 1998; Breschi et al., 2003; Tanriverdi & Venkatraman, 2005; Miller, 2006; Miller, Fern, & Cardinal, 2007; Neffke & Henning, 2013; Shin & Shin, 2013), an empirical examination of knowledge transfer within multi-business firms is lacking in literature with only a handful of exceptions (Villalero, 2013, 2014, 2015). This research gap is the consequence of a long-standing tradition in diversification studies according to which synergies are assumed to be realized rather than ascertaining whether or not they are actually realized (Davis & Thomas,

1993). These studies consequently assess the *potential* knowledge relatedness within a business portfolio, whereas the *realized* knowledge relatedness obtained via the cross-business unit transfer of knowledge is overlooked (Bausch & Pils, 2009).

Potential knowledge relatedness is usually captured by assessing the similarities between resource profiles throughout the SIC-based industries in which diversified firms are involved (Sambharya, 2000). However, the fact that externally-defined industries rely on common resources does not guarantee that the diversified firms that are active in those industries will pursue such inter-industry linkages internally (Pehrsson, 2006a). Diversified firms actually exploit the common resources within their industry portfolios in as much as the divisions into which they are organized are involved in knowledge exchange within the corporate network (Tsai, 2001). The intra-network knowledge flows are therefore a reliable indicator of the diversified firms' efforts to mobilize knowledge relatedness in actual terms. Rather than observing the *corporation* as whole, the study of realized knowledge relatedness imposes the need to adopt a fine-grained perspective based on the *business unit* level as the unit of analysis (Hauschild & Knyphausen-Aufse , 2013).

Overall knowledge flows are not only informative of the corporate-wide efforts as regards benefiting from resource similarities within the industry portfolio, but their directionality also reveals the resource base of the divisions and, specifically, whether such resources are valuable, rare, inimitable and difficult to substitute (VRIN) as requested by the resource-based view of the firm (RBV) (Barney, 1991; Lin & Wu, 2014). Within the corporate knowledge network, divisions may participate in knowledge exchanges in which they either provide the rest of the corporation with knowledge or receive of knowledge from the rest

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of the corporation (Tanriverdi & Venkatraman, 2005). Becoming knowledge provider points to focal division's efforts at leveraging unique resource endowments; whereas becoming knowledge receiver is a sign that the focal division seeks to improve its resource base and uncovers efforts at accumulating resources. Put in other terms, the position of a concrete division as a knowledge provider or receiver is a reliable indicator of the underlying resource base on which that division is operating and the ensuing leveraging or accumulating intentions. Rather than assessing the potential value derived from the divisions' resource bases in an abstract manner as has been widely criticized when assessing the empirical studies on the RBV (Newbert, 2007; Kraaijenbrink, Spender, & Groen Aard, 2010), the *knowledge role* that divisions occupy within the corporate network is an actual, realized, behavior-based indicator of the divisions' resource bases as suggested in recent research on diversification strategy (Nath, Nachiappan, & Ramanathan, 2010; Hauschild & Knyphausen-Aufseß, 2013).

The present study fills the aforementioned research gaps by addressing realized knowledge relatedness at the business unit level. It does so using the concept of knowledge role as a resource-based indicator of the presence of VRIN resources within related diversified firms and the efforts at leveraging or accumulating such resources. In particular, the study analyzes the patterns and performance implications of knowledge flows among 116 product divisions in large Spanish firms with a related corporate strategy. Divisions are classified into four groups, starting from the extent to which the division is a user of knowledge from the rest of the corporation and the extent to which the division provides the rest of the corporation with such knowledge (Gupta & Govindarajan, 1991). Consistent with resource-based considerations, the results indicate that the divisions that play a knowledge provider role outperform those that do not play that knowledge role within the related firm, which supports the notion that knowledge outflows are a sign of having unique *resource endowments*. Consistent also with theoretically-derived expectations, the divisions that takes a knowledge receiver role do not outperform those that do not take that role, thus downplaying the allegedly benefits derived from internal *resource accumulation* processes.

The study contributes to existent literature by advancing the first empirical examination of *realized* knowledge flows in related firms at the *business unit* level, extending the classification of *knowledge roles* with theoretically-grounded, resource-based performance implications, shedding light on the performance consequences of knowledge transfer within firms, and providing an elaborated empirical test of the RBV within the context of diversification strategy.

## 2. Knowledge flows and related diversification

Research on related diversification has been focused on the similarities in resources throughout the industries in which related diversified firms participate, thus capturing potential knowledge relatedness in a somewhat imperfect manner (Pehrsson, 2006a). These types of studies have two shortcomings. First, they do not observe whether potential relatedness is actually pursued within the firm in the form of inter-unit exchanges, and second, they do not address the issue of whether the common resources within the industries' portfolios are indeed valuable, or are simply ordinary resources (Hauschild & Knyphausen-Aufseß, 2013).

The observation of actual knowledge flows within related diversified firms provides the opportunity to overcome these limitations by revealing the value of the resource bases and capturing realized knowledge relatedness. This study therefore presents a more analytical approach to related diversification that takes the corporate network of divisions as the starting point. A RBV is then used to show how knowledge flows within the corporate network reflect the underlying resource base on which divisions operate. A testable hypothesis is subsequently derived, which is based on the connection between knowledge flows, resource bases and division performance.

### 2.1. A network approach to diversification

Diversified corporations are internal markets in which transactions among business units or divisions occur in three key dimensions: capital flows, product flows and knowledge flows (Liebeskind, 2000). Certain divisions within the business portfolio of the diversified firm provide other receiving divisions with capital, products and knowledge with the purpose of obtaining synergies that may not otherwise be achieved (Teece, 1980, 1982).

This conceptualization of the diversified firm as a network of capital, product and knowledge flows is consistent with various theories regarding corporate strategy, such as transaction cost economics (Williamson, 1985), the resource-based view (Barney, 1991), the knowledge-based view (Grant, 1996) and the dynamic capabilities perspective (Teece, Pisano, & Shuen, 1997). Transaction cost economics was originally applied in order to analyze product flows in vertically-integrated firms, and it has also been applied to the study of capital flows in conglomerates (Hill, 1988). The resource-based view is useful when dealing with corporate diversification, and implies the use of the underlying resources that support product flows, which are technological resources (Robins & Wiersema, 1995), human resources (Farjoun, 1998) or other resources (Markides & Williamson, 1994). The knowledge-based view highlights the problems involved in organizing knowledge flows within diversified corporations (Szulanski, 1996; Kodama, 2006), whereas the dynamic capabilities perspective explains the path-dependent development of knowledge in the context of corporate diversification (Teece, Rumelt, Dosi, & Winter, 1994; Valvano & Vannoni, 2003; Piscitello, 2004).

The network approach to business diversification is not only consistent with theory, but also captures key differences among generic corporate strategies (Fig. 1). Let us, for example, consider the Rumelt (1974) classification into dominant, related and unrelated firms. Within the framework adopted in this work, unrelated firms would be characterized by capital flows originating from harvest divisions to build divisions (Staglianò, La Rocca, & La Rocca, 2014), dominant firms would be characterized by product flows from downstream divisions to upstream divisions (Raudszus, Schiereck, & Trillig, 2014), and related firms would be characterized by knowledge flows from successful divisions to other related divisions (Hauschild & Knyphausen-Aufseß, 2013).

This conceptualization of diversified firms has been empirically applied in order to study both capital flows (Govindarajan & Gupta, 1985; Gupta & Govindarajan, 1986) and product flows (Govindarajan & Fisher, 1990), but no analysis of knowledge flows exists. This is an interesting research opportunity, since the best-performing related strategy is largely based on knowledge flows among divisions (Tanriverdi & Venkatraman, 2005; Kodama, 2006). Moreover, knowledge flows within multinational corporations have been investigated (Gupta & Govindarajan, 2000; Foss & Pedersen, 2002; Schulz, 2003), which allows this research on geographical diversity to be applied to the study of product diversity (Gupta & Govindarajan, 1991; Ellis, 2000). From here on, this article focuses on knowledge flow patterns in related diversified firms according to a RBV.

### 2.2. Knowledge flows and resource base

In a resource-based framework, the internal transference of knowledge enables the mobility of core competences within the firm (Fang, Wade, Delios, & Beamish Paul, 2007). The existent empirical studies adopt a macro-analytic approach according to which no distinction is made between knowledge inflows and knowledge outflows, and the knowledge provider or knowledge receiver roles of business units are consequently not considered. The principal point of this study is that the divisions' knowledge provider role within the corporate network reveals the underlying resource base on which those divisions operate.

In related diversified firms, each division is a user of knowledge from the rest of the corporation in addition to providing the rest of the

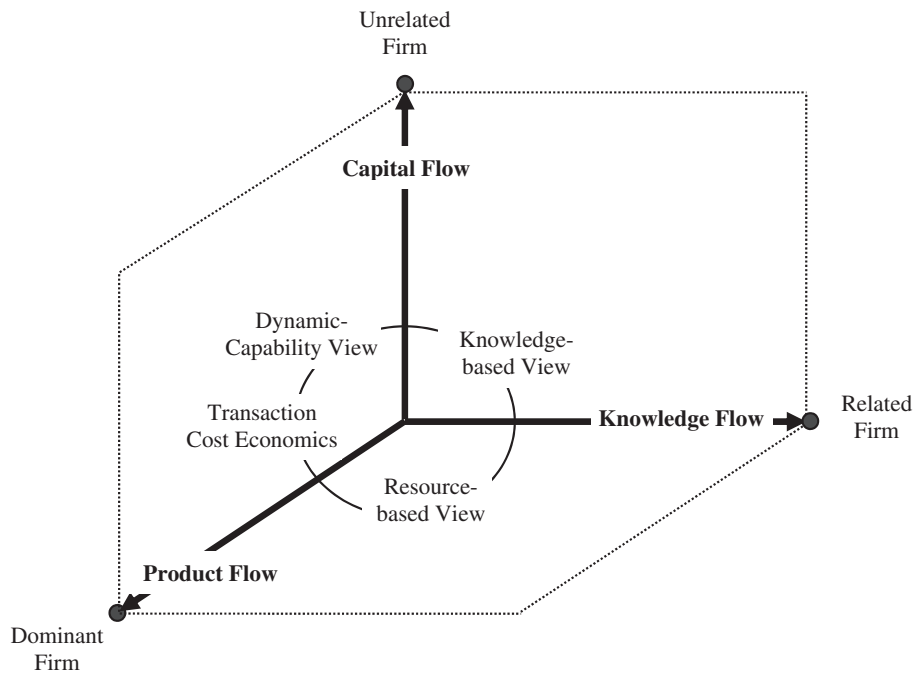


Fig. 1. A network approach to corporate diversification strategy.

corporation with knowledge. In accordance with this view, Gupta and Govindarajan (1991) presented a framework whose objective was to classify the subsidiaries from multinational corporations according to knowledge inflows and knowledge outflows. With some changes, this classification can be adapted to characterize the role of each division within a related diversified firm (Fig. 2).

In the *Corporate Innovator* role, the division serves as the source of knowledge for the rest of the corporation. In the context of multi-business firms, this role is usually performed by the core division from which the diversification originated. In the *Integrated Player* role, the division provides other divisions with knowledge in addition to receiving knowledge from other divisions. This status tends to be adopted when a division needs to integrate different types of knowledge bases in order to be competitive in the marketplace. In the *Corporate Implementer* role, the division is rather passive as regards knowledge creation, but it is still integrated in the corporate network through the knowledge provided by other divisions. This role is typical of corporate entries into new businesses through ex novo investments. A division that adopts a *Differentiated Innovator* role is, meanwhile, outside the core of the corporate network since it operates on the basis of its own knowledge for its own purposes. This is the case of corporate entries that

become integrated into unrelated businesses through acquisitions. In summary, some divisions play the role of knowledge providers (*Corporate Innovators*) while others play the role of knowledge receivers (*Implementers*), with mixed situations in which some divisions are neither knowledge providers nor knowledge receivers (*Differentiated Innovators*) and others are simultaneously knowledge providers and receivers (*Integrated Players*).

### 2.3. Knowledge role and division performance

The classification described above allows us to distinguish the two sides of the same coin as regards the mobility of the core competences within the firm. On the one hand, those divisions which occupy the knowledge roles of *Corporate Innovators* and *Integrated Players* provide the rest of the corporation with knowledge. In this case, the business unit's effort is at *leveraging* an allegedly VRIN resource base. On the other hand, those divisions which play the knowledge roles of *Integrated Players* and *Implementers* receive knowledge from the rest of the corporation. In this case, the business unit's effort is at *accumulating* VRIN resources from within the corporate knowledge network. The overall phenomenon of internal knowledge mobility (Fang et al.,

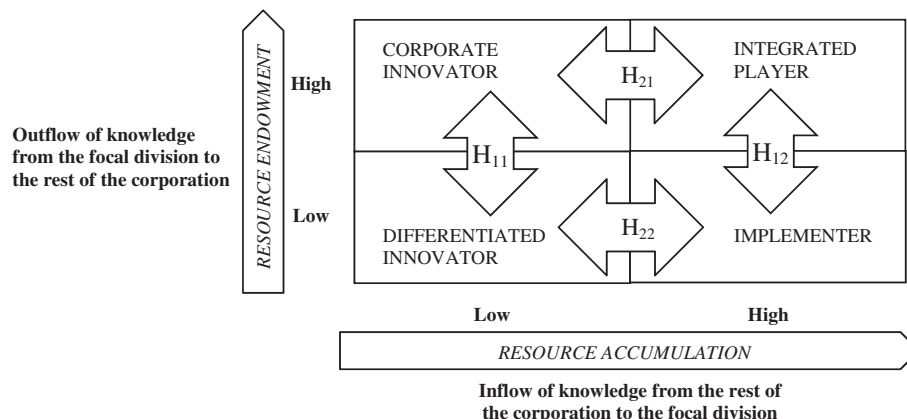


Fig. 2. The business division role within the corporate knowledge network.

2007) can therefore be split into two separate resource-based effects; one that uncovers efforts at leveraging *resource endowments* (Barney, 1986) and another that points to efforts at fostering *resource accumulation* (Dierickx & Cool, 1989).

The fact that a division is extensively involved in knowledge outflows indicates the presence of a rich resource base within the division's boundaries. On the contrary, the fact that a division is not active in knowledge outflows is a sign of a lack of key resources and a poor resource base (Gupta & Govindarajan, 2000). Monteiro, Arvidsson, and Birkinshaw (2008) have supported this reasoning in the context of multinational corporations and report that foreign subsidiaries that are extensively engaged in knowledge outflows to the rest of the corporation are highly rated by the receiving counterparts as having valuable capabilities, while Harzing and Noorderhaven (2006) have detected that foreign subsidiaries with high knowledge outflows report higher relative capabilities than foreign subsidiaries with high knowledge inflows. Cho and Lee (2004) have similarly found that the larger the foreign subsidiary's competitive advantage, the greater the extent to which the foreign subsidiary is engaged in knowledge sharing with the rest of the multinational corporation.

Corporate Innovators with high knowledge outflows and low knowledge inflows, and Integrated Players with high knowledge outflows and high knowledge inflows, have the advantage that a rich resource base is built around the core competences of the corporation. However, Implementers with low knowledge outflows and high knowledge inflows, and Differentiated Innovators, with low knowledge outflows and low knowledge inflows, have the disadvantage of a poor resource base. Those divisions that take on the role of knowledge provider, such as Corporate Innovators and Integrated Players, will consequently have a healthy performance, whereas those divisions that do not play such a role, i.e., Implementers and Differentiated Innovators, will have a poor performance. Following the reasoning above, from the provider knowledge role to the division performance outcome through the underlying resource base, we therefore put forward the set of hypotheses concerning resource endowment as follows:

**H1.** Corporate Innovators outperform Differentiated Innovators (H11), whereas Integrated Players outperform Implementers (H12).

The fact that a division is receiving large amounts of knowledge from the rest of the corporation points to efforts as regards accelerating the accumulation of resources. In fact, the privileged access that divisions have to each other's pools of resources have been considered to be the key aspect for the well-being of related diversified firms as a whole (Prahalad & Hamel, 1990; Markides & Williamson, 1994). The performance implications of this type of behavior are however not necessarily beneficial for individual business units. A division may accumulate resources internally by relying on peer divisions' knowledge or externally by sourcing knowledge from competitors, partners or customers. Previous studies suggest that the internal accumulation of resources may lead the focal division to be locked-in because of a lack of knowledge diversity (Boschma, 2005). For example, Rosenkopf and Nerkar (2001) detected that the reliance on internal over external patents is harmful for innovation in the optical disk industry. In another context, Capaldo and Petruzzelli (2014) found that strategic alliances among affiliated companies that belongs to the same business group are detrimental in terms of innovative performance.

In accordance with our framework, the resource accumulation effects implies a performance comparison of those divisions with low knowledge inflows (Corporate Innovators and Differentiated Innovators) from those with high knowledge inflows (Integrated Players and Implementers). From the above reasoning, we do not expect that the resource accumulation effect entails performance differentials between divisions that takes the role of knowledge receivers and those who do not. We therefore hypothesize the relations as regards resource accumulation as follows:

**H2.** Integrated Players do not outperform Corporate Innovators (H<sub>21</sub>), nor do Implementers outperform Differentiated Innovators (H<sub>22</sub>).

It is important to note that the two previous hypotheses are based on conservative performance comparisons on one knowledge flows while keeping another controlled in order to avoid any confounding effects. Graphically, the comparisons are made by column when the row is fixed or the other way around (see Fig. 2). The diagonal comparisons follow directly from these hypotheses. If Hypotheses 1 and 2 hold, which means that resource endowment is beneficial and resource accumulation is not, pure knowledge providers benefiting from the former such as Corporate Innovators should outperform pure knowledge receivers such as Implementers not benefiting from the latter. Similarly, Integrated Players which plays the double role of knowledge providers and knowledge receivers benefit from the resource endowment effect but not from resource accumulation effect if Hypotheses 1 and 2 hold and, consequently, should outperform Differentiated Innovators which do not benefit the favorable effects of resource endowment nor experiment any consequence owing to the resource accumulation effect. The diagonal comparison that integrates resource endowment and resource accumulation can be formalized as follows:

**H3.** Corporate Innovators outperform Implementers (H31), whereas Integrated Players outperform Differentiated Innovators (H32).

### 3. Methods

The 100 largest Spanish firms with a Rumelt (1974) related corporate strategy were selected for this study, which resulted in a population of 46 firms organized around 214 product divisions. The remaining 54 firms were found to follow an unrelated or dominant corporate strategy in which knowledge flows are not the main intra-firm flow, and were thus excluded from this study. The procedure used to classify the firms into the different categories of corporate strategy is based on the computation of three ratios (specialization, vertical and related ratios) derived from secondary sources of information (details in Rumelt, 1974, 1982; Srivasta, Nargundkar, & Green Ronald, 1994).

The variables were measured by using secondary data for firms taken from corporate annual reports and survey data for business divisions just prior to the financial crisis that hit the global economy in 2008. A questionnaire to be mailed to division general managers was refined and improved by means of a pilot study. After three mailing rounds, we obtained valid information for 116 divisions belonging to 38 firms. The response rate was 83% for firms and 54% for divisions. No response biases were detected between respondents and non-respondents in archival variables such as division size or industry group.

#### 3.1. Knowledge role

The level to which a division is involved in knowledge flows with peer divisions or the corporate office was measured using the multidimensional scale developed by Gupta and Govindarajan (2000) in the context of multinational corporations. This scale captures not only the intensity but also the pattern of knowledge flows (Ambos, Björn, & Schlegelmilch Bodo, 2006; Harzing & Noorderhaven, 2006; McGuinness, Demirbag, & Bandara, 2013). The aforementioned scale was used to allow general managers to assess the degree to which their divisions are involved in knowledge inflows and knowledge outflows with sister divisions and the corporate office in different areas such as knowledge regarding marketing, distribution, product delivery, product design, operations, supply and management. Other researchers have operationalized the level of knowledge transfer in multinational corporations by applying a similar procedure (Ghoshal & Bartlett, 1988; Zhao & Luo, 2005; Minbaeva, 2007). In this paper, the knowledge flow patterns were used as the starting point for the creation of two variables. Knowledge inflow is the level to which a division receives



knowledge from either the corporate office or peer divisions, while knowledge outflow is the level to which a division provides either the corporate office or peer divisions with knowledge (Gupta & Govindarajan, 1994; Harzing & Noorderhaven, 2006). This differentiation between knowledge inflow and knowledge outflow is subsequently used to categorize the divisions' role (Gupta & Govindarajan, 1991).

The internal consistency reliability of the knowledge outflow measure is strong (Cronbach's  $\alpha = 0.893$ ,  $n = 14$  items), as is the knowledge inflow measure (Cronbach's  $\alpha = 0.908$ ,  $n = 14$  items). Content validity was studied by analyzing the correlations between our measurement and other variables in a manner consistent with previous findings. Gupta and Govindarajan (2000) showed that formal coordination improves knowledge transfer among subsidiaries from multinational corporations. Our measurement is consistent with those findings since the level of formal coordination correlates (a) positively with knowledge outflow ( $n = 116$  divisions;  $r = 0.280$ ;  $p < 0.01$ ) and (b) positively with knowledge inflow ( $n = 116$  divisions;  $r = 0.323$ ;  $p < 0.01$ ). These tests support the applicability of a measurement instrument developed for multinationals by Gupta and Govindarajan (2000) for multi-business corporations. The convergent validity, based on 10 questionnaires, was assessed using the inter-rater agreement rate. This rate was over 73% for knowledge outflow and 76% for knowledge inflow, which suggests that there were no interpretation problems among internal observers when these operationalizations were applied. Finally, discriminant validity is also ensured, since a factor analysis of the 28 items of which the knowledge outflow and knowledge inflow scales are composed showed that each item loads on the corresponding factor in a two-factor solution based on the principal component method with a varimax rotation.

### 3.2. Division performance

We have not used a conventional corporate-wide measurement to operationalize performance, but rather a relative performance measurement for each division. The division performance variable was based on an instrument developed by Gupta and Govindarajan (1986), which assesses the level to which a division is effective as regards attaining 10 objectives weighted by the importance of those objectives for the corporate office. The computation of this measurement involves two related scales. First, a 10-item scale which allows us to overview the division's balanced scorecard. Second, a 10-item scale which informs us about the division's ability to do what is required in accordance with the balanced scorecard. The final measurement is a weighted mean with which to address the division's effectiveness as regards performing its corporate-imposed role in the corporate business portfolio in areas such as rate of growth in sales, operating profits, market share, profit-to-sales ratio, return on investment, cash flow from operation, cost reduction programs, new product development, personnel development and political/public affairs (Gupta & Govindarajan, 1986).

The relative character of this measure allows inter-industry and inter-firm division performance comparisons with more confidence than when absolute measures are applied. Moreover, firms tend to revise the objectives attached to each division in the event of environmental shocks not correctly predicted at the beginning of the year, thus controlling unpredicted inter-temporal jolts. Finally, the corporate officers approve division objectives with the purpose of attaining a corporate-wide optimum and, in this respect, cast different the divisions in the business portfolio in different roles. Each division's ability to perform its part is better than absolute measurements as regards measuring the degree to which that division improves corporate performance (Gupta & Govindarajan, 1986).

The content validity of division performance was analyzed using correlations between our measurement and two accounting measurements. Most Spanish firms do not disclose information for business units, but we detected 31 exceptions. The correlation between our division performance measurement and ROA – return on assets – were high

( $n = 31$  divisions;  $r = 0.529$ ;  $p < 0.001$ ), as were those between our division performance measurement and ROE – return on equity – ( $n = 31$  divisions;  $r = 0.447$ ;  $p < 0.001$ ). These findings support the content validity of the division performance measure. The reliability was high (Cronbach's  $\alpha = 0.778$ ;  $n = 10$  items, computed before weighting) and the convergent validity was strong, since the inter-rater agreement rate was over 85% based on 10 questionnaires.

### 3.3. Control variables

Six variables were used to control the division heterogeneity, and the validated scales, instruments and procedures described in other studies were used for this purpose. The *division size* is measured as the natural logarithm of division workforce (Keats & Hitt, 1988). The *industry membership* is operationalized by means of three dummy variables in order to capture four industry groups –water, energy and telecoms; banking and insurance; construction and real estate; and manufacturing– (Dess, Ireland, & Hitt, 1990). The *prospector orientation* gathers key issues concerning the strategy and organization of the divisions, ranging from the defender profile to the prospector profile (Miles & Snow, 1978), in accordance with the general manager's self-typing as regards the degree to which the division tends to change products and markets (Shortell & Zajac, 1990). The *environmental uncertainty* (Cronbach's  $\alpha = 0.800$ ;  $n = 20$  items) measures the general manager's capacity to confront the division environment, made up of the degree to which the suppliers', competitors', financiers', regulators' and workers' actions are unpredictable (Buchko, 1994). The *strategic mission* (Cronbach's alpha = 0.566;  $n = 2$  items) measures the role assigned by the corporate office to the business unit throughout the continuum between the extreme positions of harvesting (prioritizing short-term profitability over long-term market share) and building (prioritizing long-term market share over short-term profitability) (Gupta & Govindarajan, 1984). Finally, the *organizational socialization* measures the corporate offices' efforts as regards integrating their constituent business units by making use of socialization mechanisms (Ghoshal & Bartlett, 1988), operationalized as a summed scale of 2 dichotomous items (Gupta & Govindarajan, 2000).

## 4. Results

The 116 divisions were grouped into four categories according of the level to which they provided rest of the corporation with knowledge or they were users of knowledge from the rest of the corporation. As in the work of Ambos et al. (2006), Gupta and Govindarajan (1994) and Harzing and Noorderhaven (2006), the median values for knowledge outflow and knowledge inflow were used to categorize the sample in accordance with the typology presented in Fig. 2 (Table 1).

A scatterplot analysis of the four knowledge role categories with knowledge outflow and knowledge inflow as the Cartesian axes reveals

**Table 1**  
Division knowledge role based on knowledge flow patterns.

| Category                              | N   | Knowledge outflow |                         | Knowledge inflow |                         |
|---------------------------------------|-----|-------------------|-------------------------|------------------|-------------------------|
|                                       |     | Mean              | Standard deviation (SD) | Mean             | Standard deviation (SD) |
| Corporate Innovator <sup>a</sup>      | 12  | 3.309             | (0.463)                 | 1.970            | (0.317)                 |
| Integrated Player <sup>b</sup>        | 44  | 3.373             | (0.374)                 | 3.069            | (0.443)                 |
| Differentiated Innovator <sup>c</sup> | 44  | 1.998             | (0.443)                 | 1.727            | (0.359)                 |
| Implementer <sup>d</sup>              | 16  | 2.254             | (0.448)                 | 2.745            | (0.351)                 |
| Total                                 | 116 | 2.690             | (0.775)                 | 2.402            | (0.726)                 |

<sup>a</sup> Knowledge outflow  $> 2.714$  and knowledge inflow  $< 2.428$ .

<sup>b</sup> Knowledge outflow  $> 2.714$  and knowledge inflow  $> 2.428$ .

<sup>c</sup> Knowledge outflow  $< 2.714$  and knowledge inflow  $< 2.428$ .

<sup>d</sup> Knowledge outflow  $< 2.714$  and knowledge inflow  $> 2.428$ .

that the categories on the main diagonal (Differentiated Innovators and Integrated Players) are far more populated than those in off-diagonal positions (Corporate Innovators and Implementers), which is consistent with previous findings (Fig. 3).

#### 4.1. Testing of hypotheses

This typology was used as a starting point to carry out an analysis of variance (ANOVA) of division performance by knowledge role in order to test whether the performance of business divisions depends upon the role that they play within the corporate knowledge network. The statistical package SPSS was used for both this and subsequent analyses. The results from the ANOVA show that the knowledge role played by divisions is a powerful determinant of division performance with significant performance differences at a level of confidence exceeding 99% (Table 2, section I). The analysis of pairwise comparisons additionally reveals support for all three subsets of the hypotheses with confidence levels ranging between 95% and 99% in accordance with the most conservative method, i.e., that which detected the smaller division performance differences. (Table 2, section II). As predicted, Corporate Innovators outperform Differentiated Innovators ( $H_{11}$ ) and Implementers ( $H_{31}$ ), and the same occurs in the case of Integrated Players with respect to Implementers ( $H_{21}$ ) and Differentiated Innovators ( $H_{32}$ ), whereas Integrated Players do not outperform Corporate Innovators ( $H_{31}$ ) nor do Implementers outperform Differentiated Innovators ( $H_{32}$ ).

It was believed necessary to provide further confidence in the preliminary results derived from the ANOVA and rule out the possibility of some other reasons being behind the performance differences across the four knowledge roles that a division may take within the corporate network. An analysis of covariance (ANCOVA) was therefore employed to account for the potential effect of some covariates, such as division size, industry membership, strategic orientation, environmental uncertainty, strategic mission and organizational socialization. The total model and the main effect of the knowledge role were significant in explaining division performance, as were the covariate effects of industry membership, prospector orientation, environmental uncertainty, strategic mission and organizational socialization, thus indicating that a division's knowledge role is important as regards explaining division performance even when those covariate effects are taken into account (Table 3, section I).

**Table 2**  
ANOVA of division performance by knowledge role.

| I. Analysis of variance             |                          |                 |                    |             |         |
|-------------------------------------|--------------------------|-----------------|--------------------|-------------|---------|
| Effect                              | Source                   | Sum of squares  | Degrees of freedom | Mean square | F-value |
| One-way <sup>a</sup>                | Between groups           | 05.820          | 3                  | 1.940       | 9.853** |
|                                     | Within groups            | 22.052          | 112                | 0.197       |         |
|                                     | Total                    | 27.872          | 115                |             |         |
| II. Post Hoc (Tamhane) <sup>b</sup> |                          |                 |                    |             |         |
| Group                               | Comparison               | Mean difference | Standard error     |             |         |
| Corporate Innovator                 | Differentiated Innovator | 0.460*          | 0.152              |             |         |
|                                     | Implementer              | 0.746**         | 0.206              |             |         |
|                                     | Integrated Player        | 0.178           | 0.154              |             |         |
| Integrated Player                   | Differentiated Innovator | 0.282**         | 0.085              |             |         |
|                                     | Implementer              | 0.568*          | 0.163              |             |         |
| Implementer                         | Corporate Innovator      | -0.178          | 0.154              |             |         |
|                                     | Differentiated Innovator | -0.286          | 0.161              |             |         |

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

<sup>a</sup> Levene's test rejects the null hypothesis of variance homogeneity ( $F = 3.141$ ;  $p < 0.028$ ).

<sup>b</sup> The 4 methods based on the variance heterogeneity assumption detect significant differences. We present the results using the Tamhane method since it is the more conservative, that is to say, it is that which detects the smaller division performance differences.

The post hoc analysis of covariance allowed vis-à-vis comparisons to be made between the different knowledge roles that a business division can play. Again, the results obtained from the ANCOVA reinforce those derived from the ANOVA (Table 3, section II), which is noteworthy because, unlike the ANOVA, the ANCOVA uses adjusted values of division performance after accounting for the effects of covariates – 5 out of 6 are significant at varying levels. Moreover, it is interesting to note that the unbalanced distribution of cases among categories may be interpreted positively in the light of these results, since it is more difficult to obtain statistically significant differences in this context. Consistent with previous findings, prospector orientation and organizational socialization improves division performance (Puranam, Singh, & Chaudhuri, 2009), whereas environmental uncertainty and building a strategic mission damages it. The comparisons remained significant in the results obtained from the ANCOVA and are parallel to those derived from the ANOVA, with the exception of the performance comparison between Implementers and Differentiated Innovators, which is negative and significant, contrary to what was detected by the ANOVA. This means that the resource accumulation effect might not be neutral as predicted in the second hypothesis, and may even be detrimental for knowledge receivers in some instances.

To further explore this result as regards the resource accumulation effect, the comparison of unadjusted values derived from the ANOVA with the adjusted values obtained from the ANCOVA reveals a substantial drop in the division performance of Corporate Innovators ( $-3.71\%$ ), which is less pronounced in the case of Implementers ( $-1.31\%$ ), and a notable rise for Differentiated Innovators ( $+1.64\%$ ), with almost no changes for Integrated Players when the effect of covariates are taken into account (Table 4).

The drop in the division performance of Implementers and the rise in the case of Differentiated Innovators explain the fact that their pairwise comparison gained statistical significance in the fine-grained results derived from the ANCOVA. The drop in the division performance of Corporate Innovators was not, however, sufficiently great to be able to obtain a similar result in comparison with Integrated Players. Overall, the results support the second hypothesis consisting of an unfavorable effect of resource accumulation within the corporate network boundaries, but with the important qualification that the effect is not only neutral but even detrimental in some cases.

#### 4.2. Robustness tests

A stepwise ordinary least square (OLS) regression analysis of division performance was performed in order to test the robustness of these findings. The regression analysis is similar to the ANCOVA with the exception that instead of four categorical variables (the four knowledge roles), two continuous variables (knowledge outflow and knowledge inflow) were introduced as explanatory variables. The regression results are therefore less precise than those derived from the ANCOVA, but are, however, more statistically powerful given that the explanatory variables impose less restrictions on the degrees of freedom. The results from the baseline regression analysis in Model 1 show a similar pattern as regards control variables to those derived from the ANCOVA as regards covariates, with industry membership, prospector orientation, environmental uncertainty, strategic mission and organizational socialization, reaching significance at varying levels of confidence (Table 5).

The addition of knowledge outflow to the regression analysis in Model 2 improves its overall explanatory power as regards the baseline model and detects that knowledge outflow impacts positively and significantly on division performance. On the contrary, the addition of knowledge inflow to the regression analysis in Model 3 deteriorates the overall fit as regards the baseline model and results in a non-significant relationship for knowledge inflow. The regression equation which best fits the data is that specified in Model 4 in which knowledge outflow and knowledge inflow are simultaneously introduced as independent variables together with all the control variables. This specification

**Table 3**  
ANCOVA of division performance by knowledge role.

| I. Analysis of covariance                                |   |                         |                    |             |                    |
|--|---|-------------------------|--------------------|-------------|--------------------|
| Effect   | Source                                  | Type III sum of squares | Degrees of freedom | Mean square | F-Value            |
| Total <sup>a</sup>                                       | Intercept                               | 18.382                  | 1                  | 18.382      | 115.407**          |
|  | Corrected model                         | 11.307                  | 11                 | 1.028       | 6.454**            |
| Covariate  | Division size                           | 0.138                   | 1                  | 0.138       | 0.869              |
|  | Water, energy & telecoms <sup>b</sup>   | 0.537                   | 1                  | 0.537       | 3.374 <sup>+</sup> |
|  | Banking & insurance <sup>b</sup>        | 1.304                   | 1                  | 1.304       | 8.189**            |
|  | Construction & real estate <sup>b</sup> | 0.172                   | 1                  | 0.172       | 1.080              |
|  | Prospector orientation                  | 0.441                   | 1                  | 0.441       | 2.766 <sup>+</sup> |
|  | Environmental uncertainty               | 0.944                   | 1                  | 0.944       | 5.926*             |
|  | Strategic mission                       | 0.516                   | 1                  | 0.516       | 3.241 <sup>+</sup> |
|  | Organizational socialization            | 0.735                   | 1                  | 0.735       | 4.612*             |
|  | Main <sup>c</sup>                       | Knowledge role          | 04.870             | 3           | 1.623              |
| II. Post Hoc (Least Significant Difference) <sup>d</sup> |   |                         |                    |             |                    |
| Group  | Comparison                              |                         | Mean difference    |             | Standard error     |
| Corporate Innovator                                      | Differentiated innovator                |                         | 0.245 <sup>+</sup> |             | 0.139              |
|  | Implementer                             |                         | 0.637**            |             | 0.157              |
|  | Integrated player                       |                         | 0.025              |             | 0.138              |
| Integrated Player  | Differentiated innovator                |                         | 0.220*             |             | 0.091              |
|  | Implementer                             |                         | 0.612**            |             | 0.118              |
|  | Corporate innovator                     |                         | −0.025             |             | 0.138              |
| Implementer  | Differentiated innovator                |                         | −0.392**           |             | 0.121              |

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

<sup>+</sup>  $p < 0.10$ .

<sup>a</sup> Model significance including the main effect of knowledge role and the effect of covariates.

<sup>b</sup> Industry membership; the effects must be interpreted in contrast with the omitted 'Manufacturing' group.

<sup>c</sup> Levene's test does not reject the null hypothesis that the error variance of division performance is equal across knowledge roles ( $F = 1.998$ ;  $p < 0.118$ ) after accounting for the effects of covariates.

<sup>d</sup> Pairwise comparisons based on the adjusted values of division performance after accounting for the effects of covariates.

leads to the larger improvement in explanatory capacity as regards the baseline model and produces statistically significant estimators for both main variables, which are positive for knowledge outflow and negative for knowledge inflow. These results, which are consistent with those obtained previously using the analyses based on the knowledge roles, support the favorable effect of resource endowment as regards the positive sign of knowledge outflow and the detrimental effect of resource accumulation as regards the negative sign of knowledge inflow.

#### 4.3. Summary of findings

The **Hypothesis 1** encompasses the *resource endowments* effect and contends that Corporate Innovators outperform Differentiated Innovators ( $H_{11}$ ) whereas Integrated Players outperform Implementers ( $H_{12}$ ). The results from the ANOVA and ANCOVA support this first set of hypotheses and the results from the OLS regression further reinforce them with a positive sign of knowledge outflow.

The **Hypothesis 2** comprises the *resource accumulation* effect and indicates that Integrated Players do not outperform Corporate Innovators ( $H_{21}$ ) and Implementers do not outperform Differentiated Innovators ( $H_{22}$ ). The results from the ANOVA and ANCOVA provide support for

this second set of hypotheses, while the results from the OLS regression also confirm them with a negative sign of knowledge inflow in the best-fitted model. Despite the fact that the resource accumulation effect is not favorable as outlined in **Hypothesis 2**, this finding requires further qualifications as it is neutral for some knowledge receivers such as Integrated Players and detrimental for others such as Implementers. This qualification passed unnoticed in the context of the ANOVA results, but was detected by the ANCOVA and further evidenced by the changing coefficients for knowledge inflow in the context of the stepwise regression analysis.

The **Hypothesis 3** is a less conservative test of the previous two hypotheses in the sense that it makes diagonal comparisons, i.e., comparisons in which both effects are mixed and no one effect is controlled for when testing for another. Again, the results of the ANOVA and ANCOVA strongly support **Hypothesis 3** since pure knowledge providers such as they are Corporate Innovators outperform pure knowledge receivers such as they are Implementers, thus confirming the relevance of the resource endowments effect. Similarly, those divisions that take knowledge provider and knowledge receivers roles simultaneously such as they are Integrated Players outperform those divisions that do not play any of the roles such as they are Differentiated Innovators. Put in

**Table 4**  
Division performance means and variability for knowledge roles.

| Category                 | N   | Unadjusted <sup>a</sup> |                         | Adjusted <sup>b</sup> |                     | Comparison<br>Changes in means (%) |
|--------------------------|-----|-------------------------|-------------------------|-----------------------|---------------------|------------------------------------|
|                          |     | Mean                    | Standard deviation (SD) | Mean                  | Standard error (SE) |                                    |
| Corporate Innovator      | 12  | 4.175                   | (0.487)                 | 4.020                 | (0.122)             | −3.71%                             |
| Integrated Player        | 44  | 3.997                   | (0.422)                 | 3.996                 | (0.062)             | −0.03%                             |
| Differentiated Innovator | 44  | 3.715                   | (0.382)                 | 3.776                 | (0.063)             | 1.64%                              |
| Implementer              | 16  | 3.429                   | (0.602)                 | 3.384                 | (0.101)             | −1.31%                             |
| Total                    | 116 | 3.830                   | (0.492)                 |                       |                     |                                    |

<sup>a</sup> Unadjusted mean and variability values are used in the context of Analysis of Variance (ANOVA).

<sup>b</sup> Adjusted mean and variability values are used in the context of Analysis of Covariance (ANCOVA) and resulted from a linear regression model with division size, industry membership, prospector orientation, environmental uncertainty, strategic mission and organizational socialization as explanatory variables, including an intercept term ( $R^2 = 0.406$ ;  $R^2_{\text{adjusted}} = 0.343$ ).

**Table 5**  
OLS linear regression (dependent variable: division performance).

| Effect          | Variable                                | Unstandardized coefficient (standard error) |                 |                 |                 |
|-----------------|---|---|-----------------|-----------------|-----------------|
|                 |   | Model 1 controls                            | Model 2 outflow | Model 3 inflow  | Model 4 total   |
| Covariate       | Constant                                | 3.933 (0.401)                               | 3.431 (0.391)   | 3.909 (0.403)   | 3.332 (0.386)   |
|                 | Division size                           | 0.019 (0.020)                               | 0.017 (0.019)   | 0.017 (0.020)   | 0.025 (0.019)   |
|                 | Water, energy & telecoms <sup>a</sup>   | 0.367* (0.168)                              | 0.222 (0.159)   | 0.338+ (0.173)  | 0.276+ (0.158)  |
|                 | Banking & insurance <sup>a</sup>        | 0.317** (0.113)                             | 0.253* (0.106)  | 0.307** (0.114) | 0.264* (0.104)  |
|                 | Construction & real estate <sup>a</sup> | 0.166 (0.131)                               | 0.142 (0.122)   | 0.161 (0.131)   | 0.154 (0.119)   |
|                 | Prospector orientation                  | 0.066+ (0.039)                              | 0.065+ (0.036)  | 0.065+ (0.039)  | 0.069+ (0.036)  |
|                 | Environmental uncertainty               | -0.243* (0.108)                             | -0.252* (0.100) | -0.258* (0.110) | -0.196+ (0.101) |
|                 | Strategic mission                       | -0.079+ (0.043)                             | -0.074+ (0.040) | -0.080+ (0.043) | -0.066+ (0.039) |
|                 | Organizational socialization            | 0.190+ (0.114)                              | 0.163 (0.106)   | 0.181 (0.115)   | 0.188+ (0.105)  |
| Main            | Knowledge outflow                       |   | 0.220** (0.052) |                 | 0.302** (0.063) |
|                 | Knowledge inflow                        |   |                 | 0.042 (0.063)   | -0.158* (0.071) |
| Goodness of fit | F                                       | 4.017**                                     | 6.125**         | 3.601**         | 6.220**         |
|                 | R <sup>2</sup>                          | 0.231                                       | 0.342           | 0.234           | 0.372           |
|                 | ΔR <sup>2</sup>                         |   | 0.111**         | 0.003           | 0.141**         |
|                 | N                                       | 116   | 116             | 116             | 116             |

\* p < 0.05.  
 \*\* p < 0.01.  
 + p < 0.10.  
<sup>a</sup> Industry membership; the effects must be interpreted in contrast with the omitted 'Manufacturing' group.

other terms, the direct comparisons between pure players on the one hand and mixed and no players on the other hand provide support to the beneficial effects of resource endowments and the negligible effects of resource accumulation.

**5. Discussion and conclusion**

The RVB of rent creation explains performance differentials among firms on the grounds of their ability to possess and accumulate unique resources (Barney, 1989; Dierickx & Cool, 1989) through the interplay of resource-pickering and capability-building mechanisms (Makadok, 2001). This study investigates these issues in the richer context of related diversified firms in which these processes can be explored at a deeper level by looking at knowledge exchanges among their constituent business units (Tsai, 2001) and the corresponding knowledge role that they play within the internal corporate network (Gupta & Govindarajan, 2000).

The results support the importance of division knowledge as regards understanding division performance within related firms. Those business divisions with high knowledge outflows to the rest of the corporation have the advantages that a rich resource base is developed around the core competences of the corporation. On the contrary, those business divisions with low knowledge outflows to the rest of the corporation do not have a resource base on which to sustain their operations (Fig. 4).

Divisions that are strong in knowledge outflow, such as Corporate Innovators and Integrated Players, outperform divisions that are weak in knowledge outflow, such as Implementers and Differentiated Innovators, respectively, thus highlighting the beneficial effects of having VRIN resource endowments uncovered by knowledge outflows. This study confirms in the context of multi-business firms what has been previously detected in the research on multinational corporations (Cho & Lee, 2004; Harzing & Noorderhaven, 2006; Monteiro et al., 2008).

The resources at the disposal of multi-business firms are unevenly distributed across the business units into which they are internally

organized. The knowledge flows among business units are therefore an indicator of that asymmetric distribution; if a multi-business firm has unique resources, then they are placed in those business units that provide knowledge to the rest of the corporation, as in the cases of Corporate Innovators and Integrated Players with high knowledge outflows. This study does not directly confront the complicated challenge of elucidating whether a business unit's resource endowments meet the VRIN criteria on a standalone base. Instead, it follows an indirect approach to identify where those VRIN resources are placed on an interdependent base, and one that considers the knowledge role that business units play within their respective corporate networks.

The study of top diversified firms which concentrates most of the corporate resources in the economy and the restriction to only related diversifiers in which the knowledge flows better reflect the underlying resource endowments provides greater confidence in the aforementioned indirect approach. Moreover, these study design choices minimize the risk of the occurrence of reverse causation from division performance to knowledge role, notwithstanding that the RBV theory sees past performance as an endogenous factor in the accumulation processes leading to available resource endowments at a given moment. Past performance is therefore incorporated into the resource base and issues of reverse causation are thus discarded, at least from a theoretical point of view. Overall, the study finds that business units that take on knowledge provider roles perform better than those that do not play those roles, which is consistent with an RBV explanation of performance differentials within related diversified firms owing to the uneven internal distribution of resource endowments.

Our findings suggest that the role of knowledge inflow is not favorable for division performance, ranging from a neutral effect with no differences between Corporate Innovators and Integrated Players to a detrimental effect with Implementers being outperformed by Differentiated Innovators (see Fig. 2). This study adds to the growing literature that warns against relying too much on the internal knowledge network to accumulate VRIN resources (Rosenkopf & Nerkar, 2001; Capaldo & Petruzzelli, 2014).

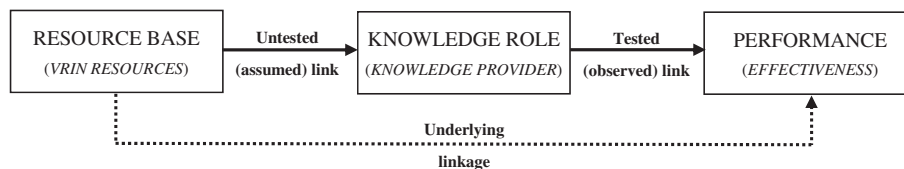


Fig. 3. Overview of causal linkages from resource base and knowledge role to performance.



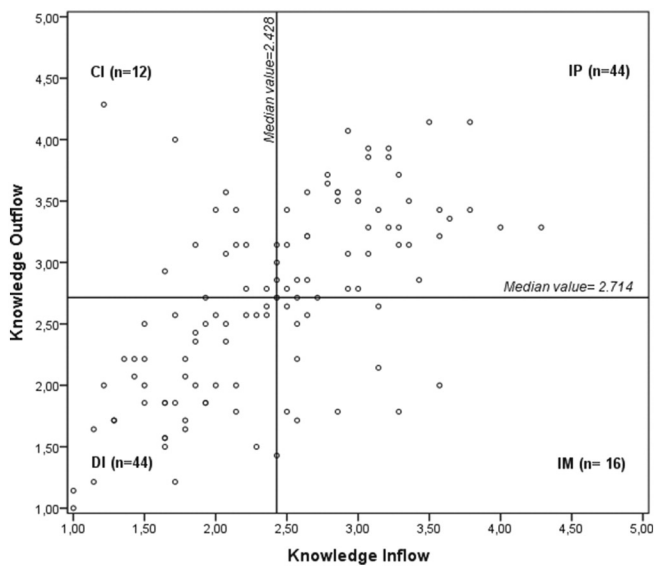


Fig. 4. Scatterplot of knowledge roles.

The business divisions that play the role of knowledge receivers are actively pursuing internal accumulation processes aimed at capability-building within the corporate knowledge network. In contrast with the resource endowments effect discussed above, the processes that are related to the resource accumulation effect are time-consuming, remain uncertain as regards accomplishments and take time to impact on performance (Dierickx & Cool, 1989; Knott, Bryce, & Posen Hart, 2003; Karim & Kaul, 2015). More important than these potential lagging issues is, in the case of multi-business firms, the unique question that business units have the opportunity to accumulate resources within or outside the corporate boundaries. This study only considers the internal accumulation processes that a business unit may develop by absorbing knowledge from sister business units, but it overlooks the external accumulation processes that a business unit may also pursue based on knowledge from customers, suppliers and partners beyond the multi-business firm boundaries.

As with many other managerial decisions, firms are rarely able to follow alternative paths simultaneously (Kumar, 2009; Filippini, Güttel, & Nosella, 2012; Gatti, Volpe, & Vagnani, 2015), so there are reasons to suspect that internal knowledge receivers (Integrated Players and Implementers) are prone to neglecting external accumulation processes, whereas their counterparts that do not rely on knowledge inflows (Corporate Innovators and Differentiated Innovators) are focused on external accumulation processes. Previous studies have shown that accumulation processes that overly focus on internal networks produce unfavorable outcomes as a consequence of the resulting lack of knowledge diversity (Rosenkopf & Nerkar, 2001; Capaldo & Petruzzelli, 2014). This may explain the fact that Implementers, which overly focus on internal knowledge inflows, are outperformed by Differentiated Innovators, which reportedly focus on their external knowledge networks (Harzing & Noorderhaven, 2006).

### 5.1. Research implications

This study has research implications in the fields of knowledge management, diversification strategy and the RBV theory. With respect to knowledge management, previous studies dealing with the performance consequences of internal knowledge transfer do not make the distinction between knowledge inflows and knowledge outflows, which could explain the contradictory findings derived from these studies (Ding, Liu, & Song, 2013). Our results suggest that future studies would benefit from considering not only the intensity but also the directionality of internal knowledge transfer processes. In this regard, the

conceptual framework presented herein allows extending the classification proposed by Gupta and Govindarajan (1991) in a normative sense with the corresponding prescriptive implications, as suggested by Harzing and Noorderhaven (2006). These knowledge roles could be useful in future studies on internal knowledge transfer processes, as either the independent or the control variable.

This study follows several guidelines suggested in the research on diversification strategy, such as those dealing with adopting a business unit level of analysis wherein synergistic effects are more apparent (Davis, Robinson, Pearce, & Ho, 1992; Dess, Gupta, Hennart, & Hill, 1995; Hauschild & Knyphausen-Aufseß, 2013), focusing on business relatedness as the most appropriate concept in the study of diversification (Pehrsson, 2006b; Bausch & Pils, 2009), using survey based research to capture managerial perceptions of relatedness (Nayyar, 1992; Stimpert & Duhaime, 1997; Pehrsson, 2006a; Nath et al., 2010) and asking real-world managers not only whether their businesses are related, but also whether strategic resources are actually transferred among related businesses (Tanriverdi & Venkatraman, 2005; Hauschild & Knyphausen-Aufseß, 2013). Despite any step in these directions increases notably the ensuing research efforts, future studies may consider adopting the so-called network approach to diversification along these lines in order to more accurately delineate the diversification phenomenon and its performance implications (see Fig. 1).

This study also contributes to the empirical testing of the RBV by applying an elaborated methodological approach to uncover the elusive concept of VRIN resources (Barney et al., 2011). As is depicted in Fig. 4, we use knowledge flows as observable surrogates of an unobservable phenomenon such as it is the business unit's resource base and, particularly, whether it meets the VRIN criteria or not. As indicated by Barney and Arikan (2001), this type of testing approach to RBV is one of the more promising methodological strategies to confront RBV predictions with reality (Barney & Mackey, 2005). Another important contribution on the empirical front is the use of dynamic, process- and behavior-based indicators of underlying resources. As Newbert (2007) detected in its systematic review of the empirical research on the RBV, the mere possession of superior resources is less important than the deployment of those resources for gaining a competitive advantage. Our findings are based on how business units make use of existing resources within the knowledge network that the related diversified firm represents. In this study, the results support the view that is the possession of a unique resource base which matters such in the case of pure knowledge providers (Corporate innovators), whereas the deployment of those resources elsewhere in the firm has not always favorable consequences such in the case of pure knowledge receivers (Implementers). This argument should be interpreted with cautious, however, because the performance is defined at the business unit level and it may be well possible that the overall effect of knowledge flows within related diversified firms remains favorable, no matter whether there are individual winners and losers in the race for corporate synergy.

### 5.2. Managerial implications

This study has several implications for both corporate officers and division general managers. Our results show that there are winners and losers in the quest for corporate synergies based on knowledge assets. Well-endowed divisions within the knowledge network take advantage of their resource bases to have a healthy performance (Corporate Innovators), even in the case of also receiving knowledge from the rest of the corporation (Integrated Players). However, divisions that are weak in knowledge outflow are isolated from the knowledge network (Differentiated Innovators) or occupy an ex-centric network position which relegates them to a passive role as knowledge users in comparison to the rest of the corporation (Implementers).

From the perspective of division general managers, it is useful to trace the knowledge role of their divisions through the easy-to-use schema outlined in Fig. 2. If the division occupies a differentiated

innovator role, the general manager could seek opportunities to integrate his or her division into the knowledge network by means of (a) new products within the division based on knowledge from peer divisions, (b) new products within another division based on knowledge from the focal division, or (c) completely new businesses based on the recombination of knowledge from the focal division and peer divisions. Otherwise, the likelihood of being sold to another corporation would appear to be high. If the division plays an implementer role, then the recipe is to improve its resource base on the basis of knowledge inflow from the rest of the corporation, which may render the opportunity of becoming a corporate innovator or integrated player in the medium to long term.

From a corporate officer perspective, the viewpoint must change toward the whole division knowledge role portfolio. An important concern for corporate officers would be to determine whether Differentiated innovators and Implementers are necessary for the corporate knowledge network to perform well. Our study does not provide a definitive answer to this question since we have analyzed certain divisions belonging to different firms rather than all the divisions from each firm, but it appears that the corporate cast involves the distribution of both winning roles and losing roles. Future studies could compare the performance outcomes of knowledge role portfolios from different related firms.

### 5.3. Limitations and future research

This study has some limitations. On the theoretical and methodological fronts, the knowledge roles played by divisions have been connected to the resource base employed by those divisions taking a contemporaneous causation (Bausch & Pils, 2009). The cross-sectional research design used in this study prevented the investigation of dynamically-oriented issues such as knowledge learning, knowledge adaptation or knowledge depreciation, which can be associated with knowledge flows within diversified corporations. Furthermore, potential issues of reverse causation from division performance to knowledge role cannot be empirically ascertained. Future studies could collect longitudinal data for the dynamic analysis of these concepts in order to complement resource-based considerations with knowledge-based and capability reasoning and shed light on issues of causality (Erden, Klang, Renato, & von Krogh, 2014).

On the empirical front, the sample size and the unbalanced distributions of cases throughout the different knowledge role categories permit only a very conservative testing of the hypothesis. Considering that the hypothesis is supported, the level of conservativeness runs in favor of the findings achieved as regards the performance advantages of those divisions that take on the role of knowledge provider (Corporate Innovators and Integrated Players), but it may also be possible that some performance differences associated with the fact of being a knowledge receiver went unnoticed owing to statistical power issues. Future studies based on larger samples may confirm whether or not there are performance differences between Corporate Innovators and Integrated Players or between Differentiated Innovators and Implementers.

Another interesting extension of the present study might be to consider not only related diversifiers but also unrelated diversifiers and dominant-business firms. It is plausible that dominant-business and unrelated firms have a different pattern in the knowledge flows among the divisions into which they are organized, thus offering a richer picture of the performance consequences of internal knowledge transfer processes.

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### References

- Ambos, T. C., Björn, A., & Schlegelmilch Bodo, B. (2006). Learning from foreign subsidiaries: An empirical investigation of headquarters' benefits from reverse knowledge transfers. *International Business Review*, 15(3), 294–312.
- Azan, W., & Sutter, I. H. (2010). Knowledge transfer in post-merger integration management: Case study of a multinational healthcare company in Greece. *Knowledge Management Research and Practice*, 8(4), 307–321.
- Barney, J. B. (1986). Strategic factor markets: Expectations, luck, and business strategy. *Management Science*, 32(10), 1231–1241.
- Barney, J. B. (1989). Asset stocks and sustained competitive advantage: A comment. *Management Science*, 35(12), 1511–1513.
- Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Barney, J. B., & Arian, A. M. (2001). The resource-based view: Origins and implications. In M. A. Hitt, E. R. Freeman, & J. S. Harrison (Eds.), *The Blackwell handbook of strategic management* (pp. 124–188). Oxford: Blackwell.
- Barney, J. B., Ketchen, D. J., & Mike, W. (2011). The future of resource-based theory: Revalidation or decline? *Journal of Management*, 37(5), 1299–1315.
- Barney, J. B., & Mackey, T. B. (2005). Testing resource-based theory. In D. J. Ketchen, & D. D. Bergh (Eds.), *Research methodology in strategy and management*. Vol. 2. (pp. 1–13). Greenwich, CT: Elsevier.
- Bausch, A., & Pils, F. (2009). Product diversification strategy and financial performance: Meta-analytic evidence on causality and construct multidimensionality. *Review of Managerial Science*, 3(3), 157–190.
- Boschma, R. A. (2005). Proximity and innovation: A critical assessment. *Regional Studies*, 39(1), 61–74.
- Breschi, S., Lissoni, F., & Malerba, F. (2003). Knowledge-relatedness in firm technological diversification. *Research Policy*, 32(1), 69–87.
- Buchko, A. A. (1994). Conceptualization and measurement of environmental uncertainty: An assessment of the Miles and Snow perceived environmental uncertainty scale. *Academy of Management Journal*, 37(2), 410–425.
- Capaldo, B. A., & Petruzzelli, A. M. (2014). Partner geographic and organizational proximity and the innovative performance of knowledge-creating alliances. *European Management Review*, 11(1), 63–84.
- Cho, K. R., & Lee, J. (2004). Firm characteristics and MNC's intra-network knowledge sharing. *Management International Review*, 44(4), 435–455.
- Davis, R., & Thomas, L. G. (1993). Direct estimation of synergy: A new approach to the diversity-performance debate. *Management Science*, 39(11), 1334–1346.
- Davis, P. S., Robinson, R. B., Pearce, J. A., & Ho, P. S. (1992). Business unit relatedness and performance: A look at the pulp and paper industry. *Strategic Management Journal*, 13(5), 349–361.
- Dess, G. G., Ireland, R. D., & Hitt, M. A. (1990). Industry effects and strategic management research. *Journal of Management*, 16(1), 7–27.
- Dess, G. G., Gupta, A., Hennart, J. -F., & Hill, C. W. L. (1995). Conducting and integrating strategy research at the international, corporate, and business levels: Issues and directions. *Journal of Management*, 21(3), 357–393.
- Dierickx, I., & Cool, K. (1989). Asset stock accumulation and sustainability of competitive advantage. *Management Science*, 35(12), 1504–1511.
- Ding, X. -H., Liu, H., & Song, Y. (2013). Are internal knowledge transfer strategies double-edged swords? *Journal of Knowledge Management*, 17(1), 69–86.
- Ellis, K. M. (2000). Strategic contexts, knowledge flows, and the competitiveness of MNCs: A procedural justice approach. *Competitiveness Review*, 10(1), 9–24.
- Erden, Z., Klang, D., Renato, S., & von Krogh, G. (2014). Knowledge-flows and firm performance. *Journal of Business Research*, 67(1), 2777–2785.
- Fang, Y., Wade, M., Delios, A., & Beamish Paul, W. (2007). International diversification, subsidiary performance, and the mobility of knowledge resources. *Strategic Management Journal*, 28(10), 1053–1064.
- Farjoun, M. (1998). The independent and joint effects of the skill and physical bases of relatedness in diversification. *Strategic Management Journal*, 19(7), 611–630.
- Filippini, R., Güttel, W. H., & Nosella, A. (2012). Ambidexterity and the evolution of knowledge management initiatives. *Journal of Business Research*, 65(3), 317–324.
- Foss, N. J., & Pedersen, T. (2002). Transferring knowledge in MNCs: The role of sources of subsidiary knowledge and organizational context. *Journal of International Management*, 8(1), 49–67.
- Gatti, C., Volpe, L., & Vagnani, G. (2015). Interdependence among productive activities: Implications for exploration and exploitation. *Journal of Business Research*, 68(3), 711–722.



- Ghoshal, S., & Bartlett, C. A. (1988). Creation, adoption, and diffusion of innovations by subsidiaries of multinational corporations. *Journal of International Business Studies*, 19(3), 365–388.
- Gooderham, P. N. (2007). Enhancing knowledge transfer in multinational corporations: A dynamic capabilities driven model. *Knowledge Management Research and Practice*, 5(1), 34–43.
- Govindarajan, V., & Fisher, J. (1990). Strategy, control systems, and resource sharing: Effects on business-unit performance. *Academy of Management Journal*, 33(2), 259–285.
- Govindarajan, V., & Gupta, A. K. (1985). Linking control systems to business unit strategy: Impact on performance. *Accounting, Organizations and Society*, 10(1), 51–66.
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17, 109–122 (Winter Special Issue).
- Gupta, A. K., & Govindarajan, V. (1984). Business unit strategy, managerial characteristics, and business unit effectiveness at strategy implementation. *Academy of Management Journal*, 27(1), 25–41.
- Gupta, A. K., & Govindarajan, V. (1986). Resource sharing among SBUs: Strategic antecedents and administrative implications. *Academy of Management Journal*, 29(4), 695–714.
- Gupta, A. K., & Govindarajan, V. (1991). Knowledge flows and the structure of control within multinational corporations. *Academy of Management Review*, 16(4), 768–792.
- Gupta, A. K., & Govindarajan, V. (1994). Organizing for knowledge flows within MNCs. *International Business Review*, 3(4), 443–457.
- Gupta, A. K., & Govindarajan, V. (2000). Knowledge flows within multinational corporations. *Strategic Management Journal*, 21(4), 473–496.
- Harzing, A. -W., & Noorderhaven, N. (2006). Knowledge flows in MNCs: An empirical test and extension of Gupta and Govindarajan's typology of subsidiary roles. *International Business Review*, 15(3), 195–214.
- Hauschild, S., & Knyphausen-Aufseß, D. Z. (2013). The resource-based view of diversification success: Conceptual issues, methodological flaws, and future directions. *Review of Managerial Science*, 7(3), 327–363.
- Hill, C. W. L. (1988). Internal capital market controls and financial performance in multi-divisional firms. *Journal of Industrial Economics*, 37(1), 67–83.
- Karim, S., & Kaul, A. (2015). Structural recombination and innovation: Unlocking intraorganizational knowledge synergy through structural change. *Organization Science*, 26(2), 439–455.
- Keats, B. W., & Hitt, M. A. (1988). A causal model of linkages among environmental dimensions, macro organizational characteristics, and performance. *Academy of Management Journal*, 31(3), 570–598.
- Khamesh, H. M., & Jolly, D. (2014). Knowledge transfer in alliances: The moderating role of the alliance type. *Knowledge Management Research and Practice*, 12(4), 409–420.
- Knott, A. M., Bryce, D. J., & Posen Hart, E. (2003). On the strategic accumulation of intangible assets. *Organization Science*, 14(2), 192–207.
- Kodama, M. (2006). Knowledge-based view of corporate strategy. *Technovation*, 26(12), 1390–1406.
- Kor, Y. Y., & Leblebici, H. (2005). How do interdependencies among human-capital deployment, development, and diversification strategies affect firms' financial performance? *Strategic Management Journal*, 26(10), 967–985.
- Kraaijenbrink, J., Spender, J. -C., & Groen Aard, J. (2010). The resource-based view: A review and assessment of its critiques. *Journal of Management*, 36(1), 349–372.
- Kumar, M. V. S. (2009). The relationship between product and international diversification: The effects of short-run constraints and endogeneity. *Strategic Management Journal*, 30(1), 99–116.
- Kumar, A., & Ganesh, L. S. (2009). Research on knowledge transfer in organizations: A morphology. *Journal of Knowledge Management*, 13(4), 161–174.
- Lemelin, A. (1982). Relatedness in the patterns of interindustry diversification. *The Review of Economics and Statistics*, 64(4), 646–657.
- Liebeskind, J. P. (2000). Internal capital markets: Benefits, costs, and organizational arrangements. *Organization Science*, 11(1), 58–76.
- Lin, Y., & Wu, L. -Y. (2014). Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. *Journal of Business Research*, 67(3), 407–413.
- Makadok, R. (2001). Toward a synthesis of the resource-based and dynamic-capability views of rent creation. *Strategic Management Journal*, 22(5), 387–401.
- Markides, C. C., & Williamson, P. J. (1994). Related diversification, core competences and corporate performance. *Strategic Management Journal*, 15(S2), 149–165.
- McGuinness, M., Demirbag, M., & Bandara, S. (2013). Towards a multi-perspective model of reverse knowledge transfer in multinational enterprises: A case study of coats plc. *European Management Journal*, 31(2), 179–195.
- Miles, R. E., & Snow, C. C. (1978). *Organizational strategy, structure, and process*. New York: McGraw-Hill.
- Miller, D. J. (2006). Technological diversity, related diversification, and firm performance. *Strategic Management Journal*, 27(7), 601–619.
- Miller, D. J., Fern, M. J., & Cardinal, L. B. (2007). The use of knowledge for technological innovation within diversified firms. *Academy of Management Journal*, 50(2), 308–326.
- Minbaeva, D. B. (2007). Knowledge transfer in multinational corporations. *Management International Review*, 47(4), 567–593.
- Monteiro, L. F., Arvidsson, N., & Birkinshaw, J. (2008). Knowledge flows within multinational corporations: Explaining subsidiary isolation and its performance implications. *Organization Science*, 19(1), 90–107.
- Nath, P., Nachiappan, S., & Ramanathan, R. (2010). The impact of marketing capability, operations capability and diversification strategy on performance: A resource-based view. *Industrial Marketing Management*, 39(2), 317–329.
- Nayyar, P. R. (1992). On the measurement of corporate diversification strategy: Evidence from large U.S. service firms. *Strategic Management Journal*, 13(3), 219–235.
- Neffke, F., & Henning, M. (2013). Skill relatedness and firm diversification. *Strategic Management Journal*, 34(3), 297–316.
- Newbert, S. L. (2007). Empirical research on the resource-based view of the firm: An assessment and suggestions for future research. *Strategic Management Journal*, 28(2), 121–146.
- Pehrsson, A. (2006a). Business relatedness and performance: A study of managerial perceptions. *Strategic Management Journal*, 27(3), 265–282.
- Pehrsson, A. (2006b). Business relatedness measurements: State-of-the-art and a proposal. *European Business Review*, 18(5), 350–363.
- Piscitello, L. (2004). Corporate diversification, coherence and economic performance. *Industrial and Corporate Change*, 13(5), 757–787.
- Prahalad, C. K., & Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review*, 68(3), 79–91.
- Puranam, P., Singh, H., & Chaudhuri, S. (2009). Integrating acquired capabilities: When structural integration is (un)necessary. *Organization Science*, 20(2), 313–328.
- Raudszus, M., Schiereck, D., & Trillig, J. (2014). Does vertical diversification create superior value? Evidence from the construction industry. *Review of Managerial Science*, 1–33.
- Ribière, V., & Walter, C. (2013). 10 years of KM theory and practices. *Knowledge Management Research and Practice*, 11(1), 4–9.
- Robins, J., & Wiersema, M. F. (1995). A resource-based approach to the multibusiness firm: Empirical analysis of portfolio interrelationships and corporate financial performance. *Strategic Management Journal*, 16(4), 277–299.
- Rosenkopf, L., & Nerkar, A. (2001). Beyond local search: Boundary-spanning, exploration, and impact in the optical disk industry. *Strategic Management Journal*, 22(4), 287–306.
- Rumelt, R. P. (1974). *Strategy, structure, and economic performance*. Cambridge, MA: Harvard Business School.
- Rumelt, R. P. (1982). Diversification strategy and profitability. *Strategic Management Journal*, 3(4), 359–369.
- Sambharya, R. B. (2000). Assessing the construct validity of strategic and SIC-based measures of corporate diversification. *British Journal of Management*, 11(2), 163–173.
- Schulz, M. (2003). Pathways of relevance: Exploring inflows of knowledge into subunits of multinational corporations. *Organization Science*, 14(4), 440–459.
- Shin, J., & Shin, H. (2013). Institutional ownership and technological relatedness: A test of endogeneity. *Journal of Business Research*, 66(11), 2279–2286.
- Shortell, S. M., & Zajac, E. J. (1990). Perceptual and archival measures of Miles and Snow's strategic types: A comprehensive assessment of reliability and validity. *Academy of Management Journal*, 33(4), 817–832.
- Srivasta, A., Nargundkar, S., & Green Ronald, F. (1994). An empirical evaluation of the equivalence of categorical and continuous measures of diversity. *Journal of Business Research*, 29(2), 145–149.
- Stagliano, R., La Rocca, M., & La Rocca, T. (2014). Agency costs of free cash flow, internal capital markets and unrelated diversification. *Review of Managerial Science*, 8(2), 145–174.
- Stimpert, J. L., & Duhaime, I. M. (1997). In the eyes of the beholder: Conceptualizations of relatedness held by the managers of large diversified firms. *Strategic Management Journal*, 18(2), 111–125.
- Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, 17, 27–43 (Winter Special Issue).
- Tanriverdi, H., & Venkatraman, N. (2005). Knowledge relatedness and the performance of multibusiness firms. *Strategic Management Journal*, 26(2), 97–119.
- Teece David, J. (1980). Economies of scope and the scope of the enterprise. *Journal of Economic Behavior and Organization*, 1(3), 223–247.
- Teece David, J. (1982). Towards an economic theory of the multiproduct firm. *Journal of Economic Behavior & Organization*, 3(1), 39–63.
- Teece, D. J., Rumelt, R., Dosi, G., & Winter, S. (1994). Understanding corporate coherence: Theory and evidence. *Journal of Economic Behavior & Organization*, 23(1), 1–30.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
- Tsai, W. (2001). Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance. *Academy of Management Journal*, 44(5), 996–1004.
- Valvano, S., & Vannoni, D. (2003). Diversification strategies and corporate coherence evidence from Italian leading firms. *Review of Industrial Organization*, 23(1), 25–41.
- van Wijk, R., Jansen, J. J. P., & Lyles Marjorie, A. (2008). Inter- and intra-organizational knowledge transfer: A meta-analytic review and assessment of its antecedents and consequences. *Journal of Management Studies*, 45(4), 830–853.
- Villasalero, Manuel (2013). Signaling, spillover and learning effects of knowledge flows on division performance within related diversified firms. *Journal of Knowledge Management*, 17(6), 928–942.
- Villasalero, Manuel (2014). Intra-network knowledge roles and division performance in multi-business firms. *Journal of Knowledge Management*, 18(6), 1165–1183.
- Villasalero, Manuel (2015). Multi-business firms, knowledge flows and intra-network open innovations. *Journal of the Knowledge Economy*. <http://dx.doi.org/10.1007/s13132-015-0330-z>.
- Williamson, O. E. (1985). *The economic institutions of capitalism*. New York: Free Press.
- Zhao, H., & Luo, Y. (2005). Antecedents of knowledge sharing with peer subsidiaries in other countries: A perspective from subsidiary managers in a foreign emerging market. *Management International Review*, 45(1), 71–97.

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