



Contents lists available at ScienceDirect

Journal of World Business

journal homepage: www.elsevier.com/locate/jwb

Complements or substitutes? A meta-analysis of the role of integration mechanisms for knowledge transfer in the MNE network

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ARTICLE INFO

Keywords:

Integration mechanisms
Multinational enterprise
Meta-analysis
Knowledge-transfer
Socialization

ABSTRACT

The MNE integration literature lacks coherence in the use and effectiveness of different integration mechanisms. In this study, we use meta-analytic techniques to quantitatively synthesize and evaluate the impact of centralization, formalization and socialization on knowledge transfer. Our analysis of 89 independent samples, including 15,506 subsidiaries, shows that socialization facilitates knowledge transfer more strongly than centralization and formalization. Socialization substitutes for formalization's positive impact, and mitigates centralization's negative impact on knowledge transfer. We further identify that directionality of knowledge flows is key in explaining the impact of centralization mechanisms. Finally, we point out important systemic problems in current empirical research.

1. Introduction

The ability to develop and leverage firm-specific advantages (FSAs) in multiple markets is one of the main competitive advantages of a multinational enterprise (MNE) (Rugman, Verbeke, & Nguyen, 2011). This requires integration of resources and activities within the MNE. MNE integration has been a central theme in international management research over the past decades (Kostova, Marano, & Tallman, 2016). Through this vast literature, we have gleaned that MNEs use a range of integration mechanisms to control and coordinate resources and activities across organizational and geographical boundaries (Bartlett & Ghoshal, 1989; Kobrin, 1991; Mauri & Sambharya, 2001).

Integration mechanisms can generally be categorized into three key areas: centralization of decision-making, formalization and standardization of organizational processes, and socialization through shared values and common organizational cultures (Ghoshal & Nohria, 1989; Kim, Park, & Prescott, 2003). Over the past decades, a substantial body of empirical research has examined the use and outcomes of integration mechanisms (e.g., Björkman, Barner-Rasmussen, & Li, 2004; Kim et al., 2003; Noorderhaven & Harzing, 2009). However, in reviewing these studies, we find a lack of coherence, with limited attention to the potential interrelatedness of integration mechanisms and their differential impact when multiple ones are adopted simultaneously (Björkman et al., 2004; Gomez & Sanchez, 2005; Kim et al., 2003; Martinez & Jarillo, 1989).

While studies on the outcomes of integration mechanisms have used various financial and operational measures, we focus specifically on knowledge transfer in this study. In line with dominant MNE theories, we view knowledge transfer as the most important outcome of MNE integration mechanisms, due to the importance of knowledge assets for the MNE's competitiveness and long-term performance. For instance, from an internalization perspective, MNEs exist to overcome inefficient external markets, particularly the market for knowledge-based assets (Buckley & Casson, 1976; Gupta & Govindarajan, 2000; Rugman & Verbeke, 2001). Similarly, knowledge transfer is the *raison d'être* for MNEs according to evolutionary theory, albeit not to overcome inefficient market intermediaries but rather to create social communities that enable efficient knowledge transfer (Kogut & Zander, 1993).

Despite the recognized importance of knowledge sharing in MNEs, the impacts of different integration mechanisms on knowledge transfer need clarity (Björkman et al., 2004; Noorderhaven & Harzing, 2009). While some conceptual and qualitative reviews of integration mechanisms do exist (e.g., Fan, Zhu, & Nyland, 2012; Martinez & Jarillo, 1989), such reviews are unable to address statistical artifacts, give a generalizable picture of the field, or extend theory in the same way as a meta-analysis (Geyskens et al., 2009). Considering the significance of the topic, the presence of disparate findings, and the number of empirical studies, integration mechanisms satisfy the typical criteria for a topic "ripe" for meta-analysis (Kirca & Yaprak, 2010). A quantitative synthesis of the relationships is particularly important to strengthen our

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<https://doi.org/10.1016/j.jwb.2018.02.001>

Received 7 March 2017; Received in revised form 7 November 2017; Accepted 1 February 2018
1090-9516/© 2018 Published by Elsevier Inc.

understanding of this important topic in the international management literature, since we do not yet know how various integration mechanisms will affect knowledge transfer, or the scale of their effect sizes.

Therefore, in this study, we conduct a meta-analysis to contribute to greater coherence and synthesis of the research on integration mechanisms. The specific goals of this meta-analysis are as follows: (1) to assess the strength and consistency of the pairwise relationships between different integration mechanisms and knowledge transfer in MNEs, by correcting for statistical artifacts; (2) to account for variances in these relationships by specifying different dimensions of knowledge transfer and identifying other important moderators that influence the pairwise relationships; (3) to assess differentiated impacts of integration mechanisms by accounting for the interrelatedness among different integration mechanisms; and (4) to identify areas for future studies.

It is important to note that our study does not include antecedents of integration, such as competitive pressures or a firm's international strategy and subsidiary roles. Although these studies are also important for our overall understanding of *why* firms seek integration, they do not address *how* firms integrate; thus, they are outside the scope of this study.

Our study makes several important theoretical and empirical contributions that extend our understanding of the roles and boundaries of integration mechanisms key in achieving knowledge transfer in MNEs. First, we contribute to the MNE integration literature by showing that socialization appears to be the most important mechanism for knowledge transfer. Our findings also show the importance of the interrelatedness of integration mechanisms. Specifically, we find that when integration mechanisms are combined simultaneously, socialization reduces the positive impact of formalization on knowledge transfer and mitigates the negative impact of centralization. Second, we contribute to the knowledge-based view of the firm by uncovering how the directionality and performance (efficiency or effectiveness) of the transferred knowledge affects the relationship between integration mechanisms and knowledge transfer. Directionality is particularly important for centralization, which facilitates knowledge transfers from HQs to subsidiaries, but hinders knowledge transfers in other directions. Our focus on these boundary conditions for the integration mechanisms also revealed systemic errors in extant research on MNE integration. We find that important dimensions of knowledge transfer such as directionality, knowledge performance, and the types of knowledge are not sufficiently specified to generate unambiguous empirical results. Third, we also emphasize the importance of contextual factors, such as institutional dimensions of the home and host country, regionalization, and the data sources, as these factors influence the relationships between integration mechanisms and knowledge transfer. Our findings provide valuable directions for future studies, advancing the research on MNE integration and the knowledge-based view.

2. Conceptual framework

2.1. MNE integration mechanisms

An inherent competitive advantage of MNEs is their ability to integrate resources and activities across organizational and geographical boundaries. In this study, we assume that integration entails the coordination and control of business activities by developing, utilizing, and recombining resources and capabilities across borders (Cray, 1984; Kim et al., 2003; Martinez & Jarillo, 1989; Yaprak, Xu, & Cavusgil, 2011). Through coordination, firms achieve linkages between functions in different parts of their organizations to accomplish collective goals (Cray, 1984; Kim et al., 2003; Martinez & Jarillo, 1989; Roth, Schweiger, & Morrison, 1991). Through control, firms regulate activities and decision-making, and align organizational units with corporate expectations.

The perceived need for integration is shaped by several factors, such as external competitive pressures (Kobrin, 1991; Prahalad & Doz, 1987)

or an MNE's international strategy (Bartlett & Ghoshal, 1987; Jarillo & Martínez, 1990). For instance, firms pursuing global strategies typically rely more on extensively transferring FSAs compared to locally responsive MNEs that primarily base their competitive advantages on location-bound FSAs, giving limited attention to integration. Integration is not specific to MNEs as it can also benefit other multi-unit organizations. However, the complexity and diversity of organizational units spanning national and regional borders make the topic especially important and challenging for MNEs (Martinez & Jarillo, 1991).

Previous studies encompass various reasons why firms integrate, but understanding of *how* firms achieve such integration, and if expected benefits are achieved, remains less clear (Ambos & Ambos, 2009; Keupp, Palmié, & Gassmann, 2011). We focus on observable integration mechanisms to understand how MNEs successfully integrate, since integration “becomes possible only through the use of organizational mechanisms for coordination and control” (Kim et al., 2003, p. 329). Extant research has identified a range of integration mechanisms, generally categorized as centralization, formalization and socialization (e.g., Nohria & Ghoshal, 1994; Palmié et al., 2016).

Centralization focuses on control from HQs and refers to decision-making through the organizational hierarchy (Kim et al., 2003; O'Donnell, 2000). *Formalization*, also referred to as standardization, focuses on codifying processes and routines in policies, rules, and standard procedures that are used across different units in the MNE network (Ambos & Schlegelmilch, 2007). *Socialization* refers to organizational mechanisms that build interpersonal relationships and shared goals and values among personnel across different units in the MNE network (Cicekli, 2011; Ghoshal & Nohria, 1989; Grøgaard & Colman, 2016; Gupta & Govindarajan, 2000). Centralization and formalization are regarded as formal structural or hierarchical mechanisms. Socialization mechanisms are typically regarded as informal normative mechanisms (Martinez & Jarillo, 1989). Early studies on MNE integration mechanisms focused primarily on formal mechanisms, although researchers have increasingly emphasized informal mechanisms in the last decade (Kostova et al., 2016).

2.2. Knowledge transfer as the expected outcome of MNE integration mechanisms

Although MNEs typically seek integration to strengthen their performance and competitive advantage (Kim et al., 2003), MNE performance is contingent on multiple factors related to the firm and its external environment (Kirca et al., 2012; Meyer & Su, 2015; Verbeke, Li, & Goerzen, 2009). Examining the direct relationship between integration mechanisms and generic financial measures can thus be difficult and may capture factors unrelated to the MNEs integration efforts. To better understand the impacts of integration mechanisms, we therefore find it more useful to examine their relationships with specific MNE behavior like knowledge transfer.

Studies on MNE competitiveness are increasingly emphasizing the role of knowledge transfer and the ability to recombine knowledge from multiple locations (Ciabuschi, Dellestrand, & Kappen, 2011; Kogut & Zander, 1993; Verbeke et al., 2009). Knowledge transfer is not an “end” in itself, but is central to the ability of an MNE to gain competitive advantage, which should ultimately result in higher performance (Davenport, De Long, & Beers, 1998; Rugman & Verbeke, 2001). In this study, we define knowledge transfer in line with van Wijk, Jansen and Lyles (2008, p. 832) as “the process through which organizational actors – teams, units, or organizations – exchange, receive, and are influenced by the experience and knowledge of others.” More empirical studies now recognize different dimensions of knowledge transfer, including the direction, transfer performance, or types of knowledge. The direction of knowledge transfer describes whether the knowledge flows from HQs to subsidiaries, from the subsidiaries to HQ (reverse knowledge flows), or between subsidiaries (lateral knowledge flows) (Rabbiosi, 2011). Knowledge transfer performance involves both

efficiency and effectiveness, where transfer efficiency refers to the cost or speed of the transfer process and transfer effectiveness reflects the use and benefits for the recipient of the transferred knowledge (Ambos & Ambos, 2009; Andersson, Bjorkman, & Forsgren, 2005; Pérez-Nordtvedt et al., 2008; Yamin, Tsai, & Holm, 2011). Types of knowledge reflect tacit versus explicit knowledge, where tacit knowledge is expected to be more challenging to identify, interpret, and communicate (Noorderhaven & Harzing, 2009).

Our meta-analysis does not attempt to extend our understanding of knowledge transfer *per se* (for a thorough review of antecedents and consequences of knowledge transfer, see the meta-analysis by van Wijk et al. (2008)). However, we acknowledge the important impact that different dimensions of knowledge transfer can have on the relationships between integration mechanisms and the knowledge transfer outcome when examining the relationships between the use of different integration mechanisms in MNEs and knowledge transfer. We take these dimensions of knowledge transfer into account to the extent that extant empirical studies enable us to do so. We also recognize that most MNEs compete based on both transferrable and non-transferrable FSAs (Rugman & Verbeke, 1992; Rugman & Verbeke, 2001). However, we do not focus on the antecedents of knowledge transfer in this study for the reasons mentioned above. We assume that an MNE will seek to achieve the benefits of integration mechanisms once it uses these tools.

2.3. The influence of integration mechanisms on knowledge transfer

Despite the prevalence of three broad categories of integration mechanisms, a previous meta-analysis collapsed them into one classification for the sake of power in the analysis (Liu, Vredenburg, & Steel, 2014). However, this is problematic because most researchers generally agree that the integration mechanism construct is multidimensional, not unidimensional (Keupp et al., 2011; Martinez & Jarillo, 1989). Classifying all the integration mechanisms into one or two types may therefore not adequately capture the differential impact of the particular mechanisms that affect knowledge transfer. Thus, to capture these nuances, we include all three categories.

2.3.1. Centralization mechanisms

Centralized decision-making is used by HQs to control subsidiaries (Kim et al., 2003; O'Donnell, 2000) and to ease coordination between HQs and subsidiaries (Ghoshal, Korine, & Szulanski, 1994). Empirical evidence suggests that firms pursuing global integration strategies are more centralized relative to firms pursuing other international strategies (Leong & Tan, 1993). Indeed, according to internalization theory, MNEs often prefer to use hierarchical control rather than market-based contractual relationships for knowledge-based assets. Hierarchy, in turn, is often implemented through some degree of centralization. Centralized strategic decision-making especially enables the MNE to exercise fiat as needed, for HQs that function as a primary hub (Narula, 2014). This is beneficial for speeding up knowledge exploitation since it reduces uncertainty in decision-making and increases information-processing efficiency (Jansen, Van den Bosch, & Volberda, 2006). For firms seeking internal integration, centralized decision-making should thus positively influence expected integration outcomes (Yaprak et al., 2011).

However, the use of centralization is a controversial integration mechanism. The empirical results of the relationship between centralization and knowledge transfer vary (van Wijk et al., 2008), with studies also showing negative impacts on knowledge transfer (Ciabuschi et al., 2011; van Wijk et al., 2008; Yamin et al., 2011) or insignificant results (Ghoshal et al., 1994). Local market complexities can influence the ability to use centralization as an effective integration mechanism. For instance, HQ managers may have difficulties identifying and understanding challenges and opportunities in local markets, resulting in bounded rationality when decision-making is centralized through the hierarchy (Ghoshal & Nohria, 1989). Centralization may

prevent subsidiaries from exercising necessary autonomy to deal with specific demands in their local environments and thereby reduce their willingness to exchange knowledge (Ciabuschi, Martín, & Ståhl, 2010; Tsai, 2002). Higher levels of centralization may thus deter a subsidiary from integrating with the MNE and engaging effectively in knowledge transfer (Gupta & Govindarajan, 2000). In addition, centralization may decrease the likelihood that subsidiary managers and employees seek innovative ways to assimilate knowledge (Jansen et al., 2006).

The competing arguments for and against centralization apply to different contexts. In fact, contextual factors could potentially cancel out the overall main-effect relationship, leading to difficulties in detecting the main-effect relationship between centralization and knowledge transfer. Based on the results from the majority of empirical studies involving the use of centralization mechanisms to transfer knowledge within MNEs, we therefore hypothesize the following:

Hypothesis 1. Centralization is negatively correlated with knowledge transfer.

The dimensions of knowledge transfer inform the conflicting arguments about the relationship between centralization and knowledge transfer. While early studies on MNE integration took an MNE-centric perspective, focusing on the knowledge facilitation from HQs to subsidiaries, there is an increased recognition that MNEs function as networks of organizational units with knowledge flows in multiple directions (Ghoshal & Bartlett, 1990; Ghoshal & Nohria, 1989; Mudambi, Piscitello, & Rabbiosi, 2014). Centralization may also hinder the flow of knowledge from subsidiaries to HQ (i.e., reverse knowledge transfer) due to a possible tension between subsidiary autonomy and HQ control (Rabbiosi, 2011). This impeded knowledge flow may also be due to less discretion on the part of a subsidiary manager to deal with specific demands in their local environments (Tsai, 2002). Further, centralization could reduce subsidiary initiatives to transfer knowledge between different units, especially when different subsidiaries have different strategic priorities. This suggests that the negative relationship between centralization and knowledge transfer is even stronger for lateral knowledge transfer (Noorderhaven & Harzing, 2009; Tsai, 2002).

A few empirical studies have also demonstrated that the relationship between centralization and knowledge transfer differs if we distinguish between the efficiency and effectiveness of the knowledge transfer (Andersson, Buckley, & Dellestrand, 2015; Ciabuschi et al., 2010; Yamin et al., 2011). Direct HQ involvement may negatively influence the transfer efficiency because of higher coordination costs, but still favor the transfer effectiveness because of stronger HQ commitment (Ciabuschi et al., 2010). Knowledge transfer is also affected by whether actors hold tacit or explicit knowledge. In general, tacit knowledge is seen as more difficult to transfer through the use of formal mechanisms. In contrast, the transfer of explicit knowledge is facilitated by formal mechanisms (Lee, Tsai, & Lee, 2011). The relationship between centralization, a key formal integration mechanism, and knowledge transfer is thus expected to differ according to the types of knowledge being transferred (Ghoshal et al., 1994; Martinez & Jarillo, 1989).

Given the potentially conflicting arguments and empirical evidence, we expect different dimensions of knowledge transfer (knowledge flow direction, transfer performance, and types of knowledge) to influence the relationship between centralized decision-making and knowledge transfer. We therefore include additional hypotheses that incorporate the effects of different dimensions of knowledge transfer:

Hypothesis 2a. The correlation between centralization and knowledge transfer is negative, except when knowledge flows from HQs to subsidiaries.

Hypothesis 2b. The performance dimension moderates the relationship between centralization and knowledge transfer; specifically, the correlation is more negative for knowledge transfer efficiency than for knowledge transfer effectiveness.

Hypothesis 2c. The types of knowledge moderate the relationship between centralization and knowledge transfer; specifically, explicit knowledge influences the relationship more positively than tacit knowledge.

2.3.2. Formalization mechanisms

Empirical studies have identified formalized processes, routines, and standards in MNEs pursuing integration strategies (Lin & Hsieh, 2010), which reduce ambiguity in communications (Ghoshal et al., 1994; Kogut & Zander, 1993) and thus facilitate knowledge transfer (Jansen et al., 2006; Palmié et al., 2016). To transfer knowledge between different units more efficiently, routines have to be established (Ambos & Ambos, 2009) since they bring greater clarity to the MNE operations as a whole (Crespo, Griffith, & Lages, 2014). Formalized management and control processes guide behaviors, instruct organizational units, and stimulate knowledge sharing (Andersson et al., 2015; Ghoshal & Gratton, 2002; Roth et al., 1991). Ghoshal and Nohria (1989) found that, contradictory to their predictions, better performing firms in complex environments relied more on formalization than those in less complex environments, which was also the case among subsidiaries with more localized resources. They explain their findings by suggesting “that even autonomous behavior or innovation must take place within a structured context if it is to be effective” (p. 332).

As a result, we expect that formalization, with codified, standardized systems and routines between various organizational units facilitates knowledge transfer within the MNE.

Hypothesis 3. Formalization is positively correlated with knowledge transfer

However, not all empirical results on the influence of formalization mechanisms on knowledge transfer are consistent. For instance, the moderation effect of the directionality of knowledge transfer is unclear. Formalization mechanisms are generally found to support knowledge transfer from HQ to subsidiaries (Crespo et al., 2014; Gupta & Govindarajan, 2000) while the influence of formalization on knowledge transfer from the subsidiary is not entirely clear. Formalization mechanisms may restrict flexibility within subsidiaries and potentially hinder lateral knowledge transfer (Crespo et al., 2014), but may also increase the density of communication channels between different subsidiaries and thereby facilitate knowledge transfer (Gupta & Govindarajan, 2000). In fact, Williams and Lee (2016) did not find any support for the role played by formalization mechanisms in transferring knowledge into and from subsidiaries in their study of human resource management practices.

Previous studies have also indicated that the relationship between formalization mechanisms and knowledge transfer may differ depending on whether the focus is on the efficiency or effectiveness of knowledge transfer. However, the nature of this influence remains uncertain. For instance, formalization mechanisms may positively contribute to knowledge transfer efficiency as they routinize decision-making (Palmié et al., 2016), but may also negatively affect the utilization of transferred knowledge since relational knowledge is lacking (Alharbi & Singh, 2013; Yamin et al., 2011). A few studies have also examined potential differences due to the types of knowledge transferred. Explicit knowledge, measured in terms of codifiability and written formal documentation, is regular, predictable, and thus often considered readily transferred through formalization mechanisms (Keupp et al., 2011; Lee et al., 2011). Tacit knowledge, in comparison, is generally more abstract and locally embedded and thus considered more difficult to transfer by formalization mechanisms (Crespo et al., 2014). Bresman, Birkinshaw and Nobel (1999) have also found support for formalization to facilitate the transfer of tacit knowledge. Hence, potential differences between explicit and tacit knowledge remain ambiguous. Given empirical indications that different dimensions of knowledge transfer might influence how and what knowledge is

transferred, we explore whether these various dimensions may moderate the relationship between formalization mechanisms and knowledge transfer. Hence, we include additional hypotheses to test for such effects:

Hypothesis 4a. The direction of knowledge flow moderates the relationship between formalization and knowledge transfer, with HQs to subsidiaries being the most positive.

Hypothesis 4b. The knowledge transfer performance dimension moderates the relationship between formalization and knowledge transfer.

Hypothesis 4c. The types of knowledge transferred moderate the relationship between formalization and knowledge transfer.

2.3.3. Socialization mechanisms

Socialization mechanisms, “which build interpersonal familiarity, personal affinity, and convergence in cognitive maps among personnel from different subsidiaries” (Gupta & Govindarajan, 2000, p. 479), help to align organizational members and develop trust and cooperation between HQs and subsidiaries. Organizations often use socialization mechanisms to develop shared goals, values, and a sense of shared identity, which generates a “cohesiveness” among organizational units that increase the willingness of subsidiaries to share knowledge with other units (Björkman et al., 2004; Grøgaard & Colman, 2016).

Socialization strengthens interpersonal networks, thereby increasing open communication between the interacting parties as well as the number of communication channels through which knowledge is transmitted (Gupta & Govindarajan, 2000). Informal social relations built through socialization increase opportunities to access different knowledge throughout the MNE network (Palmié et al., 2016). For instance, this is illustrated through enduring personal interaction in international joint ventures (Lee et al., 2011). Socialization also generates new knowledge through continuous recombination in social communities with a shared identity (Zander & Zander, 2010). Hence, social integration mechanisms create incentives that facilitate knowledge sharing, diffusion, and creation across different units within the MNE network (Björkman et al., 2004; Persson, 2006).

As a result, we expect the investment in socialization mechanisms to be positively related to knowledge transfer within the MNE (Gooderham, Minbaeva, & Pedersen, 2011), as proposed in the following hypothesis:

Hypothesis 5. Socialization is positively correlated with knowledge transfer.

While most empirical studies have found a positive relationship between socialization and knowledge transfer, empirical research indicates that the strength of this influence may vary depending on different dimensions of the knowledge transfer. For instance, the impact of directionality is unclear. Gupta and Govindarajan (2000) found significant effects of socialization on lateral knowledge transfer. However, their results for reverse knowledge transfer were insignificant. Organizational units tend to learn more from each other through informal socialization mechanisms and experience stronger incentives to share with other subsidiaries without HQ involvements (Tsai, 2002). This strengthens the influence of socialization for lateral knowledge transfer when compared to vertical knowledge transfers.

Socialization contributes to common goals and understanding of tasks, which fosters routines (Kogut & Zander, 1993). This may affect the efficiency and effectiveness of knowledge transfer (Andersson et al., 2015). Socialization may ultimately shorten the time to transfer knowledge and improve the transfer efficiency (Palmié et al., 2016). Socialization mechanisms have also been found to influence the effectiveness of knowledge flows (Alharbi & Singh, 2013; Willem & Buelens, 2007). The types of knowledge can also influence the relationship between socialization and knowledge transfer. Socialization mechanisms

are particularly expected to facilitate the transfer of tacit knowledge that is difficult to codify and communicate (Dhanaraj et al., 2004; Nonaka, 1994).

In line with our hypotheses for the differential correlation between the other two integration mechanisms and different dimensions of knowledge transfer, we also want to explore whether the following relationships hold:

Hypothesis 6a. The relationship between socialization and knowledge transfer will be significantly moderated by the direction of the knowledge flows, exerting a stronger positive influence on lateral knowledge transfer.

Hypothesis 6b. The knowledge transfer performance dimension moderates the relationship between socialization and knowledge transfer.

Hypothesis 6c. Types of knowledge transferred moderate the relationship between socialization and knowledge transfer.

2.4. Differentiated impact of integration mechanisms on knowledge transfer

Despite the distinct categorizations and descriptions of integration mechanisms, the different integration mechanisms employed in MNEs are never mutually exclusive and are often considered to be complements instead of substitutes (Björkman et al., 2004; Harzing, 1999; Kim et al., 2003; Martinez & Jarillo, 1989). Empirical results point to high correlations between different integration mechanisms, which, in turn, suggest complementarity of different integration mechanisms (Birkinshaw, Bresman, & Håkanson, 2000; Kim et al., 2003). Thus, it is important to consider the correlations between integration mechanisms and the balance between them (Roth & Nigh, 1992; Roth et al., 1991) when exploring the differential impact of integration mechanisms.

When centralization is extensive, headquarters will intervene in the operations of subsidiaries and often simultaneously participate directly in developing formalized rules and behaviors to ensure control over activities throughout the MNE (Keupp et al., 2011; Roth et al., 1991). We thus expect a high correlation between centralization and formalization, since the success of both depend on ongoing interactions between headquarters and subsidiaries and both rely on various formal structures and codified documentation (e.g., rules, policies, and procedures).

This does not eliminate the potential positive correlation between formal and informal integration mechanisms (Birkinshaw, Bresman, et al., 2000; Kim et al., 2003). Even in MNEs where much socialization occurs, some degree of formalization may support the development of shared goals, shared values, and organizational culture – the qualities that socialization mechanisms seek to develop even in more autonomous subsidiaries (Ghoshal & Nohria, 1989). We also expect that the emphasis on socialization will be stronger in organizations with considerable centralized decision-making, since a high level of socialization will be needed to complement the possible negative impact brought about by centralization (Gooderham et al., 2011). The above discussion leads to the following hypothesis:

Hypothesis 7. Centralization, formalization, and socialization are positively correlated.

Based on the expected correlations among integration mechanisms, we assume that various integration mechanisms are not mutually exclusive and should co-exist because they satisfy different internal and external demands (Gomez & Sanchez, 2005). Although researchers realize that the different integration mechanisms employed in MNEs can complement each other (Björkman et al., 2004; Kim et al., 2003; Martinez & Jarillo, 1989), most hypotheses are formulated based on the assumption that different integration mechanisms are distinct and separate (Birkinshaw, Bresman, et al., 2000; Schaaper et al., 2011). When the three mechanisms are implemented simultaneously, it is important

to consider the interrelatedness and balance between them (Roth & Nigh, 1992).

If organizations are increasingly viewed as networks of organizational units that compete through both transferrable and non-transferable advantages, hierarchical coordination through centralized decision-making can reduce MNEs' competitiveness (Grant, 1996) because bounded rationality hinders organizations from effectively dealing with the demands of their local environments (Rugman et al., 2011). Many activities in organizations do not follow hierarchical structures (Galbraith, 1973), suggesting that lateral relations become increasingly important as they integrate activities across different units (Zander & Zander, 2010). Since knowledge transfer is also less tangible and hard to measure, social mechanisms are sometimes perceived as more suitable than formal mechanisms to achieve desired outcomes (Persson, 2006). Socialization mechanisms are therefore expected to substantially improve channels for information exchange and thus knowledge transfer within the organization (Gupta & Govindarajan, 2000; Tsai, 2002).

Consequently, the following hypothesis is formulated:

Hypothesis 8. When multiple integration mechanisms are used, socialization will contribute more to knowledge transfer than will centralization and formalization.

2.5. Exploratory moderators analyses

Due to the expected firm-level and environmental contingencies for performance outcomes (Kirca et al., 2012; Meyer & Su, 2015; Verbeke et al., 2009), we also identify several contextual variables important in international business research in studies on MNE integration mechanisms and include them as moderators in our meta-analysis. In essence, we explore whether these moderators add explanatory power to the heterogeneity of effect sizes for the relationships between the three integration mechanisms and knowledge transfer.

For instance, HQs and subsidiary managers often have different perceptions of ongoing activities, such as the extent to which integration mechanisms are used and the knowledge transfer performance. However, the impact of their different perceptions has not been explicitly investigated (Birkinshaw, Holm, et al., 2000). We therefore examine the survey data sources in each study (whether the data were collected from the headquarters, subsidiaries, or both units) and include this as a moderator in our meta-analysis.

We also include home country origin, host country, and whether the HQs and subsidiaries are in the same region (regionalization) as moderators since these are important variables in international business that may influence the relationship between integration mechanisms and knowledge transfer. We capture differences in institutional dimensions by identifying the home and host countries as these have been found to influence the types of advantages (e.g., knowledge) developed by MNEs (Dunning & Lundan, 2008; Rugman & Verbeke, 1992). For most studies in this meta-analysis, the home countries studied are located in advanced countries. Research suggests that MNEs from emerging countries might have weaker recombination skills relative to MNEs in advanced economies (Dunning & Lundan, 2008; Rugman & Verbeke, 1992), and thus we anticipate the relationship between integration mechanisms and knowledge transfer might differ between MNEs from emerging versus advanced countries. Similarly, host countries may critically affect how particular resources and capabilities are accessed, recombined, or created by MNEs (Dunning & Lundan, 2008; Rugman & Verbeke, 1992), which could also produce different results for the relationships between integration mechanisms and knowledge transfer (Johnson, Arya, & Mirchandani, 2013).

From the perspective of transaction cost economics (Williamson, 1981), a broader geographic scope across different regions entails additional costs because of bounded rationality and bounded reliability constraints (Rugman & Verbeke, 2005). We have therefore included

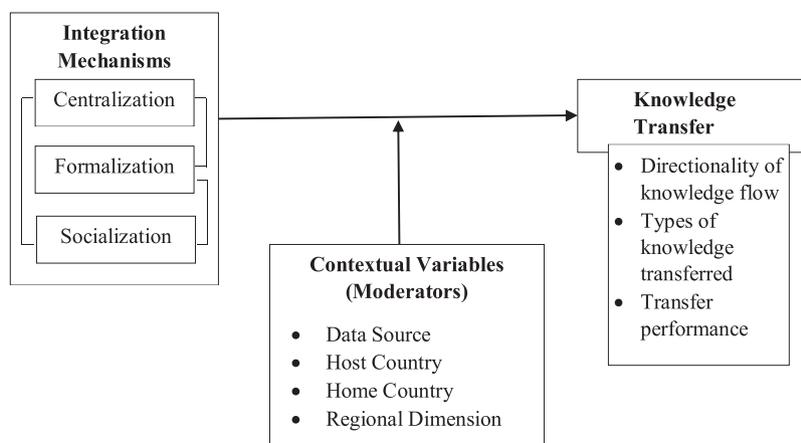


Fig. 1. Conceptual Framework.

regionalization as a moderator to test whether operations within and outside the home region produce different results for the relationship between integration mechanisms and knowledge transfer. Some empirical studies imply that the liability for foreignness increases when firms cross regional borders (see the review by [Aguilera, Flores, & Kim, 2015](#)). We expect that correlations between integration mechanisms and knowledge transfer differ among inter-regional MNEs and intra-regional MNEs.

We illustrate the conceptual framework for our meta-analysis in [Fig. 1](#). Specifically, our conceptual framework includes three different integration mechanisms instead of one collapsed integration mechanism, as we believe that they are interrelated as specified in Hypothesis 7, and have different impacts on knowledge transfer. Our framework also includes different dimensions of knowledge transfer that may impact the correlation between each integration mechanism and knowledge transfer respectively. In addition, it includes contextual variables as potential moderating influences on the relationships between integration mechanisms and knowledge transfer.

3. Methods

The degree a meta-analysis helps to synthesize knowledge and establish empirical generalization depends on the accuracy of its applied methods ([Geyskens et al., 2009](#)). This meta-analysis adopts established methods ([Hunter & Schmidt, 2004](#)) and improvements recommended for a rigorous meta-analysis ([Geyskens et al., 2009](#); [Steel & Kammeyer-Mueller, 2002b](#)).

3.1. Literature search and criteria for inclusion

First, we conducted a systematic search of the integration literature in MNEs from 1988 to 2015 using several methods, including searches of the EBSCO, ABI/INFORM, Web of Science, ProQuest, and Google Scholar. To be inclusive, our broad search used these keywords: *integration mechanism*, *administrative mechanism*, *coordination mechanism*, *control mechanism* or *mode*, *centralization*, *formalization/standardization*, *socialization/normative integration* plus *MNE*, *MNC*, or *multinational*. The search was complemented by an ancestry approach to search articles identified in three review articles of integration mechanisms ([Fan et al., 2012](#); [Martinez & Jarillo, 1989](#); [Schaaper et al., 2011](#)). A descendancy approach to search articles (Web of Science) citing two important empirical articles ([Ghoshal & Nohria, 1989](#); [Kim et al., 2003](#)) was also conducted. Then, among the downloaded empirical articles on integration mechanisms in the MNE network, a search of the keywords *knowledge* or *innovation* was conducted. In addition; we sent out posts to the Listservs at the Academy of Management and the Academy of International Business to ask for unpublished works.

From this database of studies, we applied the following filtering criteria to determine what is included in the final meta-analysis:

1. The study had to contain at least two variables that fit the theoretical model, which translated to the paper matching one of these two options: (a) It included one integration mechanism and one outcome related to knowledge transfer, or (b) It had two integration mechanisms in the models it used. For instance, [Pérez-Nordtvedt et al. \(2008\)](#) is an important article on the effectiveness and efficiency of cross-border knowledge transfer. However, it does not include any integration mechanism in its model. As a result, this paper was not included.
2. Studies that investigated integration mechanisms in contexts other than MNEs were excluded. For examples, because [Cousins and Menguc \(2006\)](#) discussed the impact of integration mechanisms in supply chain management rather than in MNEs, we excluded this study.
3. Included studies needed to report sample sizes along with pairwise zero-order correlations or statistical results. These had to be adequate to compute a pairwise correlation coefficient or effect size between two variables in the model (e.g., *t* score, *d* score, and *F* score). If a study only provided partial correlations or lacked statistics to compute zero-order correlations for two key variables of interest, it was not included. Qualitative research, such as case studies (e.g., [Ghoshal & Gratton, 2002](#)), modeling studies (e.g., [Devinney, Midgley, & Venaik, 2000](#)), and conceptual papers (e.g., [Sinkovics, Roath, & Cavusgil, 2011](#)), were not included.
4. Some articles were excluded because they used the same datasets as other articles. For example, [Gomez and Werner \(2004\)](#) was meta-analyzed but not [Gomez and Sanchez \(2005\)](#), since the 2004 article included all the variables in the 2005 article from the same dataset. The datasets used in [Björkman et al. \(2004\)](#) and [Andersson et al. \(2005\)](#) are the same, but different variables were studied in these two papers. As a result, we only coded once the pairwise correlations between the same two constructs.

Finally, we also emailed authors of nine empirical papers that lacked statistics, in an effort to obtain the requisite statistics. In total, these screens and efforts resulted in 85 papers with 89 studies, including a total sample size of 15,506 subsidiaries. The process for the literature search and exclusion is illustrated in [Fig. 2](#).

3.2. Coding and measurements

After the initial literature search described above, the lead author classified and coded integration mechanisms based on [Hunter and Schmidt \(2004\)](#) for 30 randomly chosen articles. Then, two trained

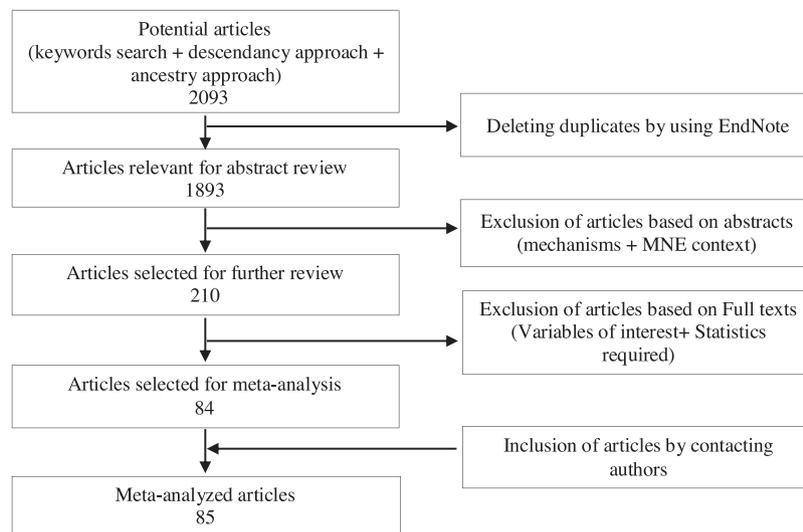


Fig. 2. Literature Search and Inclusion/Exclusion Process.

research assistants independently coded the same 30 articles and compared their codes. All discrepancies were discussed and the consensus rate rose from 60.5% in the first round to 87% for the second round. After that, 14 additional articles with 54 effects sizes were coded independently by the two trained research assistants, with 90.1% agreement, which is a good indicator of intercoder reliability (Orwin & Vevea, 2009). All discrepancies revolved around subjective judgments of the classifications of integration mechanism and we reached complete consensus (i.e., 100%) after discussions. For the remaining studies, the two research assistants computed effect sizes independently. When there was a discrepancy between coders or they were uncertain about how to code particular data, they contacted the lead author and further discussions would lead to consensus.

3.2.1. Independent variables

We included three independent variables: *centralization*, *formalization*, and *socialization* in the meta-analysis for the following reasons. (1) Empirical results imply there are high associations between different integration mechanisms, suggesting either complementarity or a substitution effect (Ghoshal & Nohria, 1989; Kim et al., 2003). By separating the integration mechanisms, we could extend the theory by testing the substitution or complementary effect among them. (2) Collapsing or “clumping” gives researchers a sufficient number of studies for meta-analysis (Liu et al., 2014), but this practice reduces precision, injects more measurement error, and makes findings more difficult to understand because of the commensurability problem (Steel, Schmidt, & Shultz, 2008). (3) The sign for correlations between different mechanisms differs among studies, with some finding a negative association between formalization and centralization (e.g., Andersson et al., 2005). Collapsing them into one construct would cancel out their impact on different consequences. Hence, our decision to include the three independent variables is based on statistical and theoretical considerations, and is consistent with our aim to extend theory.

As noted in extant research, variables are often operationalized in multiple ways in international business research (Liu et al., 2014; Reus & Rottig, 2009). To ensure commensurability, we closely compared the construct definitions and carefully examined how these concepts were operationalized. The intent was to confirm that they were similar to the definitions in our theoretical framework and hypotheses development section. Sometimes, different authors used the same term to mean different concepts or used various terms to mean similar concepts (i.e., the jingle-jangle problem). We compared the operationalizations of various integration mechanisms in different papers and made sure they were also consistent. For example, in the study by Noorderhaven and Harzing

(2009) “formal coordination” was coded as formalization since its conceptualization focuses on “use of planning systems, formal procedures, and reporting, and ERP systems,” which corresponds to our definition of formalization. Another construct also appeared in this study, “subsidiary autonomy,” meaning the “influence that HQs would normally have on a range of issues” (selection of suppliers, advertising, etc.), which we coded as the opposite to “centralization”. The term “integrative mechanism” used in Kumar and Seth (1998) was actually similar to the socialization mechanism as conceptualized in other studies. Thus, we did, in fact, code their “integrative mechanism” as socialization.

When several indicators of a focal integration mechanism were used in the same study, we used Hunter and Schmidt’s (2004) method to arrive at a composite index based on the inter-correlation information between these indicators from the original studies.

3.2.2. Dependent variables

The dependent variable, *knowledge transfer*, has many dimensions as we have noted: vertical and lateral knowledge flows, thought of as the “direction” (e.g., Gooderham et al., 2011; Noorderhaven & Harzing, 2009); efficiency and effectiveness in knowledge transfer, understood as “performance” qualities (e.g., Ciabuschi et al., 2010; Yamin et al., 2011); and tacit knowledge transfer and explicit knowledge transfer, framed as “types” of knowledge (e.g., Keupp et al., 2011; Lee et al., 2011).

In the main-effect analysis, we aggregated all these *knowledge transfer* dimensions, as is the standard practice in meta-analysis for analyzing the main effect (Steel et al., 2008). When several indicators of *knowledge transfer* were used in the same study, we used the Hunter and Schmidt (2004) method to arrive at a composite index based on the inter-correlation information between these indicators as they appeared in the original studies.

This aggregation gives the meta-analysis a large sample size – resulting in increased power to detect relationships – but also increases method variance among the relationships. The trade-off between power and method is described in meta-analysis as the commensurability problem, and can be addressed by moderator analysis (Steel et al., 2008). Consequently, we also coded different dimensions of knowledge transfer (directionality, type, and performance) when such information was available in the original studies. We also, when possible, ran a subgroup analysis for each integration mechanism and each dimension of the aggregate *knowledge transfer*.

3.2.3. Moderators

Based on the international business literature, we included several moderators for the pairwise relationship between integration mechanisms and knowledge transfer: *data source*, *home country*, *host country*, *regionalization*, and *publication bias*. For data source, we used two dummy variables (*HQ* and *sub*) to code it. When the survey data were collected only from managers in the HQs in the primary study, $HQ = 1$ and $sub = 0$. When the survey data were collected only from managers in subsidiaries in the primary study, $HQ = 0$ and $sub = 1$. When the survey data in the primary study were collected from managers both at HQs and in subsidiaries, $HQ = 1$ and $sub = 1$.

Since economic development is one indicator of a country's institutional underpinnings (Meyer & Sinani, 2009), we coded *Home* = 1 when the MNE is from an advanced country. We used the World Bank (2013) definition to separate advanced from emerging countries, where countries with a GNI per capita of US\$ 11,905 and less are defined as emerging countries. Similarly, when subsidiaries are located in advanced countries, *Host* = 1. In our moderator analysis of the regional nature of internationalization, we included studies that have information for both home countries and host countries. If the home country and the host country are from the same region, as specified in Rugman and Verbeke (2004), then *Region* = 1. Otherwise, *Region* = 0. Finally, we coded the articles published in peer reviewed journals as *Publication* = 1 and those in other types of publications as *Publication* = 0.

Table 1 lists all studies included in the meta-analysis and the major coded information used in the data analysis.

3.3. Meta-analytic procedures

Following recommendations for a rigorous meta-analysis by Geyskens et al. (2009), we used the meta-analytic procedures in Hunter and Schmidt (2004) to calculate the weighted mean correlations between various integration mechanisms and knowledge transfer. Effect sizes were only analyzed where at least three studies were available (Lipsey & Wilson, 2001). We corrected for measurement error, as some researchers have argued that measurement errors need to be accounted for to provide a more accurate estimate (Cook et al., 1992; Hunter & Schmidt, 2004). In the cases where reliability estimates were not provided, we used the average obtained from the meta-analysis for the same construct. Where such an average was not available, we only controlled for the sampling error (Hunter & Schmidt, 2004).

In addition to reporting the weighted mean uncorrected correlations (r) and weighted mean corrected correlations (ρ), we also reported Q statistics and 90% credibility intervals to describe variability in the correlations. The 95% confidence intervals following random effects procedures (Hunter & Schmidt, 2004) were reported, to indicate whether the weighted mean corrected effects (ρ) were statistically significant or not. To assess the potential causes of non-robustness, fail-safe N was estimated to evaluate the possibility of publication bias; it indicates the number of unpublished statistically non-significant studies needed to dilute the obtained meta-analytic results to non-significance (Rosenthal, 1995).

All the computations (e.g., effect sizes, conversion, credibility intervals, confidence intervals, Q statistic, and fail-safe N), except for the moderator analysis, were performed using MetaExcel (Steel, 2007), which follows the Hunter and Schmidt (2004) method.

The weighted least square regression (WLS) has been used to conduct the moderator analysis in STATA (v.13) because of its robustness under conditions of multicollinearity and heteroscedasticity. The weight used in the multiple regression analysis is based on the inverse of sampling error (Steel & Kammeyer-Mueller, 2002a).

Since we aim to synthesize the empirical studies on integration mechanisms and explore the relative impact of different integration mechanisms on knowledge transfer, we conducted multiple regressions based on meta-analytic structural equation modeling techniques (MASEM), a standard approach for a meta-analysis to extend or

advance theory (Landis, 2013; Viswesvaran & Ones, 1995). For the correlation matrix input required to run MASEM, we used the correlations for interrelatedness between three integration mechanisms generated from the meta-analysis. As for the sample size to run the MASEM, we used the harmonic mean, the most defensible choice and conservative approach, since it limits the influence of very large values (Landis, 2013; Steel et al., 2008).

4. Results

4.1. Main-effect results

Our meta-analysis shows that formalization and socialization exhibit significant relationships with knowledge transfer, with socialization demonstrating the strongest relationship. However, the significant Q statistics and very wide 90% credibility intervals in all relationships suggest the necessity of a moderator analysis.

Table 2 depicts the bivariate relationship between integration mechanisms and knowledge transfer. For centralization, we find a rather small negative, yet not significant, effect on overall knowledge transfer, with the corrected true correlation of -0.08 ($k = 30$, $N = 6466$). Hence, we find no empirical support for Hypothesis 1 at $p = 0.05$ (i.e., the 95% confidence interval), as specified in Table 2. However, additional analysis shows that when $p = 0.10$, its 90% confidence interval is $(-0.18, -0.08)$, supporting a weak negative relationship, in line with Hypothesis 1. The significant Q statistic and wide credibility interval also suggest the necessity of a moderator analysis.

Formalization and knowledge transfer in MNEs is significantly related. The corrected true correlation is 0.25 ($k = 40$, $N = 7309$), with a 95% confidence interval from 0.17 to 0.35 , supporting Hypothesis 3. The 90% credibility interval spans from -0.20 to 0.70 , suggesting that the positive relationship may not be generalizable in other circumstances.

The corrected true correlation between socialization and knowledge transfer is 0.35 ($k = 53$, $N = 10,036$), with a 95% confidence interval from 0.29 to 0.42 . The mean effect size $\rho = 0.35$ can be interpreted as large (Cohen, 2013). The 90% credibility interval spans from 0.00 to 0.72 , suggesting that the strong positive relationship is likely generalizable to other circumstances. The meta-analysis results suggest that the positive correlation between socialization and knowledge transfer is rather large, thus strongly supporting Hypothesis 5.

4.2. Different dimensions of knowledge transfer

Table 3 presents the results of different dimensions of the dependent variable knowledge transfer using WLS moderator analysis and subgroup analyses. We have only included the knowledge dimensions where we had a sufficient number of primary studies available to run subgroup analyses for each integration mechanism. The two columns labeled R^2 and F show the percentage of variance the moderator accounts for and the statistical significance of differences among groups, respectively.

Our subgroup analyses for different dimensions of knowledge transfer show that the relationship between centralization and knowledge transfer is significantly affected by directionality in knowledge flow. For the relationship between centralization and knowledge transfer, the WLS model was significant, at $p < 0.01$, and the mean differences among the three knowledge flow groups were obvious, with $\rho = 0.21$ for the HQs to subsidiaries subgroup ($k = 4$, $N = 1484$), $\rho = -0.01$ for the reverse knowledge flow subgroup ($k = 6$, $N = 1292$), and $\rho = -0.09$ for the lateral knowledge flow subgroup ($k = 8$, $N = 1736$). A closer examination of its credibility interval and confidence interval showed that when the knowledge flow is from headquarters to subsidiaries, both credibility and confidence intervals were rather narrow without crossing zero. This implies that centralization facilitates knowledge inflows to subsidiaries from HQs across

Table 1
Summary of Studies Included in the Meta-analysis.

Studies	Sample size	Integration mechanisms covered	Knowledge transfer	Data source	Host country	Home country	Region	Publication type
Ahlvik and Björkman (2015)	105	C, F, S	Y	M	EE	AE	N	J
Alharbi and Singh (2013)	147	C, F, S	Y	S	EE	AE	N	J
Ambos and Schlegelmilch (2007)	134	F, S	N	HQ	EE	AE	N	J
Andersson et al. (2005)	140	C, F	N	S	EE	AE	N	J
Andersson et al. (2015)	169	F, S	Y	S	EE	AE	N	J
Barner-Rasmussen (2003)	89	F, S	Y	S	AE	AE	Y	J
Björkman et al. (2004)	134	F, S	Y	S	EE	AE	N	J
Blomkvist (2012)	149	F	Y	S	EE	EE	N	J
Boonyarith (2012)	83	F, S	Y	S	EE	AE	N	J
Bresman et al. (1999)	42	F, S	Y	S	AE	AE	Y	J
Burgers et al. (2009)	240	F, S	N	S	AE	EE	N	J
Cavaliere and Lombardi (2015)	389	F, S	Y	S	AE	EE	N	J
Chen, Hsiao, and Chu (2014)	120	S	Y	S	EE	EE	N	J
Chen, Park, and Newbury (2009)	202	F, S	Y	S	EE	EE	N	J
Chen, Chen, et al. (2014)	156	F, S	N	S	EE	EE	N	J
Ciabuschi (2004)	169	C, F, S	Y	S	AE	EE	N	U
Ciabuschi et al. (2010)	141	C, F	Y	M	AE	AE	Y	J
Colakoglu (2012)	99	C, F, S	Y	S	AE	AE	N	J
Cray (1984)	57	C, F	N	M	AE	AE	N	J
Crespo et al. (2014)	202	C, F, S	Y	S	AE	AE	N	J
Dhanaraj et al. (2004)	63	S	Y	S	EE	EE	N	J
Dhanaraj et al. (2004)	72	S	Y	S	EE	EE	N	J
Dimitratos et al. (2011)	528	C, F, S	N	HQ	EE	EE	N	B
Fey and Furu (2008)	164	C, F, S	Y	S	EE	AE	N	J
Frost and Zhou (2005)	104	FIM (C, F)	Y	M	N/A	N/A	N/A	J
Ghoshal and Bartlett (1988)	618	C, S	Y	HQ	EE	AE	N	J
Ghoshal et al. (1994)	164	C, S	Y	S	EE	EE	N	J
Ghoshal et al. (1994)	84	C, S	Y	S	EE	EE	N	J
Gomez and Werner (2004)	74	F, S	N	S	EE	AE	Y	J
Gooderham et al. (2011)	470	C, F	Y	S	EE	AE	N	J
Grevesen and Damanpour (2007)	79	C, F, S	N	S	AE	AE	Y	J
Grewal et al. (2013)	175	C, F	N	S	AE	AE	N	J
Gupta and Govindarajan (1994)	359	C, S	N	S	EE	AE	N	J
Gupta and Govindarajan (2000)	374	C, F, S	Y	M	EE	AE	N	J
Haas (2010)	96	C	Y	M	EE	EE	N	J
Hocking et al. (2007)	71	S	Y	S	AE	AE	N	J
Hoetker and Mellewigt (2009)	71	F, S	N	HQ	EE	AE	N	J
Holtbrügge and Berg (2004)	142	F, S	Y	S	EE	AE	N	J
Holtbrugge (2005)	66	C, F	N	S	N/A	N/A	N/A	J
Huang et al. (2015)	152	C, F, S	N	HQ	EE	EE	Y	J
Islam et al. (2015)	90	C, F	Y	HQ	EE	EE	N	J
Jansen et al. (2005)	462	C, F, S	N	S	EE	AE	N	J
Jansen et al. (2006)	283	C, F, S	N	S	EE	AE	N	J
Jansen et al. (2009)	230	F, S	N	HQ	EE	EE	N	J
Jaussaud and Schaaper (2007)	316	F	Y	S	EE	AE	N	J
Kawai and Strange (2014)	88	C, F	N	S	AE	AE	N	J
Keupp et al. (2011)	287	C	Y	HQ	EE	AE	N	J
Kim and Park (2000)	61	C, F, S	N	HQ	EE	AE	N	J
Kim et al. (2003)	161	C, F, S	N	HQ	EE	AE	N	J
Kumar and Seth (1998)	128	F	N	S	AE	AE	N	J
Lee and Chan (2013)	114	S	Y	S	AE	EE	N	C
Lee et al. (2011)	104	C, F, S	Y	S	AE	EE	N	J
Lei et al. (1994)	113	F	Y	HQ	EE	AE	N	J
Lunnan et al. (2016)	105	F, S	Y	S	EE	AE	N	B
Luo (2012)	140	C, F, S	N	S	EE	EE	N	J
Mäkelä et al. (2012)	326	S	Y	S	AE	EE	N	J
Mani et al. (2014)	132	C, F	Y	S	EE	EE	Y	J
Miao et al. (2011)	81	C, F	N	S	AE	EE	N	J
Miao et al. (2011)	71	C, F	N	S	AE	EE	N	J
Michailova and Minbaeva (2012)	219	S	Y	S	EE	AE	N	J
Minbaeva et al. (2014)	168	F, S	Y	S	EE	AE	N	J
Mudambi et al. (2014)	293	C, S	N	HQ	AE	AE	N	J
Nell and Ambos (2013)	124	C, F, S	Y	S	AE	AE	Y	J
Nguyen and Hong (2014)	123	F, S	Y	S	EE	EE	N	J
Noorderhaven and Harzing (2009)	169	C, F, S	Y	S	EE	AE	N	J
Pahl and Roth (1993)	105	F, S	N	S	AE	EE	N	J
Palmié et al. (2016)	103	C, F, S	N	HQ	EE	AE	N	J
Peltokorpi (2015)	661	S	Y	S	AE	AE	N	J
Persaud et al. (2002)	79	C, S	N	S	EE	AE	N	J
Persaud (2005)	79	C, F	N	S	EE	AE	N	J
Persson (2006)	74	F, S	Y	S	EE	AE	N	J
Rabbiosi (2008)	307	C, S	Y	HQ	AE	AE	Y	J

(continued on next page)

Table 1 (continued)

Studies	Sample size	Integration mechanisms covered	Knowledge transfer	Data source	Host country	Home country	Region	Publication type
Rabbiosi (2011)	280	C, F, S	Y	HQ	EE	AE	N	J
Rao et al. (2007)	54	C, F, S	Y	M	EE	EE	N	J
Reiche (2011)	269	F, S	Y	HQ	EE	AE	N	J
Reiche et al. (2015)	817	C, F, S	Y	S	AE	EE	N	J
Roth et al. (1991)	82	C, F, S	N	S	EE	AE	N	J
Sauter (2015)	103	C, F, S	N	HQ	EE	AE	N	U
Sauter (2015)	61	C, F, S	N	HQ	EE	AE	N	U
Schomaker and Zaheer (2014)	59	S	Y	HQ	EE	AE	N	J
Schuler-Zhou and Schuller (2013)	45	C	Y	S	AE	EE	N	J
Smale et al. (2012)	76	F, S	N	S	EE	AE	N	J
Subramaniam (2006)	90	F, S	N	HQ	EE	EE	N	J
Willem et al. (2006)	165	F, S	Y	S	EE	AE	N	J
Willem and Buelens (2007)	358	F, S	Y	HQ	EE	AE	N	J
Willem and Buelens (2009)	152	C, F, S	Y	S	AE	AE	Y	J
Williams and Lee (2016)	86	F, S	Y	S	AE	AE	N	J
Yamao et al. (2009)	151	F, S	Y	S	AE	AE	N	J
Yamin et al. (2011)	129	C, F, S	Y	S	EE	AE	N	J

Integration mechanisms covered: C: centralization; F: formalization; S: socialization.

Knowledge transfer: Y: yes, knowledge transfer variable is included in the correlation matrix; N: no, knowledge transfer variable is not included in its correlation matrix.

Data Source: S: subsidiaries; HQ: headquarters; M: mixed.

Host country & Home country: EE: emerging economies; AE: advanced economies; M: mixed or no specific information is provided.

Region: Y: yes, host and home countries are in the same region; N: no, they are not in the same region; N.A.: no specific information is provided.

Publication type: J: journal paper; C: conference paper; B: book chapter; U: dissertation or other unpublished studies.

Table 2

Meta-Analysis Results: Main-Effect Results.

Variable	k	N	r	ρ	SD _p	Q	90% Credibility Interval		95% Confidence Interval		Fail-safe N
							Lower	Upper	Lower	Upper	
Knowledge Transfer											
Centralization	30	6466	-0.07	-0.08	0.31	379***	-0.57	0.40	-0.20	0.02	49
Centralization ^o	26	4791	-0.06	-0.07	0.20	117***	-0.36	0.23	-0.15	0.01	34
Formalization	40	7309	0.20	0.25	0.29	383***	-0.20	0.70	0.17	0.35	65
Formalization ^o	35	6057	0.22	0.28	0.21	167***	-0.01	0.59	0.22	0.35	68
Socialization	53	10036	0.27	0.35	0.23	417***	0.00	0.72	0.29	0.42	146
Socialization ^o	49	9238	0.29	0.37	0.19	249***	0.09	0.65	0.32	0.43	147
Interrelationship											
Centralization-Formalization	34	6279	0.12	0.15	0.33	499***	-0.38	0.69	0.04	0.26	72
Centralization-Formalization ^o	30	4796	0.10	0.13	0.21	140***	-0.18	0.44	0.06	0.21	48
Centralization-Socialization	32	6573	0.02	0.03	0.31	368***	-0.45	0.51	-0.08	0.13	19
Centralization-Socialization ^o	29	5351	0.09	0.12	0.20	128***	-0.17	0.41	0.04	0.19	70
Formalization-Socialization	54	8883	0.25	0.32	0.27	453***	-0.08	0.74	0.25	0.40	132
Formalization-Socialization ^o	49	7890	0.24	0.31	0.22	269***	-0.02	0.65	0.25	0.38	113

*** if p < 0.01, ** if p < 0.05, * if p < 0.10.

k: number of studies; N: sample size; r: weighted mean uncorrected correlation; ρ: weighted mean corrected correlation; SD_p: standard deviation in the population

O: Outlier excluded.

various circumstances. In contrast, when knowledge flows out of subsidiaries to HQs or other subsidiaries, such as in reverse knowledge transfer and lateral knowledge transfer, their 90% credibility intervals and 95% confidence intervals include zero. This suggests that other moderators are in place to explain the insignificant effect sizes and heterogeneity between centralization and knowledge transfer. Hypothesis 2a is therefore strongly supported.

Hypothesis 2b is not statistically significant. However, a closer look into the subgroup analyses shows that the relationship between centralization and knowledge transfer is affected when knowledge transfer performance is considered in terms of efficiency and effectiveness. The mean differences among the efficiency and effectiveness groups were obvious, with ρ = -0.39 for the efficiency subgroup (k = 4, N = 542) and ρ = -0.21 for the effectiveness subgroup (k = 3, N = 439). The 95% confidence interval for the efficiency subgroup was rather narrow at (-0.65, -0.13) without crossing zero, implying that centralization hinders the efficiency of knowledge transfer. In contrast, when the effectiveness of knowledge transfer is the goal, both the credibility interval and the confidence interval include zero, suggesting that the role

played by centralization is unclear and other moderators are in place. The relationship between centralization and tacit knowledge transfer is not significantly different from that for the relationship between centralization and explicit knowledge transfer; thus, Hypothesis 2c is not supported by the data.

As for formalization, its relationship with knowledge transfer does not change significantly despite different directionalities, an outcome that does not support Hypothesis 4a. In both directions of vertical knowledge transfer, the credibility intervals are narrow, and the effect sizes are positive. This suggests that formalization instills structure and norms in the organization, when knowledge flows vertically between HQs and subsidiaries, which is valuable in complex environments (Ghoshal & Nohria, 1989). However, the impact of formalization on lateral knowledge transfer is not significantly positive, suggesting that other factors influence the role played by formalization in facilitating lateral knowledge transfer.

The relationship between formalization and knowledge transfer is significantly affected by knowledge transfer performance dimensions, with the WLS model significant at p < 0.10. The mean differences

Table 3
Subgroup Analyses for Different Dimensions of Knowledge Transfer.

Variable	k	N	r	ρ	SD _p	R ²	F	90% Credibility Interval		95% Confidence Interval		Hypotheses
								Lower	Upper	Lower	Upper	Tested
Directionality as Moderator												
Centralization-Knowledge Transfer						0.337	9.83***					H2a
HQs to subsidiaries	4	1484	0.18	0.21	0.08			0.11	0.32	0.13	0.30	
Subsidiaries to HQs	6	1292	-0.01	-0.01	0.16			-0.24	0.23	-0.14	0.12	
Lateral knowledge transfer	8	1736	-0.08	-0.09	0.24			-0.48	0.30	-0.27	0.07	
Formalization-Knowledge Transfer						0.110	1.94					H4a
HQs to subsidiaries	9	2536	0.28	0.35	0.17			0.28	0.42	0.30	0.40	
Subsidiaries to HQs	6	1478	0.21	0.25	0.09			0.16	0.34	0.19	0.32	
Lateral knowledge transfer	9	2033	0.12	0.15	0.27			-0.28	0.58	-0.04	0.32	
Socialization-Knowledge Transfer						0.409	10.99***					H6a
HQs to subsidiaries	10	2911	0.24	0.29	0.09			0.18	0.39	0.23	0.34	
Subsidiaries to HQs	10	2138	0.27	0.35	0.20			0.05	0.65	0.22	0.48	
Lateral knowledge transfer	7	1425	0.32	0.42	0.30			-0.06	0.90	0.18	0.64	
Transfer Performance As Moderator												
Centralization-Knowledge Transfer						0.287	2.76					H2b
Efficiency	4	542	-0.26	-0.39	0.26			-0.58	0.01	-0.65	-0.13	
Effectiveness	3	439	-0.14	-0.21	0.20			-0.48	0.06	-0.43	0.05	
Formalization-Knowledge Transfer						0.257	4.92*					H4b
Efficiency	4	542	-0.08	-0.13	0.33			-0.63	0.38	-0.44	0.22	
Effectiveness	6	1113	0.06	0.08	0.27			-0.34	0.50	-0.13	0.30	
Socialization-Knowledge Transfer						0.007	0.81					H6b
Efficiency	4	443	0.16	0.23	0.18			0.02	0.44	0.04	0.41	
Effectiveness	5	972	0.15	0.21	0.27			-0.16	0.57	-0.01	0.42	
Tacit Knowledge as Moderator												
Centralization-Knowledge Transfer						0.087	2.27					H2c
Tacit knowledge	5	1751	0.152	0.178	0.10			0.04	0.32	0.09	0.27	
Explicit knowledge	2	391	0.085	0.117	0.05			0.12	0.12	0.04	0.19	
Socialization-Knowledge Transfer						0.002	0.08					H6c
Tacit knowledge	7	1641	0.20	0.23	0.14			0.05	0.42	0.14	0.33	
Explicit knowledge	3	239	0.28	0.32	0.08			0.32	0.32	0.25	0.40	

*** if p < 0.01, ** if p < 0.05, * if p < 0.10.

k: number of studies; N: sample size; r: weighted mean uncorrected correlation; ρ: weighted mean corrected correlation; SD_p: standard deviation in the population

among the knowledge transfer efficiency and effectiveness groups were obvious, with ρ = -0.13 for the efficiency subgroup (k = 4, N = 542) and ρ = 0.08 for the effectiveness subgroup (k = 6, N = 1113). Hence, Hypothesis 4b is supported. A closer examination of its credibility interval and confidence interval showed that both credibility and confidence intervals were rather wide, crossing zero. It implies that other moderators are in place to explain the heterogeneity between formalization and knowledge transfer performance. We were unable to test the impact of types of knowledge on the role played by formalization in transferring knowledge (H4c), as there are only two studies for tacit knowledge and one study for explicit knowledge in our meta-analyzed sample.

The relationship between socialization and knowledge transfer is also influenced by dimensions of knowledge transfer. For instance, the differences in effect sizes among the three groups of knowledge transfer directions are significant at p < 0.01. We therefore ran the mean difference tests among any two groups and found that the divide between vertical knowledge transfer and lateral knowledge transfer is the key factor accounting for the significantly different outcomes between the various pairs. The significantly larger effect size for the lateral

knowledge flow subgroup (ρ = 0.42, k = 7, N = 1425) implies that socialization mechanisms better enable lateral knowledge transfer, despite the fact that they also facilitate knowledge transfer between HQs and subsidiaries. Hypothesis 6a is thus strongly supported.

The impact of types of knowledge and transfer performance do not moderate the relationship between socialization and knowledge transfer, as evidenced by small F and R² in these two cases in Table 3. Hypothesis 6b and Hypothesis 6c are thus not supported.

Overall, the subgroup analyses presented in Table 3 fully supports Hypothesis 2a, Hypothesis 4b, and Hypothesis 6a. This suggests that the identified and tested dimensions of knowledge can be important for the relationship between integration mechanisms and knowledge transfer, but vary across integration mechanisms and knowledge transfer dimensions.

4.3. Multiple regression results

We conducted multiple regression analyses using SEM in STATA (v.13) to determine the combined and incremental contributions of the integration mechanisms to knowledge transfer. Table 4 summarizes the

Table 4
Multivariate Regression Analysis Results Summary.

Coefficients	Model 1	Model 2	Model 3	Model 4 (C + F)	Model 5 (F + S)	Model 6 (C + S)	Model 7(C + F + S)
Centralization	-0.08 (0.01)			-0.12 (0.01) ***		-0.08 (0.01) ***	-0.11 (0.01) ***
Formalization		0.25 (0.01)		0.27 (0.01) ***	0.16 (0.01) ***		0.18 (0.01) ***
Socialization			0.35 (0.008)		0.29 (0.01) ***	0.34 (0.01) ***	0.28 (0.01) ***
Sample size	6466	7309	10,036	6655	8595	6800	7060
R ²	0.005	0.09	0.150	0.080	0.140	0.124	0.151

*** if p < 0.001, ** if p < 0.01, * if p < 0.05. Standard errors are in brackets. C: centralization. F: formalization. S: socialization.

Note: Coefficients in Models 1–3 are the same as the main-effect sizes in Table 2. They are listed here in parallel with Models 4–7 for easy comparison.

results of the multiple regression analyses for different combinations of the three integration mechanisms. Beta weights and standard errors are reported for each mechanism as well as the total variance and sample size for each model.

We used the inter-correlations between different integration mechanisms reported in Table 2 as the input to run the MASEM. The inter-correlations between centralization and formalization, and between formalization and socialization are statistically significant. Specifically, the mean effect size $\rho = 0.32$ ($k = 54$, $N = 8883$) for inter-correlation between formalization and socialization can be regarded as large (Cohen, 2013). Centralization and socialization are also positively correlated when outliers are excluded from the analysis ($\rho = 0.12$, $k = 29$, $N = 5351$). Consequently, Hypothesis 7 is supported.

From Table 4, we can see that beta weights in each model are statistically significant. Among the three integration mechanisms, socialization is the mechanism that contributes most to knowledge transfer and has the highest effect size. For example, when all the three mechanisms are adopted simultaneously, the effect size for socialization is 0.28, 50% higher than that of formalization. In addition, socialization accounts for more variance than the other two mechanisms when comparing R^2 among different models. As a result, Hypothesis 8 is strongly supported.

It is interesting to note that when only centralization and formalization are entered into the model, as in Model 4, formalization still has a very strong positive effect size ($\beta = 0.27$) while centralization has a relatively strong negative size ($\beta = -0.12$). When these two effect sizes are compared to the pairwise effect size for corresponding mechanisms (Model 1 and Model 2), we can see that formalization enhances the negative impact of centralization if only these two formal integration mechanisms are at place. When socialization is entered into models (Models 5, 6 and 7), the effect sizes for formalization drop from 0.25 (Model 2) to 0.16 (Model 5), or from 0.27 (Model 4) to 0.18 (Model 7), while the negative effect sizes for centralization remain stable (-0.12 in Model 4 versus -0.11 in Model 7, or remain at -0.08 in Model 6 as in Model 1). These results also indirectly provide empirical support to Hypothesis 8 and provide implications for the effects between these three different mechanisms, such as the socialization's substitutionary effect for formalization.

4.4. Moderating effects

We tested whether any of the pairwise relationships shown in Table 2 were affected by the moderators shown in Fig. 1. For space considerations, Table 5 focuses on the results of key moderators where the differences between subgroups are significantly different. The authors can be contacted for the complete results of all moderators.

As shown in Table 5, our results indicate that the data source is an important moderator in some pairwise relationships. It is consistent with the view that HQs and subsidiaries often have different perceptions of the same issue (Birkinshaw, Holm, et al., 2000). For example, for the relationship between socialization and knowledge transfer, the WLS model was significant at $p < 0.01$ and the mean differences among HQs and subsidiary subgroups were obvious, with $\rho = 0.28$ for the HQ subgroup ($k = 10$, $N = 2623$) and $\rho = 0.37$ for the subsidiary subgroup ($k = 41$, $N = 7254$). A closer examination showed that when data were collected from HQs, the credibility interval was narrower (0.02–0.54), implying that there is a more homogeneous belief among HQs managers that socialization is positively and often strongly associated with knowledge transfer across various circumstances. In contrast, when data were collected from subsidiaries, the credibility interval was very wide (-0.02–0.76), suggesting that other moderator searches are necessary to explain the heterogeneity between these two constructs when data were collected from subsidiaries.

When home country and host country effects are considered, the magnitude for formalization differs significantly between two subgroups. When the home country is located in emerging countries, the

effect size for formalization-knowledge transfer ($\rho = 0.39$, $k = 3$, $N = 326$) is significantly higher than the case when the home country is located in advanced countries ($\rho = 0.19$, $k = 29$, $N = 4800$). As the credibility interval for the subgroup of emerging home countries does not include zero (0.14–0.63), emerging market multinational enterprises (EMNEs) believe strongly and homogeneously that formalization leads to positive knowledge transfer. When host countries are located in emerging countries, the magnitude of the positive relationship between formalization and knowledge transfer is significantly larger ($\rho = 0.41$, $k = 7$, $N = 1159$) than when host countries are located in advanced countries ($\rho = 0.35$, $k = 15$, $N = 3009$). However, these positive relationships may not be generalizable to other circumstances as their credibility intervals cross zero. For socialization as the integration mechanism, there is quite a homogeneous belief that socialization leads to better knowledge transfer, and the belief is stronger when MNEs have subsidiaries in emerging countries.

Even though the number of studies available to search for the moderation effect by region is limited ($k = 6$ for within a region, $k = 2$ for outside a region), we found that regionalization had a significant impact on the centralization-knowledge transfer relationship. The moderation effect for this relationship is significant, at $p < 0.01$. Centralization is significantly negatively correlated with intra-region knowledge transfer while it is significantly positively correlated with inter-region knowledge transfer. It implies that when the home and host countries are located within the same region, centralization deters knowledge transfer. However, the wide credibility intervals for subgroups still suggest the existence of other relevant moderators.

4.5. Robustness analyses

Identifying outliers in meta-analysis is important because outliers can distort empirical findings and influence the conclusions, especially when they represent a big discontinuity from the rest of studies. Since deleting outliers from the meta-analysis may not always be the best choice, Geyskens et al. (2009) recommends using a sensitivity analysis, by “comparing the results from a meta-analysis on the full data set with the results from a comparable meta-analysis on a reduced data set excluding the outliers” (p. 400). In this study, we have therefore run all the analyses (e.g., main effects, moderator search, and multivariate regression) both for the original full data set and a reduced data set that excludes outliers. In our meta-analysis, outliers were identified if their effect sizes were five standard deviations away from the mean correlation and represented a big discontinuity from the rest of studies. The sensitivity analysis shows that our results for the relationships regarding formalization and socialization are robust. Because of space limitations, we have not included all the results from the sensitivity analysis in the tables; rather, we provide only the analysis for the results of the main-effect, shown in Table 2. The authors can be contacted for access to the results from all sensitivity analysis.

Some evidence suggests that only significant results will be published in journals, which is known as publication bias (Dickerson, 2005). Specifically, when the probability for a study to be published is contingent on the magnitude, direction, or significance of the study's results, this bias exists. Meta-analysts should always assess the extent to which publication bias may affect the findings (Geyskens et al., 2009). As a result, as a further check on the robustness of our analysis, we tested whether any publication bias influences empirical studies on MNE integration mechanisms.

We used a funnel plot, fail-safe N method, and publication bias moderator search to examine potential publication bias. Table 2 lists fail-safe N for the relationships, estimating the number of non-reported studies (“file drawer” studies) with an average effect size of zero needed to reduce the mean effect size by 10% (Steel, 2007). Funnel plots and fail-safe N did not signal the presence of a strong publication bias. The moderator search results, shown in Table 5, suggest that publication bias for some pairwise relationships exists but does not pose a

Table 5
Significant Moderation Effect Results.

Variable	k	N	r	ρ	SD _p	R ²	F	90% Credibility Interval		95% Confidence Interval	
								Lower	Upper	Lower	Upper
Data Source as Moderator											
Centralization-Knowledge Transfer						0.245	3.86**				
HQ (HQ = 1 & sub = 0)	8	2352	-0.16	-0.20	0.35			-0.76	0.36	-0.44	0.04
Sub (HQ = 0 & sub = 1)	20	3877	-0.01	0.00	0.27			-0.42	0.42	-0.2	0.18
Mixed (HQ = 1 & sub = 1)	2	237	-0.30	-0.36	0.37			-0.94	0.22	-0.88	0.16
Formalization-Knowledge Transfer						0.175	150.63***				
HQ (HQ = 1 & sub = 0)	5	832	0.20	0.26	0.16			0.05	0.45	0.12	0.39
Sub (HQ = 0 & sub = 1)	35	6488	0.21	0.28	0.29			-0.17	0.72	0.19	0.38
Socialization-Knowledge Transfer						0.104	9.33***				
HQ (HQ = 1 & sub = 0)	10	2623	0.23	0.28	0.17			0.02	0.54	0.18	0.38
Sub (HQ = 0 & sub = 1)	41	7254	0.29	0.37	0.25			-0.02	0.76	0.29	0.45
Mixed (HQ = 1 & sub = 1)	2	159	0.21	0.28	0.24			-0.05	0.60	-0.06	0.61
Home country Effect as Moderator											
Formalization-Knowledge Transfer						0.027	17.37***				
Home country = 1	29	4800	0.14	0.19	0.31			-0.29	0.67	0.08	0.30
Home country = 0	3	326	0.31	0.39	0.19			0.14	0.63	0.20	0.59
Host Country Effect as Moderator											
Formalization-Knowledge Transfer						0.595	41.47***				
Host country = 1	15	3009	0.27	0.35	0.26			-0.05	0.75	0.22	0.48
Host country = 0	7	1159	0.31	0.41	0.32			-0.09	0.91	0.17	0.65
Socialization-Knowledge Transfer						0.272	7.09**				
Host country = 1	17	3756	0.25	0.31	0.17			0.06	0.57	0.24	0.40
Host country = 0	4	528	0.45	0.57	0.19			0.29	0.85	0.37	0.78
Region as Moderator											
Centralization-Knowledge Transfer						0.722	17.83***				
Region = 1	6	1060	-0.15	-0.21	0.20			-0.50	0.09	-0.37	-0.03
Region = 0	2	964	0.196	0.23	0.11			0.07	0.39	0.09	0.37
Publication Bias as Moderator											
Formalization-Knowledge Transfer						0.018	11.6***				
Published = 1	39	7187	0.20	0.26	0.29			-0.20	0.71	0.17	0.35
Published = 0	2	274	0.27	0.37	0.22			0.05	0.69	0.05	0.69

*** if $p < 0.01$, ** if $p < 0.05$, * if $p < 0.10$.

k: number of studies; N: sample size; r: weighted mean uncorrected correlation; ρ : weighted mean corrected correlation; SD_p: standard deviation in the population.

substantive problem as the subgroup effect sizes mainly differ in magnitude rather than sign direction. Consequently, the findings from this meta-analysis are relatively robust.

5. Discussion

The ability to develop and use knowledge assets across multiple markets is often seen as the backbone of MNEs (Kogut & Zander, 1993; Rugman & Verbeke, 2001; Verbeke, 2003). MNE integration mechanisms have been extensively studied over the past decades, generating substantial empirical data. Although conceptual and qualitative reviews of the literature on integration mechanisms have been done (e.g., Fan et al., 2012; Martinez & Jarillo, 1989), no study, to our knowledge, has so far attempted to synthesize the quantitative findings in this field.

In this study, we consolidate existing empirical research on the use and expected benefits of integration mechanisms using meta-analytic techniques. Our insights have major theoretical and empirical implications. We contribute to the MNE integration literature by nuancing the roles of different integration mechanisms in knowledge transfer. At an aggregate level, our meta-analysis provides empirical evidence that both formalization and socialization facilitate and enhance knowledge transfer, with socialization most strongly correlated with knowledge transfer. In contrast, the role played by centralization in facilitating knowledge transfer is weakly negative. The dominant role of socialization highlights the need to incorporate both formal and informal mechanisms when examining MNE integration. Although socialization has gained increasing momentum in the MNE integration literature (Grøgaard & Colman, 2016), the focus still remains on formal integration mechanisms when identifying “actionable” management tools to facilitate integration (Keupp et al., 2011).

The simultaneous use of multiple integration mechanisms and their

possible interrelationships have long been recognized in the MNE integration literature (Ghoshal & Nohria, 1989; Roth & Nigh, 1992). However, with few exceptions, like Noorderhaven and Harzing (2009), we have very limited empirical insights into the complementarity or substitution effects of integration mechanisms. After pooling primary studies together through the use of MASEM, we identify two interesting aspects of the interrelationships of integration mechanisms:

1. Socialization mitigates the negative impact of centralization on knowledge transfer. Hence, firms that rely on centralized decision-making for scale and efficiency (Kim et al., 2003) can still achieve knowledge transfer by investing in socialization mechanisms. This is critical for hierarchical MNEs that rely on knowledge development in host countries to compete globally (Hitt, Li, & Xu, 2016; Kostova et al., 2016). By improving communication channels (Gupta & Govindarajan, 2000; Tsai, 2002), socialization thus appears to economize bounded rationality issues in hierarchical MNEs (Rugman et al., 2011).
2. Socialization substitutes for formalization when these two integration mechanisms are used simultaneously, an outcome we refer to as the substitution effect. Successful knowledge transfer is thus not as straightforward as merely implementing both formal and informal integration mechanisms simultaneously, as their interrelatedness is more complex. Formalization provides clarity and a structure that improves efficiency in knowledge transfer (Ambos & Ambos, 2009; Crespo et al., 2014) and guides organizational behavior (Roth et al., 1991). However, technology developments continuously improve the availability and costs of communication and information processing (Kostova et al., 2016). The identified substitution effect may thus reflect that efficient and frequent communication reduces the need for formalized structures. MNE managers must therefore

carefully consider if formalized processes and procedures add value for particular tasks and areas, or if socialization ensures sufficient clarity and guidance while perhaps even increasing organizational flexibility.

Our analysis also contributes to the knowledge-based view by testing the impacts of knowledge dimensions (direction, transfer performance, and types of knowledge) on the relationships between integration mechanisms and knowledge transfer. Interestingly, the influence of these dimensions varies across the integration mechanisms.

Specifying the directionality of knowledge flows is particularly important for centralization, which positively facilitates knowledge transferred vertically from HQs to subsidiaries while hindering reverse and lateral knowledge transfer. This reflects that centralization is beneficial in hierarchies to transfer knowledge from HQs to subsidiaries (Dunning & Lundan, 2008; Hitt et al., 2016), and challenges the use of centralization in modern MNEs, which rely on knowledge generated in contexts outside of HQs (Blomkvist, Kappen, & Zander, 2017). However, we emphasize that definitions of centralization in extant research do not capture if subsidiaries are assigned strategic roles with broader decision-making mandates in the MNE, which may reflect a form of “lateral centralization” (O’Donnell, 2000). Both formalization and socialization positively influence knowledge transfers from subsidiaries to HQs. It is also interesting to note that while formalization facilitates vertical knowledge flows (both to and from HQs), its influence on lateral knowledge flows is unclear. Hence, the benefits of clear formal communication channels do not seem to facilitate lateral communication, possibly due to subsidiaries’ competition for resources and HQ attention (Bouquet & Birkinshaw, 2008), which reduce subsidiary motives and incentives for lateral knowledge transfer. In contrast, socialization positively facilitates lateral knowledge flows, in line with Tsai’s (2002) findings that informal structures and socialization positively influence lateral knowledge transfer even among subsidiaries that compete with each other. Managers should thus carefully consider the directionality of desired knowledge flows to ensure that scarce resources are invested appropriately and combined strategically to reduce potential negative effects on knowledge transfer.

We also find important differences based on the transfer performance. As anticipated, due to coordination costs of HQ involvement (Ciabuschii et al., 2010), centralization negatively influences knowledge transfer efficiency. This emphasizes the need to move beyond measures of knowledge transfer “volumes” to more nuanced assessments of the “quality” of knowledge transfer (Pérez-Nordtvedt et al., 2008). Extant research often equates success with high flows of knowledge (Andersson et al., 2015). However, firms that invest heavily to ensure the use and implementation of knowledge need to balance this with transfer efficiency. Our findings show that integration mechanisms clearly differ in how they facilitate or constrain efficiency and effectiveness, where socialization is the only integration mechanism that positively influences efficiency. If knowledge diffusion is important in contexts of high cost pressures, MNEs should invest resources in socialization mechanisms to increase the knowledge transfer efficiency and effectiveness.

Despite our expectations, the types of knowledge transferred did not significantly influence the relationship between integration mechanisms and knowledge transfer. This is surprising, given the extensive attention to transfer challenges related to tacit knowledge (Nonaka, 1994). However, since few empirical studies have explicitly specified the types of knowledge (i.e., tacit versus explicit) when examining the relationship between integration mechanisms and knowledge transfer, the stability of the results may not be high enough for us to draw a conclusion.

This points to another important finding in our study that has consequences for the knowledge-view of the firm, as well as MNE integration literature. Although we note that primary studies show increased recognition that different dimensions of knowledge can

influence knowledge transfer, empirical studies of integration mechanisms have not consistently identified dimensions of knowledge, reflecting a *systemic error* in the literature. Most studies that tease out different dimensions of knowledge focus on directions of knowledge flow, as observed by Andersson et al. (2015). Still, directionality is only identified in approximately one third of studies in our sample. The knowledge transfer performance (i.e., efficiency and effectiveness) is identified in around 20% of empirical studies examining the relationship between integration mechanisms and knowledge transfer. Despite decades of research on tacit versus explicit knowledge (Dhanaraj et al., 2004; Nonaka, 1994), only two studies examine the relationship between centralization and explicit knowledge transfer while at least three studies are needed to calculate stable effect sizes in a meta-analysis (Lipsey & Wilson, 2001). The number of articles nuancing types of knowledge are similarly scarce for socialization mechanisms, and even too low to test for its influence on the relationship between formalization and knowledge transfer. As our analysis shows, this is deeply problematic for our understanding of the relationship between integration mechanisms and knowledge transfer.

Additionally, our paper also contributes to the general IB literature by exploring whether a range of important IB factors influence the synthesized relationships between integration mechanisms and knowledge transfer. We find strong evidence that HQs and subsidiaries have different perceptions about the impact of integration mechanisms on knowledge transfer. This finding is similar to the findings of diverse perceptions across HQs and subsidiaries, in the study of post-acquisition integration by Birkinshaw, Bresman et al. (2000). Our results are more heterogeneous when data were collected from subsidiaries, suggesting that HQs are more aligned in their perceptions regarding the role of integration mechanisms in enabling knowledge transfer. This points to the need for HQs to more clearly explain the purpose of centralization, formalization, and socialization mechanisms. The MNE literature has previously been criticized for being too MNE-centric (Hennart, 2009). Our results reinforce the importance of collecting data from both HQs and subsidiaries to get a more balanced view of the outcomes of integration mechanisms. The variation in subsidiary responses may reflect the differentiated roles and responsibilities of MNE (Bartlett & Ghoshal, 1987; Blomkvist et al., 2017). It also implies that other unexplored variables should be identified and analyzed in future studies to better explain the hypothesized relationships from a subsidiary perspective.

Based on our limited sample of studies on EMNEs’ use of different integration mechanisms, we find that EMNEs show a stronger homogeneous belief that formalization enhances knowledge transfer, compared to MNEs from advanced markets. These findings suggest that MNEs use more formalization mechanisms when emerging market firms are involved. This could reflect lack of resources and infrastructure to invest in travel or technology that enables access to frequent communication and socialization efforts. In addition, when host countries are located in emerging countries, the relationship between formalization and knowledge transfer is stronger, than that for advanced host countries. For subsidiaries located in emerging countries, socialization leads to better knowledge transfer. To date, we have limited insights into how EMNEs differ in terms of their strategies and organizing (Kostova et al., 2016). Our exploratory findings highlight the need to develop a better understanding of such differences.

Differences due to economic developments of home and host countries and whether they belong to the same region matter for these relationships; they point to a need to better bridge contextual variables with studies on internal knowledge transfer in the IB literature. For instance, when HQs and subsidiaries are located within the same region, they may already have strong ties and shared norms. HQ involvement may then be deemed a constraint and negatively influence knowledge transfer. When the host country is located outside the home region, centralization can facilitate knowledge transfer by simplifying decision-making which reduces the costs of inter-regional activities

(Rugman & Verbeke, 2005). Regionalization should therefore be taken into consideration for studies on knowledge transfer.

Since at least three studies are necessary to meta-analyze the effect sizes (Lipsey & Wilson, 2001), we were limited by the number of available studies in our search for additional theoretically important variables to extend theory. As a result, we also make suggestions for future primary studies based on our meta-analysis findings.

5.1. Directions for future primary studies

The enabling roles of formalization and socialization in knowledge transfer could be regarded as “stylized facts”. Consequently, future primary studies should not simply examine whether formalization or socialization leads to better knowledge transfer, but instead focus on identifying boundary conditions where these mechanisms may not facilitate successful knowledge transfer.

The strong relationship between socialization and knowledge transfer emphasizes the need to better understand key attributes of socialization mechanisms when studying MNE integration and the need to account for interrelationships between integration mechanisms when studying MNE integration. Our findings that socialization substitutes for formalization when both integration mechanisms are used also suggests that more primary studies need to be conducted to unpack the nuances between the substitution effect versus the complementarity effect. Further insights into the boundary conditions for these effects will be critical for future theory development and can offer valuable managerial insights.

Types of knowledge is a theoretically important concept, but meta-analyzed results do not provide significant results that pivot around this concept, nor are the results stable enough because of a limited number of empirical studies. Future studies on outcomes of integration mechanisms should also include more fine-grained measures of knowledge transfer, particularly knowledge characteristics (e.g., tacitness, codifiability, and complexity), and performance (e.g., efficiency and effectiveness). Directionality of knowledge transfer should not be limited to headquarters and subsidiaries, but also include the knowledge inflows from peer subsidiaries and knowledge outflows to peer subsidiaries (e.g., Gupta & Govindarajan, 2000; Noorderhaven & Harzing, 2009).

Slangen and Hennart (2007) point out that one major reason for inconsistent findings in MNEs’ establishment modes is related to the empirical design. We also spotted similar problems in the integration mechanism studies since the number of studies with specific information for home and host countries is small. This limits the possibility of conducting moderator searches based on home and host countries or regions, which are considered key factors in any serious international business research (Rugman et al., 2011). For instance, if the research question is to explore firm-level or industry-level factors that favor a specific integration mechanism, it would be appropriate to examine MNEs headquartered in a single home country, with subsidiaries established in another single host country. Although the primary study has limited generalizability, such a design will provide data points with higher validity and reliability for future meta-analysis (Slangen & Hennart, 2007). In contrast, if the research question focuses on home-country factors, then the empirical context should be HQs located in different home countries that have subsidiaries in a single host country, with the reverse empirical design for research questions exploring host-country factors.

IB research has long recognized that home country characteristics may influence a firm’s choice of integration mechanisms (Harzing, 1999). Early MNE research most often focused on MNEs from advanced countries. Increasingly, we see the growth and focus on firms from developing markets, particularly EMNEs (Hiitt et al., 2016). Despite the proliferation of international expansion by EMNEs into advanced countries, we do not yet have sufficient data points for a meta-analysis of this context. Eventually, when a sufficient research base is

developed, we will better understand EMNEs’ use of integration mechanisms and outcomes, which presently lags in comparison with their counterparts from advanced economies (Kostova et al., 2016).

6. Conclusion

This meta-analysis provides the first comprehensive overview of the impact of centralization, formalization, and socialization on knowledge transfer. Our analysis addresses statistical artifacts, such as sampling and measurement errors, that have previously obscured international business insights gained from survey-based research (Chang, Van Witteloostuijn, & Eden, 2010). Our synthesis of 89 independent samples, which included over 15,000 subsidiaries, is of sufficient size to provide extremely accurate effect size estimates, a substantive improvement over the sole reliance on rudimentary significance tests (e.g., significant at $p < 0.01$), a form of null hypothesis testing often criticized within the social sciences (Hunter & Schmidt, 2004).

As most data in meta-analyzed articles are self-reported, cross-sectional data from a single source, the possibility of endogeneity exists for some of the variables that creates potential limitations when interpreting our results. In spite of these limitations, our study provides unique insights into the influences and interrelatedness of integration mechanisms. In particular, we highlight the dominant role played by socialization when it is used simultaneously with centralization and formalization. By incorporating key dimensions of knowledge transfer in our meta-analysis, we have provided more insights regarding previously inconclusive findings of integration mechanisms, particularly for centralization. Our results have identified important issues to consider for future research. Generally, we believe that our meta-analytic review provides the groundwork to further advance the research on MNE integration and the knowledge-based view, both theoretically and empirically. Future studies may benefit from examining dimensions of knowledge transfer, their interaction effects, the variations in perceptions among subsidiaries and the influence of home and host country characteristics.

Acknowledgements

We thank Bjorn Ambos (Senior Editor) and our two anonymous reviewers for constructive guidance. We are grateful for the financial support of the Haskayne School of Business at the University of Calgary. We would like to thank Arjen Slangen and Sumit Kundu for their valuable comments at the JIBS paper development workshop at AIB 2017. We would also like to thank our colleagues for providing many comments and suggestions on previous versions of this paper at EIBA 2016 and AOM 2016.

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