Building Subsidiary Local Responsiveness: (When) Does the Directionality of Intra-Firm Knowledge Transfers Matter?

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Abstract

The present study focuses on effects of subsidiary internal knowledge-based activities—knowledge transfer and reverse knowledge transfer—and absorptive capacity on local responsiveness. We also examine whether absorptive capacity, shared values, and psychological safety, representing constituents of the motivation-opportunity-ability model of behavior, moderate relationships of subsidiary internal knowledge-based activities with responsiveness. Based on a sample of 173 Chinese subsidiaries, the results suggest knowledge transfer and absorptive capacity facilitate local responsiveness. Shared values moderates positively and absorptive capacity negatively, the relationship between knowledge transfer and responsiveness. Psychological safety strengthens the link between reverse knowledge transfer and local responsiveness.

Keywords

Absorptive capacity; knowledge transfer; multinational company; psychological safety; reverse knowledge transfer; subsidiary local responsiveness.

1. Introduction

Due to constant and unpredictable changes in customers' needs within and across country markets, subsidiaries' ability to respond continuously to emerging opportunities and threats has become a prerequisite for the success of multinational companies (MNCs) (Lee, Chen, & Lu, 2009; Luo, 2001; Morris, Hammond, & Snell, 2014). Indeed, a challenge to MNCs' efforts to successfully manage international operations is that their strategic leverage is moving from global business efficiency to market responsiveness. Local responsiveness refers to the extent to which the firm is able to address customer- and competitor-related changes in a timely way (Homburg, Grozdanovic, & Klarmann, 2007; Katsikeas, Leonidou, & Morgan, 2000). In the context of MNC networks, local responsiveness concerns the subsidiary's rapid response to specific needs of the host country's marketplace (Luo, 2001).

In the international business literature, intrafirm learning has received enduring attention (Bilgili, Kedia, & Bilgili, 2016; Hung, Yang, Lien, McLean, & Kuo, 2010; Saka-Helmhout, 2010). In particular, intrafirm knowledge flows have been considered primary mechanisms for learning in cross-border operations (e.g. Lane, Salk, & Lyles, 2001; Rui, Zhang, & Shipman, 2016) that result in incremental innovations (Lages, Jap, & Griffith, 2008). Headquarters' knowledge transfer enhances internal capabilities such as knowledge development (e.g. Jiang, Branzei, & Xia, 2016; Li & Lee, 2015; Najafi-Tavani, et al., 2015) and potentially impacts subsidiary performance (e.g. Contractor, Yang, & Gaur, 2016).

Nonetheless, findings regarding the impact of headquarters' knowledge transfer on subsidiary performance are far from conclusive, with some indicating positive effects (e.g. Fang, Wade, Delios, & Beamish, 2013; Keupp, Palmié, & Gassmann, 2011) and others negative ones (e.g. Dhanaraj, Lyles, Steensma, & Tihanyi, 2004). The explanation for these mixed findings may be that resources provided through knowledge transfer benefit subsidiary performance only when they fit with subsidiary capabilities and conditions (Li & Lee, 2015).

The literature, however, lacks theory development on factors that condition the outcomes of knowledge transfer and is unable to provide guidelines on when MNCs should invest in such activities. Given the key role played by knowledge transfer within MNC settings, coupled with substantial time and resources needed for successful knowledge flows, it is imperative to identify boundary conditions that shape their performance relevance.

Although responsiveness is a core dimension of business performance, alongside efficiency and effectiveness (Katsikeas, et al., 2000), prior studies have focused on intrafirm learning effects on subsidiary effectiveness and/or efficiency (Roth, Jayachandran, Dakhli, & Colton, 2009). There is a dearth of empirical research on whether headquarters' knowledge transfer affects subsidiary local responsiveness. Available studies on MNC subsidiary local responsiveness have often followed the environment–strategy–performance view that responsiveness is "mainly influenced by situational contingencies at the subunit level" (Luo, 2001, p.452). The market environment directly shapes a firm's strategic abilities and outcomes (Cui, Griffith, Cavusgil, & Dabic, 2006). Yet, according to the organizational learning literature (e.g. Argote & Miron-Spektor, 2011; Bilgili, et al., 2016), learning from the context of the firm itself would generate competencies that condition its ability to flex to market changes. As part of the MNC, a subsidiary can benefit from the local market, but also utilize relevant knowledge transfers from the firm in which it is embedded (Jiang, et al., 2016; Rui, et al., 2016).

Within the MNC setting, learning does not only occur within individual subsidiaries. Reverse knowledge transfer—from the subsidiary to headquarters—enables the headquarters to learn from subsidiary competencies (Najafi-Tavani, Giroud, & Sinkovics, 2012). As headquarters can improve its innovation capabilities and performance from such knowledge flows (Driffield, Love, & Yang, 2016; Rabbiosi & Santangelo, 2013), scholars have focused on benefits of reverse knowledge transfer for headquarters or the MNC collectively.

Comparatively few studies have assessed the effects of reverse knowledge flows on subsidiary outcomes (Mudambi & Navarra, 2004; Najafi-Tavani, Giroud, & Andersson, 2014). The international business literature is silent as to whether the direction of intrafirm knowledge flows assists the subsidiary in responding quickly to market changes.

The aim of this study is to examine how and when intrafirm knowledge flows in both directions within the headquarters–subsidiary dyad, as a principle mechanism of organizational learning, effect subsidiary local responsiveness. Our focus is on vertical (between the headquarters and subsidiaries), not horizontal (between sister subsidiaries), knowledge flows, within the context of Chinese subsidiaries of non-Chinese MNCs.

The study makes three contributions to existing knowledge. First, the thrust of previous studies have asserted that a subsidiary's local responsiveness is a function of the uncertainty and complexity of the external environment (Luo, 2001). We adopt and test an alternative, organizational learning view that local responsiveness is propelled by the subsidiary's utilization of knowledge opportunities provided through knowledge transfers within the MNC structure in which it is embedded (Lee, et al., 2009). Indeed, we focus on intrafirm knowledge flows together with absorptive capacity; the latter enables the subsidiary to use available (internal and external) knowledge resources adaptively. Second, addressing the dearth of subsidiary performance studies on the directionality of knowledge transfer flows (Chen, Chen, & Ku, 2012), we study the effects of knowledge transfer and reverse knowledge transfer on local responsiveness. The results suggest knowledge transfer and absorptive capacity, but not reverse knowledge transfer, are positively linked to responsiveness.

Third, the study unveils that while opportunities provided via knowledge flows can facilitate subsidiary local responsiveness, this association is contingent on other factors (Li & Lee, 2015). Providing a novel perspective, our research employs the motivation–opportunity–ability (MOA) model of behavior (Blumberg & Pringle, 1982) as a theoretical structure to

identify subsidiary-, intrafirm exchange-, and MNC firm-level factors that account for heterogeneity in the local responsiveness outcomes of intrafirm knowledge flows. Cross-border knowledge transfers do not occur without cost and effort, and attempts to manage them can be fruitless without the participation and motivation of the receiver. We posit novel moderating roles of absorptive capacity, shared values, and psychological safety that represent ability, opportunity, and/or motivation aspects within the MOA framework. As such, the contribution of our research is not limited to providing new insights on the responsiveness outcomes of knowledge transfers; rather we shed light on boundary conditions that strengthen or weaken these links. The results suggest shared values positively moderates the knowledge transfer to local responsiveness path, while absorptive capacity negatively conditions this path. Reverse knowledge transfer is positively linked to local responsiveness when psychological safety characterizes the climate in the MNC.

2. Theoretical background and hypotheses

Despite its inconsistencies, the international business literature (e.g. Añón Higón & Manjón Antolín, 2012; Dhanaraj, et al., 2004; Keupp, et al., 2011; Tran, Mahnke, & Ambos, 2010) has become sophisticated in terms of examining outcomes of intrafirm knowledge flows (e.g. subsidiary innovativeness and performance). Nevertheless, few studies have focused on subsidiary outcomes of reverse knowledge transfer. The majority of these (e.g. Ambos, Andersson, & Birkinshaw, 2010; Mudambi & Navarra, 2004; Najafi-Tavani, et al., 2014) have emphasized how reverse knowledge impacts subsidiary position within the MNC. For instance, Najafi-Tavani et al. (2014) demonstrates that reverse knowledge transfer enhances subsidiary bargaining power within MNCs, whereas Ambos et al. (2010) indicates that such activities determine the extent of headquarters' attention. While these studies shed light on the association between reverse knowledge transfer and subsidiary strategic position within

the MNC, they do not provide guidelines regarding the performance consequences of such activities. The current study contributes to the literature on traditional and reverse knowledge transfer by investigating how subsidiary engagement in both knowledge flows impacts its local responsiveness.

Notwithstanding its historic origins in management and marketing (Maclnnis & Jaworski, 1989), the MOA framework has been employed recently by a growing stream of studies examining antecedents and outcomes of knowledge transfers in different contexts (e.g. Kim, Hur, & Schoenherr, 2015; Reinholt, Pedersen, & Foss, 2011). For instance, Chang et al. (2012) argued that expatriates' opportunity seeking and ability and motivation to transfer knowledge, influence a subsidiary's profit-related performance via the knowledge received by the subsidiary; and that this indirect mechanism is stronger in the presence of high levels of subsidiary absorptive capacity. Further, Kim et al. (2015) revealed that the impact of buyer-driven knowledge transfer (as opportunity) on the supplier's operational performance becomes stronger when the supplier's absorptive capacity (as ability) is high and weaker when their innovativeness (as motivation) is high.

We propose that the MOA framework is a robust theoretical lens through which to examine intrafirm knowledge flows to local responsiveness associations, and allied boundary conditions. These knowledge flows are complex, multilevel, and multidisciplinary in nature (Easterby-Smith, Lyles, & Tsang, 2008; Oddou, Osland, & Blakeney, 2009). Scholars have argued that various factors related to the sender and receiver, or the exchange between them, can shape the outcomes of knowledge transfers (Szulanski, 1996). Hence, the challenge of studying intrafirm knowledge flows is to focus on "a parsimonious number of exclusive variables while simultaneously being comprehensive enough to mirror reality accurately without excluding pertinent factors" (Oddou, et al., 2009, p.185). The MOA framework helps

us to overcome this barrier as it promotes the explicit consideration of boundary conditions that facilitate or hinder the outcomes of intrafirm knowledge flows (cf: Schmitz, 2013).

Further, the MOA framework lends itself to studying intrafirm knowledge flows as multilevel phenomena. It involves a "meta-theoretic principle" that transcends study domains and, thus, can account for observed phenomena across a variety of situations (Kim, Pathak, & Werner, 2015, p. 785). Several studies have used MOA theory to capture the simultaneous effects of organizational-, group-, and individual-level factors on a range of individuals' or firms' activities and outcomes (e.g. Colakoglu, Yamao, & Lepak, 2014; Crespo, Griffith, & Lages, 2014). For instance, Kettinger et al. (2015) used the MOA framework to identify antecedents, at the organizational and individual levels, of knowledge sharing within firms.

In focusing on vertical (not horizontal) knowledge transfers we imply that a focal subsidiary can exploit and benefit from acquired headquarters' knowledge more easily given that, compared to sister subsidiaries, headquarters' knowledge is relatively less idiosyncratic to country location or functional role(s) played in the MNC network (Rugman & Verbeke, 2001). Although the complexities of horizontal knowledge transfers fall beyond the current study's scope, we do not deny their importance. Under certain conditions (e.g. close geographical and technical proximity and lower levels of subsidiary entrepreneurial culture) knowledge resources of sister subsidiaries can greatly benefit the subsidiary's outcomes (Colakoglu, Yamao, & Lepak, 2014; Crespo, Griffith, & Lages, 2014; Li & Lee, 2015).

The MNC literature has asserted that "the key element in knowledge transfer is not the underlying (original) knowledge, but rather the extent to which the receiver acquires potentially useful knowledge and utilizes this knowledge in own operations" (Minbaeva, Pedersen, Bjorkman, Fey, & Park, 2003, p. 39). Such knowledge utilization is a function of motivation, opportunity, and ability mechanisms (Argote, McEvily, & Reagans, 2003), which may be activated via contextual properties linked to a subunit, the firm generally, or intrafirm

exchanges (Siemsen, Roth, & Balasubramanian, 2008). The elements of MOA theory are often related to a specific task. In this research, the task in question is the utilization of knowledge obtained via intrafirm knowledge transfers. Following the MOA framework, we argue that intrafirm knowledge flows—as a form of opportunity—can enhance local responsiveness. Yet, this link is likely to be conditioned by the receiver's (subsidiary and/or headquarters) motivation, opportunity, and ability to learn and utilize transferred knowledge.

Within the MOA framework, opportunity conveys resources that facilitate performance (Chang, et al., 2012). We consider internal knowledge flows as opportunities, because such activities can furnish a subsidiary or headquarters with important knowledge resources as well as time and flexibility, which are necessary for local responsiveness. In this, we build from Kim et al.'s (2015) treatment of buyer-driven knowledge transfer activities as the opportunity component of the MOA framework with direct performance relevance.

Opportunity has also been conceptualized as situational conditions that facilitate the particular behavior's outcomes (Maclnnis, Moorman, & Jaworski, 1991). Within the MNC context, certain conditions provide or deprive opportunities for the MNC's knowledge senders and receivers to learn from each other (cf: Argote, et al., 2003). Such learning opportunities are important as while knowledge resource flows can potentially benefit both subsidiaries and headquarters, they are by no means straight-forward activities due to barriers created by cultural and linguistic distances (Schomaker & Zaheer, 2014). The international business literature has highlighted consistently the urgent need for context similarity, in terms of culture, language, and objectives, as a remedy to distance-related barriers. In terms of its capacity to shape the outcomes of intrafirm knowledge flows, context similarity is an indispensable—if not the most fundamental—facilitator of the learning opportunity (e.g. Ambos & Ambos, 2009; Peltokorpi & Yamao, 2017; Welch & Welch, 2008). Thus, in our study, the opportunity aspect of the MOA framework is also represented by shared values.

Ability concerns the skills and capabilities to perform a particular behavior (Maclnnis, et al., 1991). Within the context of intrafirm knowledge flows, ability is represented by the receiver's ability to understand and utilize the newly acquired knowledge. Prior studies (e.g. Chang, et al., 2012; H. Kim, et al., 2015) examining inter/intrafirm knowledge flows through the lens of the MOA framework have conceptualized absorptive capacity as the ability component, since it greatly enhances the receiver's ability to capitalize on acquired knowledge. In line with these studies, and also due to its prominent role in the knowledge management literature (Chang, et al., 2012; Kotabe, Jiang, & Murray, 2011), our study focuses on subsidiary absorptive capacity as the ability component of the MOA framework.

Motivation is the impetus toward the particular behavior (Maclnnis, et al., 1991), and is denoted by both shared values and psychological safety in the current study. Within the context of intrafirm knowledge flows, motivation provides the drive that increases the willingness of a subsidiary or headquarters to learn and employ the exchanged knowledge. The literature suggests shared values not only allow meaningful communication between the MNC's constituent parts (Nahapiet & Ghoshal, 1998), but also enhance mutual trust (cf: Morgan & Hunt, 1994) and decrease uncertainties regarding the value and relatedness of the resources (i.e. knowledge) exchanged (Reiche, Harzing, & Pudelko, 2015). The implication is that shared values—as a manifestation of context similarity that enables learning opportunities, and of social relationships that motivates a knowledge receiver to learn—conditions the local responsiveness outcomes of internal knowledge flows through dual mechanisms (cf: Argote, et al., 2003).

Psychological safety likewise builds on the concept of trust, insofar as it enhances managers' willingness to participate in risk-taking activities by positively shaping evaluations of whether engaging in such activities is safe or not (cf: Choo, Linderman, & Schroeder, 2007). Among other aspects of exchange climate (e.g. incentives and social norms), MOA

studies have recognized psychological safety as a crucial motivational element within the setting of inter/intrafirm knowledge flows and learning (Kettinger, et al., 2015). Intrafirm knowledge exchanges across borders can be considered risky, in view of uncertainties linked to their outcomes (e.g. loss of proprietary knowledge) (Dasí, Pedersen, Gooderham, Elter, & Hildrum, 2017). As such, we consider a psychologically safe climate to be a crucial motivational factor impacting the subsidiary's attitude toward engaging in learning and using knowledge developed by the headquarters, and openly transferring knowledge to them.

In sum, we theorize that MNCs' intrafirm knowledge flows, in both directions, provide knowledge resources and learning opportunities that drive subsidiary local responsiveness; and that the utilization of these opportunities is subject to MOA-linked moderating roles of absorptive capacity, shared values, and psychological safety (see Figure 1). Notwithstanding our use of the MOA framework to set out a theoretically anchored ordering of the constructs, there is the possibility of feedback loops from local responsiveness to internal knowledge flows in the MNC setting.[1] The MNC literature has revealed that intrafirm knowledge flows are mutually reinforcing mechanisms (Monteiro, Arvidsson, & Birkinshaw, 2008). Hence, we used the lagged endogenous regressor technique wherein subsidiaries' managers indicated the extent of internal knowledge flows during year *t-1* and subsidiary local responsiveness in year *t* (Zaefarian, Kadile, Henneberg, & Leischnig, 2017). Put differently, our focus is on *past* (i.e. last year's) intrafirm knowledge flows and current subsidiary local responsiveness.

Insert Figure 1 about here

2.1. Past knowledge transfer and local responsiveness

[1] We thank an anonymous reviewer for highlighting the issue of reverse causality in our model.

Headquarters' knowledge transfer refers to top-down movement of knowledge (e.g. sales, distribution, and R&D know-how) from headquarters to their subsidiaries (Ciabuschi, Dellestrand, & Kappen, 2011). We suggest knowledge transfer refers to the deliberate movement of know-how, skills, and best practices related to various business functions (i.e. sales, marketing, distribution, R&D, manufacturing, HRM, and strategy), rather than to declarative, operational information (e.g. Gupta & Govindarajan, 2000; Li & Lee, 2015).

One of the main disadvantages of subsidiaries over their local counterparts is that they face liabilities of foreignness due to unfamiliarity with the political, cultural, and economic aspects of foreign markets (Buckley & Casson, 1976). Such lack of local knowledge makes it difficult for subsidiaries to interpret local cultures, behaviors, and institutions (Mezias, et al., 2002). Interpretation is necessary for responding rapidly to customer- and competitor-related changes. Nevertheless, foreignness also creates advantages for subsidiaries of MNCs (Yildiz & Fey, 2012). MNCs are adept at managing the consequences of foreignness through appropriate firm-level actions (Edman, 2016). The importance of transferring MNCs' knowledge resources as a key determinant of subsidiary ability to offset liabilities of foreignness, has long been highlighted in the literature (e.g. Añón Higón & Manjón Antolín, 2012; Li & Lee, 2015; Rugman & Verbeke, 2001). The headquarters possesses valuable, non-location-specific technological (e.g. R&D and manufacturing) and managerial (e.g. HRM and marketing) know-how derived from various locations that has the potential to enhance the subsidiary's performance (Fang, Jiang, Makino, & Beamish, 2010). Headquarters' knowledge transfer furnishes subsidiaries with the opportunity to access, learn, and apply best practices or new knowledge/ideas developed by other parts of the MNC (the headquarters and sister subsidiaries). It provides the opportunity for MNCs to "build competitive advantage through the appropriation of rents from scarce internal knowledge" (Szulanski, 1996, p. 27).

As a supplement to direct knowledge of the local environment (Andersson, Forsgren, & Holm, 2002), headquarters' knowledge resources can play an important role in the subsidiary's local responsiveness, specifically. The subsidiary can use the acquired knowledge to address local needs, or it can combine it with existing knowledge to create new opportunities. Indeed, to be locally responsive, the subsidiary must be able to modify its products, services, and processes, or in other words deploy new knowledge and ideas. Knowledge transfer enhances the subsidiary's ability to innovate (Añón Higón & Manjón Antolín, 2012; Frost, 2001) by providing opportunities to access and combine different, but complementary and synergistic, knowledge resources; that is, its own knowledge stock in conjunction with information from the MNC pertinent to a variety of different market conditions (Michailova & Zhan, 2015). Such combinations are likely to yield innovative responses to new demands arising in the subsidiary's host marketplace (Kotabe, et al., 2011). Thus, we expect that past knowledge transfer helps subsidiaries not only to improve their internal activities and processes, but also to develop new knowledge and become more responsive to local market needs (Gupta & Govindarajan, 2000). By contrast, when knowledge transfer from the headquarters is limited, the subsidiary would miss a valuable source of best practices and be forced to rely exclusively on the local environment for the knowledge required to develop new ways of responding to market needs. As such:

> ***Hypothesis 1****: Past knowledge transfer from headquarters is positively related to subsidiary local responsiveness.*

2.2. Past reverse knowledge transfer and local responsiveness

Reverse knowledge transfer refers to the flow of knowledge from a focal subsidiary to its headquarters (Najafi-Tavani, et al., 2012). The international business literature often assumes that the headquarters' involvement in subsidiaries' activities (e.g. innovation) is conducive to subsidiary performance in the local market (e.g. Bhanji & Oxley, 2013; Cui, et al., 2006). The

logic is that the headquarters, given its high levels of knowledge and understanding, can make rational decisions regarding the extent and nature of its involvement in subsidiaries' activities. Such involvement is expected to create value for subsidiaries.

However, local responsiveness entails the development of new products, services, and processes that are largely context-specific (Andersson, Forsgren, & Holm, 2007; Rugman & Verbeke, 2001). These specific conditions create uncertainty as to the rationality of the headquarters' involvement in subsidiary-level strategies (Ciabuschi, Forsgren, & Martín, 2011). The headquarters often suffers from a lack of understanding not only of subsidiaries' activities (Zhang, Li, Li, & Zhou, 2010), but also of the extent and nature of possible interventions in such activities. There is a real risk of headquarters' ignorance of the subsidiary's precise needs and conditions resulting in excessively bureaucratic interventions that reduce subsidiary time and flexibility and, ultimately, dampen subsidiary local responsiveness (Conroy & Collings, 2016).

We posit that reverse knowledge transfer provides the headquarters with a learning opportunity—that is, it can use these knowledge resources to enhance its awareness of subsidiary-level operations. Reverse knowledge transfer involves the deliberate transfer of a wide range of subsidiary know-how that enables a focal subsidiary to highlight issues (e.g. lack of autonomy) impeding its ability to address local needs, and ask for strategic resources (e.g. extra funds for R&D activities) necessary for local responsiveness. Such transfers close the gap between headquarters' actual (i.e. well calibrated) and self-perceived (i.e. poorly calibrated) knowledge of subsidiary circumstances, and reduce the probability of unwarranted interventions. Further, reverse knowledge transfer presents the headquarters with the opportunity to make a better evaluation of their own resources (e.g. financial resources) vis-a-vis those of the subsidiary, and whether such competencies are useful for subsidiary responses to market changes. Therefore, we expect that past reverse knowledge transfer

enhances the subsidiary's local responsiveness by increasing the headquarters' awareness, and improving the accuracy of its evaluation, of the subsidiary's needs and the pragmatic means of addressing such needs. Greater awareness and rational thinking would boost the headquarters' efforts not only to avoid unnecessary involvement in subsidiary activities (e.g. too many meetings), but also to identify and resolve internal barriers (e.g. excessive red tape) to addressing customer- and competitor-related changes in the local market. The subsidiary can focus on meeting local needs, instead of dealing with internal issues. We thus argue:

> ***Hypothesis 2****: Past reverse knowledge transfer is positively related to subsidiary local responsiveness.*

2.3. Absorptive capacity and local responsiveness

While internal knowledge sources play a key role in sustaining and improving subsidiary competitive advantages, alone they are not sufficient. Subsidiaries also require market knowledge, associated with potential customers' needs and behaviors, competitors' behaviors, distribution channels, and how the market functions (Sullivan & Marvel, 2011). Moreover, to be able to address local needs, subsidiaries have to be able to recognize, assimilate, transform, and exploit knowledge existing in their external environments. Such an ability is referred to as absorptive capacity, which can be split into two elements: potential and realized absorptive capacity (Zahra & George, 2002). Potential absorptive capacity, which includes the acquisition and assimilation of new market knowledge, assists subsidiaries in tapping into relevant local market knowledge and information (Jansen, Van Den Bosch, & Volberda, 2005). It also enhances the subsidiary's flexibility to adjust and evolve in a dynamic environment (Zahra & George, 2002), which in turn enables them to respond to new opportunities (Flatten, Adams, & Brettel, 2015). Firms with a high level of potential absorptive capacity tend to be proactive as they are highly sensitive to emerging opportunities

(e.g. emerging customers' needs and preferences) and constantly seek new ways to improve their competencies (Cohen & Levinthal, 1990).

In order to respond quickly to market needs, the firm should be able to not only absorb and assimilate market knowledge, but also process the newly gathered knowledge (Todorova & Durisin, 2007). Indeed, realized absorptive capacity is associated with the combination of existing and new market knowledge, integrating the newly acquired knowledge into processes and operations, and applying it to commercial ends (Jansen, et al., 2005). In other words, it includes transformation and exploitation capabilities. The former assists firms to formulate new schema, while the latter enables firms to convert acquired knowledge into new processes and products (Zahra & George, 2002). Realized absorptive capacity thus affects firms' local responsiveness by exploiting newly identified knowledge and opportunities that can boost process and product innovations (Flatten, et al., 2015).

In sum, we argue that subsidiaries that possess absorptive capacity can quickly meet customers' and competitors' circumstances as they are sensitive to, and thus capable of identifying and analyzing, local market changes. Further, the ability of these subsidiaries in processing and exploiting the newly acquired knowledge enables them to develop new ideas and products to address the identified local needs. We thus expect:

> ***Hypothesis 3****: Subsidiary absorptive capacity is positively related to subsidiary local responsiveness.*

2.4. Moderating role of absorptive capacity

We expect absorptive capacity to moderate the relationship between the headquarters' knowledge transfer and subsidiary local responsiveness, specifically. Top-down knowledge transfer depends on both parties. On the one hand, the headquarters should be willing to allocate time and resources to transfer knowledge to subsidiaries. On the other, a focal subsidiary should be able to absorb such knowledge. Absorbing knowledge from the

headquarters can be problematic for subsidiaries given cultural and language differences on top of geographical distance. A focal subsidiary may be able to access its headquarters' knowledge resources, but still fail to improve its local responsiveness if it is not capable of absorbing and utilizing such knowledge. Here, we propose that absorptive capacity, as an ability component of the MOA framework, determines the extent to which the subsidiary can benefit from headquarters' knowledge transfer.

While subsidiaries' use of headquarters' knowledge is important to the spread of best practices, because it is non-location-specific, it may not fully address local needs. A high level of absorptive capacity increases a subsidiary's sensitivity toward external sources of market knowledge (Zahra & George, 2002), and enables them to assess how headquarters' knowledge resources—available through knowledge transfer—can be used to address local market problems. Subsidiaries' ability to harness the latest knowledge of local market needs and conditions can assist them in proactively searching for and engaging in the acquisition and application of relevant knowledge from headquarters. They can upgrade their internal processes, products, and services by pairing headquarters' knowledge with local market cues. Conversely, subsidiaries with low absorptive capacity are less likely to be aware of and responsive to environmental needs and changes, insofar as they would have a limited ability to recognize the contextual applicability of, and thus benefit from, headquarters' resources. Put differently, knowledge transfer from headquarters may help a subsidiary to develop new products and services, but these innovations are unlikely to meet local market needs unless they are shaped sufficiently by the latest market knowledge.

Further, organizational learning theory implies that a firm must be able to capitalize on acquired knowledge to remain competitive (Kotabe, et al., 2011). To this point, a subsidiary can address rapidly changing market needs only if it is capable of integrating and reconfiguring headquarters' knowledge (cf: Eisenhardt & Martin, 2000). It has been argued

that a firm's existing knowledge forms a basis for the interpretation, integration, and use of new knowledge (Marinova, 2004; Teece, 2000). Subsidiaries that have a high level of absorptive capacity generally possess new market knowledge, which enables them to acquire headquarters' knowledge, integrate it with their own knowledge resources, and exploit and modify it to augment processes and routines (Cohen & Levinthal, 1990; Kotabe, et al., 2011). In the absence of absorptive capacity, the subsidiary is likely to struggle to integrate and leverage headquarters' knowledge flows to improve products and processes; to the detriment of its efforts to respond quickly to local needs. Together, the above arguments suggest:

Hypothesis 4*: Subsidiary absorptive capacity enhances the positive relationship of past knowledge transfer from headquarters with subsidiary local responsiveness.*

2.5. Moderating role of shared values

Shared values is defined as the existence of the same professional language and way of communicating, shared understanding of ambitions, visions, and goals, and a common system of meaning among members of the MNC (Nahapiet & Ghoshal, 1998). The extent to which subsidiaries' and headquarters' values and goals are aligned builds social capital in the relationship, and promotes cooperation by integrating loosely coupled and geographically dispersed parts of organizations (Orton & Weick, 1990). As a key condition for organizational learning, such values "… provide direction—a focus for learning that fosters energy, commitment, and purpose among organizational members" (Sinkula, Baker, & Noordewier, 1997, p.309). While earlier studies have considered shared values as a driver of knowledge transfer (e.g. Reiche, et al., 2015; Tsai & Ghoshal, 1998), we go further by arguing that such values shape the outcomes of (reverse) knowledge transfer. Specifically, we treat shared values as a contextual factor that—by encouraging the subsidiary's (headquarters') motivation and opportunities to learn—determines how the subsidiary can benefit, in terms of local responsiveness, from internal knowledge flows.

Within MNCs, subsidiaries sometimes are unsure of the value of headquarters' knowledge transfer given that such knowledge is not location specific. Shared values serve to lessen such uncertainties through enhancing the receiver's motivation to incorporate and apply the transferred knowledge in its own business context (Reiche, et al., 2015). When a high level of shared values exists, overlapping ambitions and the prospect of closer social relations provide the impetus to learn from the counterpart. A focal subsidiary would become more accepting of and willing to use headquarters' knowledge as it believes such knowledge flows are relevant to its operations, and the manner in which they might adapt to local changes. By contrast, in the absence of a shared system of meaning between the subsidiary and headquarters, the former is likely to underestimate the potential of the latter's knowledge, resulting in lower willingness to use, or even their ignoring, the top-down knowledge.

Our MOA theorization also maintains that shared values provide learning opportunities for subsidiaries by increasing their understanding of the transferred knowledge (cf: Wales, Parida, & Patel, 2013). The presence of shared values facilitates consistent, meaningful, and better-quality communications (Smale, et al., 2015) and, thus, the creation of a common frame of reference between subsidiaries and headquarters; which is essential for organizational learning (Morris & Snell, 2011). Indeed, subsidiaries that share cultural values with headquarters can minimize communication misinterpretation (Tsai & Ghoshal, 1998) in order to maximize learning from headquarters' knowledge resources (Lane & Lubatkin, 1998). Superior learning is conducive to higher levels of local responsiveness. Conversely, when the level of shared values is low, subsidiaries have fewer opportunities to understand and link headquarters' knowledge to their own knowledge resources and activities. Under such circumstances, even if the headquarters frequently transfers knowledge, the subsidiary's local responsiveness will not improve due to the existence of a cognitive barrier (i.e. lack of a

common frame of reference) that impedes the subsidiary's understanding and interpretation of the knowledge. In light of these arguments:

> ***Hypothesis 5a****: Shared values enhances the positive relationship of past knowledge transfer from headquarters with subsidiary local responsiveness.*

Reverse knowledge transfer can enhance subsidiary local responsiveness due to the headquarters' greater awareness of the subsidiary's actual requirements for support. Still, headquarters' awareness of the subsidiary's status does not necessarily result in needed interventions. A high level of shared values creates trust (Morgan & Hunt, 1994), which assures headquarters that the subsidiary's goals are in line with those of the MNC—that is, it will not pursue self-interests to the detriment of the MNC (Tsai & Ghoshal, 1998). The presence of shared values strengthens the link between reverse knowledge transfer and local responsiveness by increasing the headquarters' willingness to learn to be responsive to the subsidiary's needs. On the other hand, a lack of shared values might be treated as a signal of divergence of a focal subsidiary from the agenda of the MNC (Nohria & Ghoshal, 1994). With conflict on the horizon, headquarters are likely to become reluctant to grant the subsidiary the resources needed to be fully responsive to local-market cues, since it is conceivable that the subsidiary could use the extra support to pursue deleterious activities.

Moreover, given that the subsidiary's knowledge is mainly location specific, and thus highly tacit in nature, there are uncertainties regarding learning capabilities of the headquarters facilitating its processing of reverse knowledge flows (Najafi-Tavani, et al., 2012). The existence of shared values provides learning opportunities for headquarters through increasing the quality and frequency of interactions between headquarters and subsidiaries, and raising the level of perspective taking in the relationship (Nahapiet & Ghoshal, 1998). The headquarters can then produce a more reliable evaluation of the subsidiary's issues and provide useful support that is conducive to local responsiveness. By

contrast, a lack of shared values in cross-border subsidiary–headquarters relationships makes it difficult, if not impossible, for the headquarters to use reverse knowledge transfer as a mechanism to identify subsidiaries' resource gaps. Due to the dissimilarity of their contexts, the headquarters can easily misinterpret knowledge acquired from the subsidiary and remain ignorant of its precise needs. The headquarters could become unable to properly link its current activities and resources to those of the subsidiary, leading to missed opportunities to identify and support the subsidiary's exact local market requirements. We thus propose:

> ***Hypothesis 5b****: Shared values enhances the positive relationship of past reverse knowledge transfer with subsidiary local responsiveness.*

2.6. Moderating role of psychological safety

Psychological safety refers to shared beliefs that the team is safe in its interpersonal risk taking (Edmondson, 1999). At the work-team level, it has been shown that perceived threats undermine individuals' trust in their team members (Choo, et al., 2007), which can ultimately dampen one's willingness to try new approaches and experiment with creative ideas (Gilson & Shalley, 2004). When individuals are exposed to new information that disconfirms their existing knowledge and expectations, they may develop a sense of anxiety (Edmondson, 1999). Lack of psychological safety undermines managers' efforts to overcome their anxiety, which effectively depletes their willingness to engage in learning and utilizing new information and ideas (cf. Kark & Carmeli, 2009). In contrast, a climate of psychological safety encourages managers to engage in innovativeness by reducing their estimation of associated risks (Hon & Lu, 2015).

In the MNC context, psychological safety denotes an encouraging and supportive intrafirm climate, wherein a subsidiary's involvement in risky exchange activities (e.g. asking for support and developing and proposing new ideas) will not lead to negative evaluation or criticism by the headquarters (or sister subsidiaries). Specifically, we argue that

psychological safety, as a motivation aspect of the MOA framework, influences the subsidiary's willingness to learn and utilize the knowledge transferred by headquarters in responding to local market needs (cf: Choo, et al., 2007). In the presence of psychological safety, knowledge transfer—particularly the transfer of new knowledge—triggers an impression of opportunity in the subsidiary, which increases its trust in the headquarters and willingness to learn and apply the knowledge in order to facilitate local responsiveness. By contrast, the absence of psychological safety creates a climate in which the subsidiary perceives headquarters' knowledge to contain threats, rather than chances for advancement. The subsidiary would become less willing to engage with, learn, and act on, headquarters' knowledge in building its capacity to respond to local market changes.

Further, since psychological safety positively influences managers' willingness to engage in risky and uncertain activities (Kark & Carmeli, 2009), psychological safety determines how a focal subsidiary creatively utilizes the knowledge transferred by headquarters. When MNCs promote a non-threatening and supportive environment, subsidiaries are likely to feel more secure and willing to engage in the development and exploration of knowledge acquired from headquarters. Activities and processes to improve upon headquarters' knowledge to properly address local requirements, require a sense of security and confidence at the subsidiary level. On the other hand, when facing an unsafe psychological climate, the subsidiary could be expected to replicate rather than actively develop the acquired knowledge; which would reduce the positive effect of knowledge transfer on local responsiveness. Overall, psychological safety strengthens the link between past knowledge transfer and local responsiveness by positively influencing the subsidiary's willingness to learn, use, and develop headquarters' transferred knowledge. Therefore:

***Hypothesis 6a**: Psychological safety strengthens the positive relationship of past knowledge transfer from headquarters with subsidiary local responsiveness.*

Psychological climate may likewise moderate the relationship between reverse knowledge transfer and local responsiveness. As theorized above, through engaging in reverse knowledge transfer, headquarters can make a more precise evaluation of whether and to what extent they should intervene in the subsidiary's activities and resource base (Volberda, Foss, & Lyles, 2010). We expect that this mechanism is shaped by the level of psychological safety as such a climate motivates managers to interact openly (Baer & Frese, 2003). When a psychologically safe environment exists within the MNC, the focal subsidiary would feel willing to trust headquarters and discuss its problems openly and frankly with them. After all, such an environment "alleviates excessive concern about others' reactions to actions that have the potential for embarrassment or threat" (Edmondson, 1999, p. 355). Reverse knowledge transfer would become an efficacious tool for headquarters to learn about the subsidiary's needs, resulting in adequate headquarters' support for local responsiveness.

By contrast, a subsidiary operating within a psychologically unsafe climate would be reluctant to expose itself in its interactions with the headquarters due to a lack of trust in them and anxiety concerning its future treatment. The subsidiary might be tempted to obscure the knowledge it is transferring to headquarters to shield itself against potential criticism. The end result is likely to be headquarters' misinterpretation and underestimation of the subsidiary's needs and, hence, the lack of targeted support for the subsidiary's local responsiveness. We thus advance the following hypothesis:

> ***Hypothesis 6b****: Psychological safety strengthens the positive relationship of past reverse knowledge transfer with subsidiary local responsiveness.*

3. Methodology

3.1. Sample and data collection

We surveyed a random sample of 600 wholly owned manufacturing subsidiaries based in China with overseas headquarters, from a list provided by the China Foreign Enterprise

Dictionary. These subsidiaries are located in more developed provinces of China including Guangdong, Jiangsu, and Zhejiang. Together, these provinces contributed 27.5% of China's GDP in 2015. We considered subsidiaries' senior managers (local or English managers based in China) including CEOs, CXOs, and Vice Presidents as key informants, because overseas headquarters rely on these managers for the business operations of Chinese subsidiaries. A series of field interviews, conducted prior to the main study, confirmed that these senior managers are highly familiar with and involved in the transfer of knowledge to and from the headquarters. They also have an advanced understanding of the local market environment. All the same, to safeguard the knowledgeability of our key informants, our survey assessed (on a seven-point scale: 1= 'very low', 7 = 'very high') their knowledge about their subsidiary's relationship with the headquarters, and their confidence in answering the survey questions. The cut-off point was set at four or below for both questions. Still, the minimum score observed for these questions was five and no questionnaires were discarded. The mean for informants' knowledge was 6.3 and the mean for their confidence was 6.25.

We first developed an English version of the questionnaire, and then translated it to Mandarin via a native-speaker translator. The Mandarin version was then back-translated to English by another native-speaker translator to make sure the original meanings were retained. Both translators were experts in the subject matter covered in the survey. Next, we pre-tested the questionnaire in field interviews with ten senior subsidiary managers to ensure face validity and content clarity. The questionnaire was revised based on their feedback as well as the feedback we received from five academic experts, who also scrutinized the instrument for clarity and validity purposes. The final survey was conducted in Mandarin, or in English in cases where the informant was non-Chinese and requested the English version.

The key informant in each subsidiary was initially contacted by phone, at which point the purpose of the research was introduced and arrangements made to send the appropriate

link to the online survey (i.e., the Mandarin or English version). Following this procedure, we received 173 completed responses from wholly owned subsidiaries; which provides an effective response rate of 28.8%. The respondents were from subsidiaries of different MNCs operating in various manufacturing sectors: 38% mechanical and electric equipment, 15% electronics, 11% food, 10% pharmaceuticals, 9% information technology, 9% automobiles, and 8% FMCGs. The subsidiaries' size varied widely—the number of those employed by them ranged from as low as five to as high as 2000. The headquarters of the Chinese subsidiaries are spread across the globe: with 94 in Europe (e.g. 33 in the U.K., 16 in Germany, 10 in France, 9 in Italy, 7 in the Netherlands, and 6 in Ireland); 38 in North America (e.g. 35 in the U.S.); 22 in other parts of Asia (e.g. 8 in Japan); and 16 in Oceania (e.g. 14 in Australia). We examined non-response bias by comparing the participating subsidiaries with nonparticipating ones on demographical factors such as subsidiary age and number of employees, and we found no notable bias.

Because we collected cross-sectional data from one key informant using perceptual measures, it is possible that our analyses are susceptible to common method bias (CMB). We therefore followed recommended steps (Podsakoff, MacKenzie, & Lee, 2003) in the research design stage for limiting such bias *ex ante*. First, we followed systematic questionnaire and measure development processes to achieve clarity of the measurement scales. Second, we guaranteed the confidentiality of the data to all informants, along with their anonymity, to reduce evaluation apprehension. Third, where possible, we placed items of different constructs together within general topic categories rather than placing them separately for each construct; and we ensured that the order of measurement for dependent and independent variables was counterbalanced. Accordingly, we made it difficult for respondents to predict relationships between predictor and criterion variables.

We also assessed the extent to which CMB affected our results by performing two *ex post* statistical tests. First, we performed the common method factor test (Podsakoff, et al., 2003), which controls for CMB effects by permitting all items to load on both the relevant theoretical construct and an unmeasured latent (method) factor. The test uses structural equation modeling and requires direct effects and multi-item construct measures (Robson, Katsikeas, & Bello, 2008). As such, we estimated the impact of CMB within a simplified version of our model, focusing on direct effects of knowledge transfer, reverse knowledge transfer, absorptive capacity, shared values, and psychological safety on local responsiveness. We estimated this structural model twice; both with and without the method factor. For the base-line model, standardized path coefficients for the direct paths from the independent variables to local responsiveness are as follows: knowledge transfer ($\beta = 0.45$, $p < 0.01$), reverse knowledge transfer ($\beta = 0.01$, $p > 0.1$), absorptive capacity ($\beta = 0.25$, $p < 0.01$), shared values ($\beta = 0.12$, $p < 0.05$), and psychological safety ($\beta = 0.01$, $p > 0.1$). Coefficients in the model including the method factor are 0.48 ($p < 0.01$), 0.05 ($p > 0.1$), 0.22 ($p < 0.01$), 0.14 ($p < 0.05$), and 0.02 ($p > 0.1$), respectively. The stability of the coefficients across the two models suggests paths are not explained by CMB.

Second, we performed a marker variable test. Here, we used the second smallest correlation between the study constructs ($r = 0.01$ for the correlation of R&D expenditure with number of expatriates) as an estimate of the marker variable (Malhotra, Kim, & Patil, 2006). We then computed the CMB-adjusted correlation for each pair of study constructs. Such an adjustment made no difference to the statistical (non-)significance of any correlation. This finding further alleviates concerns regarding CMB being problematic in our study.

3.2. Measurement scales

We drew from pre-existing, multi-item scales to operationalize the constructs of theoretical interest in this study (see Appendix). The measures were reflective and used a seven-point, Likert-type response format (1 = 'strongly disagree', 7 = 'strongly agree'). *Knowledge transfer* and *reverse knowledge transfer* were each measured based on seven items tapping the extent to which the headquarters or subsidiary engage in the transfer of sales, marketing, distribution, R&D, manufacturing, HRM, and strategy knowledge (Gupta and Govindarajan, 2000). We asked subsidiaries' managers to indicate the extent to which they received (transferred) knowledge from (to) headquarters during the last year. We did not focus on a longer time frame to capture past intrafirm knowledge flows as local responsiveness is related to the subsidiary's ability to quickly identify and address local issues, which requires timely exchanges of knowledge between a subsidiary and its headquarters. Although our moderators are capability and climate facets that tend toward stability over time, this assumption would be at risk had we used longer than a one-year past period for knowledge transfers. Pre-test discussions with senior subsidiary managers picked up on this specific matter. Our four-item scale tapping *local responsiveness* measures the subsidiary's speed in responding to local market changes, and was adapted from Homburg et al. (2007).

Shared values was measured using four items adapted from Reiche et al. (2015) and Smale et al. (2015), which were previously used by Tsai and Ghoshal (1998). The scale captures the existence of shared aims, understanding, and language between the subsidiary and headquarters. *Psychological safety* was measured with seven items modified from Edmondson (1999). This construct measures the extent to which the subsidiary feels the MNC's psychological climate is safe. We developed our measure of *absorptive capacity* on the basis of Jansen et al. (2005). They empirically validated different dimensions of

absorptive capacity (i.e. potential and realized absorptive capacity). Potential absorptive capacity includes knowledge acquisition and knowledge assimilation and realized absorptive capacity includes the transformation and exploitation of knowledge. Following Fernhaber and Patel (2012) as well as Jansen et al. (2005), we developed a global measure of absorptive capacity with eight items, that is, two for each of the four sub-dimensions.

The study used numerous *control variables.* First, we measured and controlled for subsidiary characteristics including subsidiary age, subsidiary size (natural logarithm of the number of employees), number of expatriates in the top management team (natural logarithm), subsidiary's sales (in tens of million U.S. dollars), and R&D expenditure (in tens of million U.S. dollars). Second, as a proxy measure for subsidiary local embeddedness and autonomy we used the percentage of the subsidiary's sales sold within the corporation, and the percentage of the subsidiary's purchases bought within the corporation. The logic is that subsidiaries that have a lower percentage of sales to the MNC must have a greater emphasis on local selling and be more locally embedded. Similarly, more autonomous subsidiaries are expected to be less reliant on the MNC for their procurement activities.

Third, we used a series of dummy variables to control for the subsidiary's functional roles, product type, and industry sector, and the region and country of origin of the headquarters. The functional role dummies differentiate between R&D, sales/ marketing, manufacturing, distribution, service, and regional headquarters roles. Product type includes industrial versus consumer goods. Region of origin dummies capture whether the headquarters is located in Asia, North America, Oceania, or Europe, while the country of origin more specifically looks at major countries in our sample such as France, Germany, Italy, the Netherlands, Ireland, the U.K. and the U.S.

Fourth, we controlled for cross-national distance between the headquarters and its subsidiary by measuring economic distance (using GDP deflator and imports of goods and

services; both as % GDP). We likewise controlled for geographic distance (in 1,000 kilometres). We measured cultural distance between the subsidiary country and the country of the headquarters, first using the model specified by Kogut and Singh (1988), which is an aggregate of Hofstede's (1980) original dimensions of culture (i.e. power distance, individualism, masculinity, and uncertainty avoidance). We created a second measure for cultural distance following a similar approach, but this time, only considering power distance and long-term orientation, as these dimensions are more directly relevant at subsidiary level (Choi & Contractor, 2016).

3.3. Measure validation

To validate the measures, we performed confirmatory factor analysis using LISREL 8.80 (see Appendix). In general, the items loaded highly on their pre-identified latent factor ($p < 0.01$). These loadings range from 0.61 to 0.84; we removed three items with loadings below 0.5. The results indicate that the model fits the data well: $\chi^2_{(d.f. = 512)} = 778.70$; RMSEA= 0.06; CFI = 0.98; IFI = 0.98; NNFI = 0.98; SRMR = 0.055. Further, the composite reliabilities are equal to or above 0.81, exceeding the cut-off point of 0.70 and indicating good internal reliability of the constructs. The average variances extracted (AVE) of our constructs meet the 0.50 benchmark, ranging from 0.54 to 0.59. Taken together, these results provide strong support for the convergent validity and reliability of our measurement scales.

We tested for discriminant validity following two different approaches. First, we verified that the square root of the AVE for each given construct is higher than the correlations of that construct with all other constructs in the model (see Table 1) (Fornell & Larcker, 1981). We also ran a series of two-factor, chi-square difference tests for all of the constructs in our model in pairs. The *f* coefficient in the first model was estimated freely, whereas in the second model it was fixed to unity. In all possible pairs we confirmed that the

unconstrained model is significantly better (at $p = 0.05$) than the constrained model. In sum, these results provide strong support for discriminant validity.

Insert Table 1 about here

4. Analysis and results

4.1. Hypothesis testing

We used moderated regression analyses to test our hypotheses, because of the high number of interaction and control variable effects (Harzing, 2002). Although absorptive capacity is externally focused, it is likely to stimulate internal knowledge flows from headquarters to meet discrepancies between the subsidiary's running marketing strategy and developments in the local market. Shared values and psychological safety are conducive to easing cognitively cross-border knowledge flows (cf. Edmondson, 1999; Nahapiet & Ghoshal, 1998), in both directions, within the headquarters–subsidiary dyad. Our moderators may thus drive intrafirm knowledge flows in one or both directions. To correct any such endogeneity effects, we followed Hamilton and Nickerson (2003) in employing a residual-based three-stage least square (3SLS) regression approach;[2] the 3SLS model is widely used, to these ends, in the international business and strategy literatures (Mudambi, Pedersen, & Andersson, 2014; Nell, Puck, & Heidenreich, 2015; Poppo, Zhou, & Li, 2016). In the first stage, we regressed knowledge transfer (KT) on absorptive capacity (AC), shared values (SV), and psychological safety (PS) to obtain its residuals, which partials out any direct influence of these variables on the knowledge transfer construct. We repeated the same procedure for reverse knowledge transfer (RKT) by regressing it on shared values and psychological safety:

$$\text{Eq1:} \quad KT = \alpha_0 + \alpha_1 AC + \alpha_2 SV + \alpha_3 PS + \zeta$$

$$\text{Eq2:} \quad RKT = \beta_0 + \beta_1 SV + \beta_2 PS + \zeta$$

[2] We used the residual-based 3SLS approach, which is different from the instrumental variable-based 2SLS approach. The objective of the residual-based 3SLS approach is to tease out the influence of the moderators on independent variables.

The results of our first-stage, Eq1 regression model suggest knowledge transfer is positively related to absorptive capacity ($\beta = 0.38$, $p < 0.01$), shared values ($\beta = 0.24$, $p < 0.01$), and to psychological safety ($\beta = 0.21$, $p < 0.01$). For Eq2, reverse knowledge transfer is positively related to shared values ($\beta = 0.62$, $p < 0.01$), but is not significantly linked to psychological safety ($\beta = 0.04$, $p > 0.1$). These results, together with theory, suggest use of the residual-based 3SLS model is appropriate to correct potential endogeneity effects. We proceeded with the second stage of the approach, using Eq3 and Eq4 to obtain the residuals for knowledge transfer and reverse knowledge transfer, respectively:

Eq3: $KT_{residual} = KT - KT_{predicted}$

Eq4: $RKT_{residual} = RKT - RKT_{predicted}$

Next, we replaced the indicators of knowledge transfer and reverse knowledge transfer with these obtained residuals. In the third stage, and to test our hypotheses, we first regressed local responsiveness on the control variables, absorptive capacity, shared values, and psychological safety (see Table 2, Model 1). We then added sequentially: the residuals of knowledge transfer and reverse knowledge transfer (Model 2); the interaction between the residuals of knowledge transfer and absorptive capacity (Model 3); the interaction between the residuals of knowledge transfer and shared values (Model 4); the interaction between the residuals of knowledge transfer and psychological safety (Model 5); the interaction between the residuals of reverse knowledge transfer and shared values (Model 6); and the interaction between the residuals of reverse knowledge transfer and psychological safety (Model 7). Finally, we regressed local responsiveness on all these variables together (Model 8). In computing the interaction terms, we mean-centred pertinent independent variables to reduce possible collinearity between the main and interaction effects.

Insert Table 2 about here

The results of our analyses provide support (Model 2: β = 0.33, p < 0.01; Model 8: β = 0.34, p < 0.01) for our H_1 assertion that knowledge transfer from headquarters is positively linked to subsidiary local responsiveness. In contrast, the results do not uphold H_2, since Model 2 and 8 provide no support for a positive link between reverse knowledge transfer and local responsiveness (Model 2: $\beta = 0.10$, $p > 0.1$; Model 8: $\beta = 0.08$, $p > 0.1$). In line with H_3, we found that subsidiary's absorptive capacity has a positive connection with local responsiveness (Model 1: $\beta = 0.17$, $p < 0.1$; Model 8: $\beta = 0.27$, $p < 0.01$). Contrary to our H_4 expectations, we found that subsidiary's absorptive capacity negatively moderates the path from knowledge transfer to local responsiveness (Model 3: $\beta = -0.25$, $p < 0.01$; Model 8: $\beta = -0.20$, $p < 0.01$). Prima facie, this finding indicates that the subsidiary's absorptive capacity competes with knowledge transfer in impacting responsiveness. As per H_{5a} we observe that shared values positively moderates the path from knowledge transfer to local responsiveness (Model 4: $\beta = 0.19$, $p < 0.05$; Model 8: $\beta = 0.20$, $p < 0.01$). Yet, the results do not corroborate the H_{5b} prediction of shared values conditioning the path from reverse knowledge transfer to local responsiveness (Model 6: $\beta = -0.08$, $p > 0.1$; Model 8: $\beta = -0.05$, $p > 0.1$).

We show that the interaction of psychological safety and knowledge transfer is positively associated with local responsiveness in Model 5 ($\beta = 0.19$, $p < 0.05$), but, in the overall model, the effect weakens (Model 8: $\beta = -0.06$, $p > 0.1$). Thus, we reject H_{6a}. On the other hand, the interaction of psychological safety and reverse knowledge transfer is positively linked to local responsiveness (Model 7: $\beta = 0.34$, $p < 0.01$; Model 8: $\beta = 0.39$, $p < 0.01$); providing support for H_{6b}. Figure 2 visualizes our significant moderation findings.

Insert Figure 2 about here

Table 2 also reports the highest variance inflation factor (VIF) for each regression model. As the highest VIF in all our models is 2.48—well below the cut-off point of 10—multicollinearity is not an issue. Further, we computed Cohen's f^2 to find out the effect size

for our regression models. Cohen et al. (2003) explains that the effect size can be obtained through the following equation:

$$\text{Eq5: } f^2 = \frac{R^2}{1-R^2}$$

Based on Eq5, we observe that the effect size for the regression models (see Table 2) ranges from 0.16 for Model 1 to 0.77 for Model 8, corresponding to R^2 in these models; note that Cohen et al. (2003) suggests f^2 values of .35 and above evidence a large effect size.

4.2. Robustness checks

We used further statistical analysis to assess the existence of endogeneity linked to the predictors in our study (knowledge transfer and reverse knowledge transfer) being choice variables not randomly assigned across the sample. Specifically, we followed Garen's (1984) two-stage procedure for the correction of selectivity bias with continuous choice variables. In the first stage, we created two correction equations, for knowledge transfer and reverse knowledge transfer, respectively, by regressing them on our moderator and control variables. In the second stage, we used a weighted least squares procedure to re-estimate our Model 2 (i.e. the control and main effects model) with the addition of two predicted error terms from the correction equations for knowledge transfer and reverse knowledge transfer. The overall pattern of significance did not change in this new model (e.g. knowledge transfer: $\beta = 0.53$, $p < 0.01$; reverse knowledge transfer: $\beta = 0.08$, $p > 0.1$). Moreover, the terms involving knowledge transfer and reverse knowledge transfer residuals were not significant ($\beta = -0.026$, $p > 0.1$; and $\beta = -0.003$, $p > 0.1$, respectively). The findings alleviate concern that self-selection sources of endogeneity bias are a problem in this study.

Second, we assessed the possibility of absorptive capacity and/or shared values being mediators instead of moderators of paths from knowledge transfer and reverse knowledge

transfer to local responsiveness (see Online Appendix). The results suggest no full or partial mediation effects, reinforcing the current moderation thesis.

5. Discussion and conclusions

The current study investigates how knowledge flows in different directions within headquarters–subsidiary relationships, as opportunities for organizational learning, advance the subsidiary's local responsiveness. Our results reveal that past knowledge transfer and absorptive capacity are key facilitators of subsidiary local responsiveness. We also show that linkages of past knowledge transfer and reverse knowledge transfer with local responsiveness are contingent on the participation and motivation of the subsidiary. To this point, the results indicate that while shared values (motivation and opportunity constituent) strengthens the relationship of past knowledge transfer and local responsiveness, absorptive capacity (ability constituent) weakens the association. Psychological safety (motivation constituent) positively moderates the link between past reverse knowledge transfer and responsiveness.

5.1. Theoretical implications

The study results contribute to the international business literature (e.g. Bilgili, et al., 2016; Dau, 2016; Hung, et al., 2010) in various ways. First, studies on subsidiary performance in general, and local responsiveness in particular (e.g. Hsu, Chen, & Caskey, 2016; Liu, Gao, Lu, & Lioliou, 2016; Luo, 2001), have mainly focused on how characteristics of the external environment (e.g. complexity and uncertainty) influence the subsidiary's ability to address local requirements. Our study provides a counterpoint to these contributions and advances organizational learning theory, by theorizing and testing how internal factors (i.e. intrafirm knowledge flows and absorptive capacity) influence subsidiary local responsiveness. The results suggest that past knowledge transfer and absorptive capacity are the main conduits

through which organizational learning drives subsidiary local responsiveness. In line with the MOA model, we conclude that past headquarters' knowledge transfer boosts the subsidiary's learning opportunities by improving its access to the MNC's best practices and knowledge (Rui, et al., 2016; Szulanski, 1996). These learning opportunities can yield creative subsidiary responses to local market needs. Absorptive capacity increases the subsidiary's ability to learn from knowledge resources existing in the local environment (cf: Bilgili, et al., 2016; Wales, et al., 2013), thereby facilitating its innovativeness and thus local responsiveness.

Second, we unveil how successful knowledge management within the MNC takes account of the directionality of knowledge flows shaping subsidiary local responsiveness. In capturing differential effects of past knowledge transfer and reverse knowledge transfer, our study advances the existing literature on subsidiary performance that has primarily focused on headquarters' knowledge transfer (e.g. Contractor, et al., 2016; Dhanaraj, et al., 2004; Tran, et al., 2010). Resource relevance as opposed to superiority creates subsidiary competitive advantages in emerging markets (Rui, et al., 2016). Drawing upon the organizational learning literature, but also the MOA framework, we theorized that past reverse knowledge transfer can increase subsidiary local responsiveness by providing the headquarters with an opportunity to become more aware of and thus responsive to the subsidiary's requirements. Nonetheless, our results do not support a direct positive association between past reverse knowledge transfer and local responsiveness. Past reverse knowledge transfer contribution to local responsiveness is instead conditional on circumstances of the knowledge management context.

The international business literature lacks theory and empirical evidence regarding boundary conditions under which internal knowledge flows will be useful, or otherwise, for the subsidiary's local responsiveness (e.g. Monteiro, et al., 2008). We address this limitation by using the MOA model of behavior (Blumberg & Pringle, 1982) to theorize factors that

account for variability in the local responsiveness outcomes of intrafirm knowledge flows. Our study is the first to test contingency effects of absorptive capacity, shared values, and psychological safety—as ability, opportunity, and/or motivation constituents—on paths from past intrafirm knowledge flows to subsidiary local responsiveness. The rationale is that although cross-border, past intrafirm knowledge flows can play a key role in subsidiary local responsiveness, they are inherently effortful. The subsidiary needs adequate ability, opportunity, and motivation to fully exploit the knowledge resources such flows provide.

Our results reveal that past knowledge transfer can drive subsidiary local responsiveness when the level of absorptive capacity is low (see Figure 2a). The headquarters' transfer of knowledge is not as productive for subsidiary local responsiveness when absorptive capacity is high. We attribute this to the extent to which a subsidiary actually depends on its headquarters' knowledge resources. As the level of absorptive capacity increases, a subsidiary will become more capable of learning from its local environment, which in turn decreases its dependency on headquarters' knowledge assets and reduces the positive impact of knowledge transfer on subsidiary local responsiveness. Further, the knowledge headquarters transferred often reflects globally standardized practices and integrating such knowledge in its operations to enhance local responsiveness is not an easy undertaking for subsidiaries. Although absorptive capacity is an ability to capitalize on newly acquired internal and external knowledge, it would seem efficacious to channel this ability toward external knowledge sources when feasible. These assertions complement the results of recent work (e.g. Kotabe & Kothari, 2016) that revealed that MNCs' competitive advantages in the Chinese market depend more on their learning abilities from the local market than on the exploitation of internal resources. The moderating effect of absorptive capacity identified in our study also adds to prior research on subsidiary performance (e.g.

Contractor, et al., 2016; Dau, 2016), by showing that the right amount of headquarters' knowledge transfer depends on the extent of subsidiary learning capabilities.

The results suggest shared values positively moderates the association between past knowledge transfer and subsidiary local responsiveness. The learning opportunity provided by a high level of shared values enables the subsidiary to more effectively understand and use the headquarters' intangible resources to augment local responsiveness. Likewise, the presence of shared values enhances the perceived relatedness and value of headquarters' knowledge resources and, thus, increases the subsidiary's willingness to learn and apply the transferred knowledge. Indeed, we observe that past knowledge transfer is only beneficial for subsidiary local responsiveness when the level of shared values is high, not low (see Figure 2b). The study contributes to the international business and organizational learning literatures (e.g. Kotabe, et al., 2011; Li & Lee, 2015) by highlighting shared values as a necessary condition that helps a subsidiary to benefit from headquarters' knowledge.

The presence of shared values provides the impetus and opportunity to learn not only for subsidiaries, but also for the MNC headquarters (Lane & Lubatkin, 1998); which would be better placed to understand its subsidiaries' needs. We thus postulated that shared values can strengthen the relationship between past reverse knowledge transfer and local responsiveness. Still, the results show that shared values does not have this moderating role. Our finding could indicate that although shared values enhances headquarters' awareness of subsidiaries' issues and circumstances, awareness alone does not guarantee the headquarters' action as the provision of support depends on the MNC's overall strategy and resource constraints. Testing this provisional explanation is an intriguing avenue for future inquiry.

Prior studies on intrafirm knowledge flows and subsidiary performance underestimate boundary conditions that may shape the subsidiary's attitude toward exchanging knowledge resources (e.g. Contractor, et al., 2016; Fang, et al., 2010; Kotabe, et al., 2011). Here, we

focus on psychological safety as a cognitive-influencing mechanism that can impact subsidiary trust in headquarters and thus willingness to engage in risky activities such as knowledge development (cf: Choo, et al., 2007). We argued that psychological safety conditions the link between past knowledge transfer and local responsiveness, by enhancing the subsidiary's willingness to develop the knowledge transferred from headquarters. Still, the results suggest psychological safety plays no such moderation role. One possible explanation is that the presence of an unsafe climate in the MNC encourages perceptions that it is risky for subsidiaries to not deploy headquarters' top-down knowledge. Notwithstanding the risks linked to a subsidiary's knowledge development initiatives, it may take the view that refusal to treat headquarters' knowledge as valuable and fully applicable to its local responsiveness needs is unsafe.

We do observe that bottom-up, reverse knowledge transfer is negatively linked to local responsiveness in the absence of a psychologically safe atmosphere (see Figure 2c). A lack of willingness in openly sharing knowledge, not only with sister units but also headquarters (as its role is to pass on such knowledge for the benefit of the MNC), might arise if there is anxiety within the MNC (Andersson, Gaur, Mudambi, & Persson, 2015). Our results imply that past reverse knowledge transfer can facilitate local responsiveness only when the level of psychological safety is high. As the level of psychological safety increases, the subsidiary may trust the headquarters more and become open toward sharing its knowledge with headquarters as it feels safer to do so; which then enables headquarters to identify and transfer relevant knowledge to the subsidiary. Indeed, we show for the first time that psychological conditions effecting subsidiaries' willingness to voice problems, can reverse the coefficient on the reverse knowledge transfer to local responsiveness relationship.

5.2. Managerial implications

From a managerial standpoint, the paper offers important implications for how MNCs can go about facilitating subsidiaries' local responsiveness. Our study suggests the transfer of headquarters' knowledge competencies assists subsidiaries in their efforts to respond rapidly to local environmental changes. Headquarters' knowledge transfer enhances the subsidiary's ability to develop knowledge (Frost, 2001) and thus respond to market changes, as it enhances the subsidiary's access to the MNC's best practices and knowledge. By contrast, reverse knowledge transfer lacks a direct effect relationship with local responsiveness.

Because cross-border knowledge flows, in both directions, are costly and time-consuming, MNCs can derive advantage from finding ways to optimize their subunits' ability, opportunity, and motivation to benefit from such activities. To this point, the positive association between knowledge transfer and local responsiveness drops in significance for subsidiaries with a high level of absorptive capacity. For managers, it is only worth investing in top-down knowledge transfer when subsidiary absorptive capacity is low. Given that absorptive capacity is itself a driver of subsidiary local responsiveness, this specific trade-off of knowledge transfer and absorptive capacity needs to be carefully managed.

On the other hand, managers should note that the positive relationship of knowledge transfer and local responsiveness seems to require shared norms and understanding between the headquarters and its subsidiary. The presence of shared values enhances the subsidiary's motivation and opportunity to learn and capitalize on the knowledge, resulting in a higher level of local responsiveness. A lack of shared values, however, decreases the subsidiary's likelihood of benefiting in this way from headquarters' knowledge transfer.

Finally, our results indicate that a safe and supportive climate governing intrafirm exchanges is necessary for a positive impact of reverse knowledge transfer on local responsiveness. Such a climate reduces subsidiary concerns over being criticized by the headquarters, which in turn enhances subsidiaries' willingness to openly share and

productively utilize their knowledge with headquarters. The MNC's headquarters can support their subsidiaries more effectively as they have more accurate understanding of their subunits' requirements. On the other hand, managers should be advised that subsidiaries that feel insecure within their MNCs may not be willing to openly share their knowledge with headquarters. Because of issues regarding the headquarters' subsequent inability to understand and support the subsidiary's needs, reverse knowledge transfer serves to dampen local responsiveness.

5.3. Limitations and directions for future research

Although our research advances understanding of the impact of intrafirm knowledge flows on subsidiary local responsiveness, it is subject to a set of limitations, which are themselves inductive of various avenues for further research. First, use of a key informant in collecting our data may cause perceptual bias; not least as some of the measures employed in the current model convey the cognitive side of learning (e.g. psychological safety). We used several procedural and analytical checks to minimize the potential effects of CMB. Still, we acknowledge this bias as a possible limitation. A second limitation concerns the cross-sectional nature of the study. It would be interesting to investigate how knowledge exchanges between the subsidiary and headquarters, and the atmosphere of psychological safety, impact local responsiveness in the long run. Third, we theorized drivers of subsidiary local responsiveness by combining insights from organizational learning and MOA theories. Other perspectives, such as subsidiary strategic mandates (Gupta and Govindarajan's (cf: 2000) typology of subsidiary knowledge) and network theory, might also increase our understanding of how to build local responsiveness. For instance, it could be fruitful to examine if internal and/or external embeddedness of the subsidiary shape its ability to respond to local environment changes.

Fourth, our study focuses on, and establishes, the relevance of vertical (not horizontal) intrafirm knowledge flows for subsidiary local responsiveness. It would be worthwhile to examine how the subsidiary's interactions with sister subsidiaries influence local responsiveness. Fifth, the history of interactions between the subsidiary and headquarters could also play a role in driving subsidiary local responsiveness. For example, a history of conflict may discourage the headquarters from granting autonomy to the subsidiary and supporting its localization activities. Consideration of past interactions and experiences (both positive and negative) of the two sides is warranted in future research.

Sixth, we focus on absorptive capacity, shared values, and psychological safety to capture the three main mechanisms of the MOA framework. It is important that future research extends our thesis by identifying a broader set of variables that represent MOA-related aspects in the MNC context. Knowledge exchanges can happen internally (i.e. between a focal subsidiary and other parts of the MNC) and externally (i.e. between a focal subsidiary and local actors). As the focus of our research was to shed light on whether, and under what conditions, intrafirm knowledge transfers influence subsidiary local responsiveness, we focus on intrafirm knowledge flows. Future research might derive benefit from investigating how and when interfirm and intrafirm knowledge transfers facilitate subsidiary local responsiveness. Such investigation can provide insight into whether or not these two types of knowledge transfer reinforce each other when it comes to subsidiary local responsiveness. Widening the conceptualization to incorporate interfirm and intrafirm knowledge transfers would necessitate including additional MOA aspects; for example, social capital might condition performance outcomes of interfirm and intrafirm knowledge flows.

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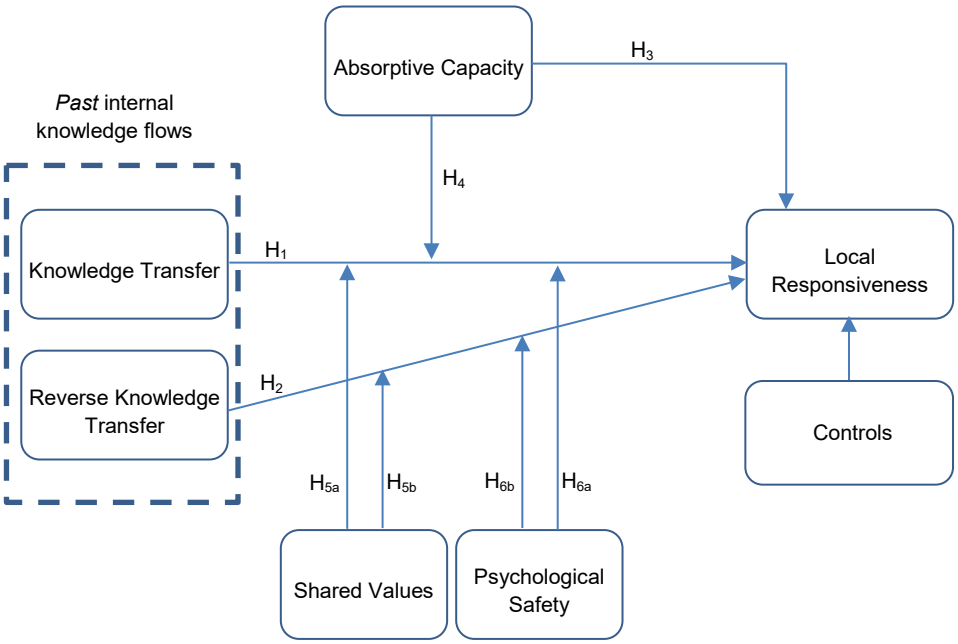
Figure 1: The conceptual model



Appendix: Constructs, items, and measurement results

$\chi^2_{(d.f. = 512)} = 778.70$; RMSEA= 0.06; CFI = 0.98; IFI = 0.98; NNFI = 0.98; SRMR = 0.055

Reflective scale names and items	Item loading λ	t-value
Knowledge Transfer (CR = 0.89, AVE = 0.55)		
To what extent during the last year has your subsidiary received knowledge from headquarters in the area of:		
Sales	0.69	10.06
Marketing	0.71	10.40
Distribution	0.72	10.59
R&D	0.75	11.26
Manufacturing	0.73	10.83
HRM	0.82	12.85
Strategy	0.75	11.15
Reverse Knowledge Transfer (CR = 0.89, AVE = 0.54)		
To what extent during the last year has your subsidiary transferred knowledge to headquarters in the area of:		
Sales	0.67	9.68
Marketing	0.75	11.17
Distribution	0.68	9.89
R&D	0.78	11.81
Manufacturing	0.84	13.30
HRM	0.72	10.60
Strategy	0.67	9.69
Absorptive Capacity (CR = 0.91, AVE = 0.56)		
Please indicate to what extent you agree or disagree with the following statements:		
Our subsidiary has frequent interactions with others in the industry to acquire new market knowledge	0.73	10.93
Our subsidiary organizes special meetings with customers, suppliers, or third parties to acquire new market knowledge	0.77	11.79
Our subsidiary is able to quickly identify new opportunities to meet the customer needs	0.73	10.88
Our subsidiary quickly analyses and interprets changing market demands	0.71	10.40
Our subsidiary regularly considers the consequences of changing market demands in terms of new products and services	0.75	11.38
Our subsidiary departments periodically meets to discuss consequences of market trends and new product development	0.79	12.12
It is clearly known how activities within our subsidiary should be performed	0.75	11.35
We constantly consider how to better exploit knowledge	0.76	11.55
Shared Values (CR = 0.84, AVE = 0.57)		
Please indicate to what extent you agree or disagree with the following statements:		
Our managers are enthusiastic about pursuing the collective goals of the whole corporation	0.77	11.45
Our managers have the same ambitions and vision as managers at headquarters	0.73	10.69
Our organizational culture and management style is very similar to that at headquarters	0.77	11.52
Our managers have the same professional language and way of communicating as managers at headquarters	0.75	11.09
Psychological Safety (CR = 0.85, AVE = 0.53)		

Please indicate to what extent you agree or disagree with the following statements:		
If our subsidiary or other sister subsidiaries make a mistake, it is often held against us (r)	0.61	8.39
Members of this corporation (our subsidiary, headquarters, and sister subsidiaries) are able to bring up problems and tough issues	--	--
Members of this corporation (headquarters and sister subsidiaries) sometimes reject others for being different (r)	0.78	11.45
It is safe to take a risk within our multinational corporation	0.71	10.04
It is difficult to ask other members of this corporation (headquarters and sister subsidiaries) for help (r)	0.70	10.00
No one within this corporation (headquarters and sister subsidiaries) would deliberately act in a way that undermines our subsidiary's efforts	--	--
Working with members of this corporation (headquarters and sister subsidiaries), our subsidiary's unique skills and talents are valued and utilized	0.83	12.58
Local Responsiveness (CR = 0.81, AVE = 0.59)		
Please indicate to what extent you agree or disagree with the following statements:		
We respond rapidly if something important happens with regard to our customers and competitors	--	--
We quickly implement our planned activities with regard to customers and competitors	0.83	12.44
If our customer and competitor related activities do not lead to the desired effects, we are fast at changing them	0.72	10.18
We quickly react to fundamental changes with regard to our customers and competitors	0.75	10.92

Note: (r) reversed item
-- removed item

Table 1: Basic descriptive statistics

Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Knowledge Transfer	**0.74**																				
2. Reverse Knowledge Transfer	0.71**	**0.73**																			
3. Absorptive Capacity	0.65**	0.61**	**0.75**																		
4. Shared Value	0.59**	0.64**	0.73**	**0.75**																	
5. Psychological Safety	-0.22**	-0.17*	-0.17**	-0.30**	**0.73**																
6. Local Responsiveness	0.67**	0.56**	0.62**	0.51**	-0.15**	**0.77**															
7. Subsidiary age	0.07	0.06	-0.07	-0.02	-0.09	0.00	**NA**														
8. Subsidiary size	-0.01	0.04	-0.10	0.03	-0.05	-0.05	0.25**	**NA**													
9. Number of expatriates	0.03	0.03	-0.19*	-0.20**	0.17*	-0.01	0.24**	0.34**	**NA**												
10. Sales	-0.06	0.02	-0.14*	-0.05	0.05	0.05	-0.11	0.02	-0.01	**NA**											
11. R&D expenditure	-0.16	-0.01	-0.04	-0.05	0.06	0.00	0.01	0.01	0.01	-0.01	**NA**										
12. Sales within corporation	0.02	0.05	0.08	0.08	0.03	-0.06	0.14	0.17*	0.11	-0.15	-0.03	**NA**									
13. Purchase within corporation	0.12	0.15	0.06	0.04	0.09	-0.05	0.19*	0.07	0.12	-0.11	-0.01	0.56**	**NA**								
14. Functional role–R&D (dummy)	0.14	0.08	0.14	0.04	0.00	0.14	0.15*	-0.08	0.03	-0.04	-0.04	0.19	0.12	**NA**							
15. Functional role–Sales/ marketing (dummy)	0.05	0.07	0.13	-0.01	0.10	0.11	-0.06	-0.03	-0.02	-0.01	-0.04	-0.02	0.03	0.22**	**NA**						
16. Functional role–Manufacturing (dummy)	-0.07	-0.11	-0.06	-0.07	-0.03	-0.12	0.12	0.07	0.08	-0.02	-0.07	-0.09	-0.07	0.10	0.26**	**NA**					
17. Functional role–Distribution (dummy)	-0.02	-0.01	-0.07	-0.11	-0.06	-0.10	-0.08	0.04	0.04	0.09	-0.08	-0.19*	-0.04	-0.12	0.05	-0.11	**NA**				
18. Functional role–Regional HQ (dummy)	0.19*	0.24**	0.31**	0.26**	0.05	0.24**	-0.04	-0.01	-0.18*	-0.02	-0.01	0.05	-0.02	0.09	0.26**	-0.13	0.13	**NA**			
19. Scope of functional role	0.05	0.03	0.05	-0.05	0.03	0.03	0.08	0.14	0.15	-0.02	-0.08	-0.05	0.03	0.43**	0.62**	0.60**	0.40**	0.35**	**NA**		
20. Product type–Industrial goods (dummy)	0.05	0.06	0.16*	0.14	0.03	0.01	0.00	-0.09	-0.19*	-0.09	-0.05	0.01	0.02	-0.04	-0.02	0.06	-0.01	0.21**	-0.04	**NA**	
21. Sector–Electronic (dummy)	-0.07	0.03	-0.06	0.04	-0.02	-0.03	-0.05	0.15	0.07	0.32**	-0.03	-0.04	-0.03	-0.09	-0.01	0.05	0.03	-0.09	0.02	-.020**	**NA**
22. Sector–Food (dummy)	-0.11	-0.01	-0.04	-0.05	-0.03	0.01	0.02	0.03	0.10	-0.05	-0.03	-0.09	0.00	0.01	0.05	0.03	0.06	-0.08	0.07	0.40**	-0.15
23. Sector–Pharmaceuticals (dummy)	-0.10	-0.14	-0.13	-0.15	0.09	-0.24**	-0.06	-0.10	0.12	-0.06	-0.03	-0.04	0.06	-0.14	-0.09	0.07	0.11	-0.07	0.01	0.14	-0.14
24. Sector–IT (dummy)	0.08	0.01	0.01	-0.01	0.03	-0.06	0.06	0.14	-0.10	-0.07	-0.02	-0.03	-0.05	-0.02	-0.09	-0.08	-0.12	-0.07	-0.19*	-0.02	-0.14
25. Sector–Automobiles (dummy)	0.13	0.12	0.23**	0.23**	-0.07	0.12	-0.11	-0.07	-0.28**	-0.06	-0.02	0.16*	0.16*	0.27**	0.14	-0.08	-0.08	0.03	0.02	-0.12	-0.14
26. Sector–FMCG (dummy)	-0.05	-0.10	0.08	0.17*	0.03	0.01	0.03	-0.11	-0.11	-0.06	-0.02	0.09	-0.05	0.00	-0.07	0.09	-0.04	0.25**	-0.01	0.30**	-0.12
27. Asia HQ origin (dummy)	0.04	0.05	0.09	0.07	-0.09	-0.10	0.16*	-0.15*	-0.26**	-0.07	-0.03	0.21**	0.15	0.03	0.00	-0.06	0.12	0.13	-0.12	0.35**	-0.10
28. North America HQ origin (dummy)	0.11	0.10	0.06	0.03	0.04	0.04	0.03	0.06	0.08	-0.10	-0.04	-0.04	-0.04	0.01	0.00	0.00	0.09	-0.01	0.02	-0.06	-0.03
29. Oceania HQ origin (dummy)	0.12	0.02	-0.03	-0.02	-0.01	0.14	-0.03	0.00	0.05	0.00	-0.03	0.02	0.12	0.03	0.11	-0.01	-0.01	-0.08	0.03	0.09	-0.14
30. France HQ origin (dummy)	-0.01	-0.03	0.13	0.18*	-0.09	0.08	-0.02	0.02	-0.04	-0.01	-0.02	0.00	-0.05	0.03	-0.12	0.03	-0.11	-0.06	-0.09	-0.06	0.03
31. Germany HQ origin (dummy)	-0.10	0.01	-0.02	0.11	0.04	-0.02	-0.09	-0.04	-0.04	0.05	-0.03	-0.06	-0.11	-0.08	0.11	0.11	0.07	0.01	0.10	0.00	0.32**
32. Italy HQ origin (dummy)	-0.07	-0.06	-0.10	-0.06	0.15*	-0.15*	-0.01	0.11	-0.03	-0.04	-0.02	-0.02	-0.06	-0.03	-0.04	0.05	-0.03	0.16*	0.03	0.07	-0.03
33. Netherlands HQ origin (dummy)	0.05	0.06	0.06	0.05	-0.03	0.07	-0.03	0.05	0.05	-0.02	-0.02	0.10	0.06	0.08	-0.02	-0.01	-0.04	0.07	0.01	0.05	-0.09
34. Ireland HQ origin (dummy)	-0.24**	-0.12	-0.26**	-0.19*	-0.15	-0.18*	0.04	0.03	0.07	-0.03	-0.01	-0.06	-0.01	-0.08	-0.09	0.08	0.12	-0.05	0.04	-0.13	0.01
35. U.K. HQ origin (dummy)	0.17	-0.07	-0.01	-0.10	-0.02	0.08	-0.07	0.03	0.02	0.024**	0.16*	-0.11	-0.08	-0.04	-0.04	-0.11	0.03	-0.06	-0.01	-0.27**	0.10
36. U.S. HQ origin (dummy)	0.11	0.10	0.04	0.05	0.02	0.04	0.03	0.06	0.08	-0.09	-0.04	-0.02	-0.02	-0.01	0.02	-0.05	0.05	0.00	0.00	-0.09	-0.01

37. GDP deflator (% GDP)	-0.22**	-0.04	-0.19*	-0.05	-0.05	-0.19*	0.04	0.02	0.08	-0.04	-0.02	-0.06	0.00	0.01	0.03	0.06	0.03	0.01	0.08	-0.18*	0.10
38. Imports of goods and services (% GDP)	-0.12	-0.01	-0.08	-0.03	-0.12	-0.04	-0.03	0.07	0.12	-0.01	-0.01	-0.08	-0.06	0.10	-0.05	0.13	0.01	0.16*	0.15*	-0.02	-0.01
39. Geographic distance	0.04	0.02	-0.05	-0.05	0.05	0.11	-0.10	0.13	0.23**	0.00	0.00	0.18*	-0.10	-0.05	0.01	0.04	0.12	-0.12	0.08	-0.29**	0.03
40. Cultural distance 1	0.05	0.06	0.01	-0.02	0.03	0.17*	-0.12	0.14	0.27**	0.04	0.02	-0.07	-0.01	-0.03	-0.03	0.00	0.09	-0.14	0.08	-0.18*	-0.03
41. Cultural distance 2	0.03	0.02	-0.12	-0.17*	0.01	0.09	-0.07	0.09	0.30**	0.02	0.01	-0.15	0.00	-0.03	0.09	0.05	0.24**	-0.15	0.18*	-0.20**	-0.03
Mean	4.18	4.16	4.24	4.30	3.69	4.33	14.49	2.60	1.41	8.22	0.31	31.10%	28.59%	0.17	0.18	0.45	0.51	0.06	2.09	0.31	0.15
S.D.	0.83	0.84	0.90	0.91	0.66	0.96	7.83	0.55	0.52	36.53	0.39	19.99%	18.49%	0.37	0.39	0.50	0.50	0.23	1.15	0.46	0.36
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	
22. Sector–Food (dummy)	**NA**																				
23. Sector–Pharmaceuticals (dummy)	-0.11	**NA**																			
24. Sector–IT (dummy)	-0.11	-0.10	**NA**																		
25. Sector–Automobiles (dummy)	-0.11	-0.10	-0.10	**NA**																	
26. Sector–FMCG (dummy)	-0.10	-0.10	-0.09	0.09	**NA**																
27. Asia HQ origin (dummy)	0.06	0.14	0.02	0.02	0.03	**NA**															
28. North America HQ origin (dummy)	-0.05	-0.08	0.18*	0.08	-0.16*	-0.21**	**NA**														
29. Oceania HQ origin (dummy)	0.15	0.03	0.04	0.04	-0.09	-0.12	-0.17*	**NA**													
30. France HQ origin (dummy)	-0.01	-0.08	-0.08	0.10	0.11	-0.10	-0.13	-0.08	**NA**												
31. Germany HQ origin (dummy)	-0.11	-0.11	0.04	-0.10	0.13	-0.12	-0.17*	-0.10	-0.08	**NA**											
32. Italy HQ origin (dummy)	-0.08	0.01	0.02	-0.08	0.23**	-0.09	-0.13	-0.08	-0.06	-0.08	**NA**										
33. Netherlands HQ origin (dummy)	0.12	0.03	-0.07	0.04	0.05	-0.08	-0.11	-0.07	-0.05	-0.07	-0.05	**NA**									
34. Ireland HQ origin (dummy)	0.04	0.15	-0.06	-0.06	0.06	-0.07	-0.10	-0.06	-0.05	-0.06	-0.04	-0.04	**NA**								
35. UK HQ origin (dummy)	-0.07	-0.10	-0.15	-0.04	-0.14	-0.19*	-0.26**	-0.16*	-0.12	-0.16*	-0.12	-0.10	-0.09	**NA**							
36. U.S. HQ origin (dummy)	-0.09	-0.07	0.20*	0.09	-0.15	-0.20*	0.49**	-0.16*	-0.13	-0.16*	-0.12	-0.11	-0.10	-0.25**	**NA**						
37. GDP deflator (% GDP)	0.02	-0.03	0.04	-0.03	0.01	-0.05	0.00	-0.38**	-0.06	0.25**	-0.06	-0.13	0.35**	-0.12	0.06	**NA**					
38. Imports of goods and services (% GDP)	0.08	0.09	-0.13	-0.08	0.07	-0.04	-0.37**	-0.15*	-0.01	0.10	-0.05	0.37**	0.32**	-0.06	-0.38**	0.49**	**NA**				
39. Geographic distance	-0.03	-0.14	0.10	0.05	-0.15	-0.42**	0.37**	0.10	0.02	-0.06	-0.02	-0.02	0.02	0.00	0.36**	0.05	-0.17*	**NA**			
40. Cultural distance 1	0.10	-0.01	-0.09	-0.04	-0.11	-0.44**	0.08	0.09	0.03	-0.02	-0.02	0.36**	-0.02	0.12	0.09	-0.04	0.09	0.37**	**NA**		
41. Cultural distance 2	0.10	-0.02	0.03	-0.03	-0.23**	-0.41**	0.36**	0.34**	-0.39**	-0.08	-0.21**	-0.06	0.32**	0.10	0.35**	0.11	0.03	0.46**	0.58**	**NA**	
Mean	0.11	0.10	0.09	0.09	0.08	0.13	0.22	0.09	0.06	0.09	0.05	0.04	0.04	0.19	0.21	0.95	32.12%	4.83	4.40	4.91	
S.D.	0.31	0.30	0.29	0.29	0.27	0.34	0.42	0.29	0.24	0.29	0.22	0.20	0.18	0.40	0.41	1.38	22.25%	1.77	1.65	2.67	

Note: **Bold and underlined** numbers on the diagonal show the square root of the AVEs

** $p < 0.01$, * $p < 0.05$ (n = 173)

Table 2: Standardized regression estimates

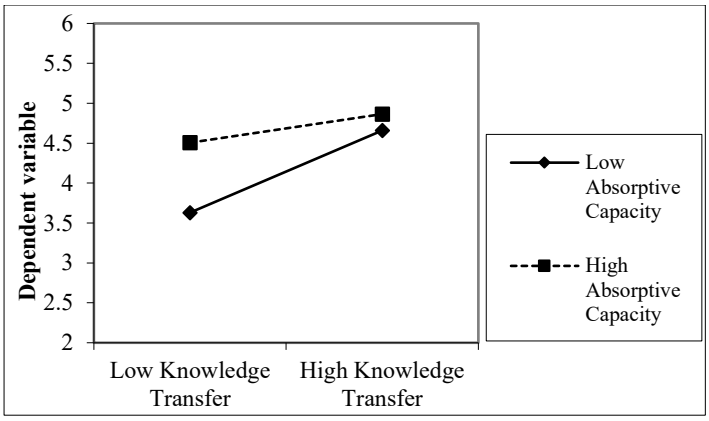
	Local Responsiveness															
	Model1		Model2		Model3		Model4		Model5		Model6		Model7		Model8	
	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE	B	SE
Predictors																
KTresidual			0.33**	0.15	0.27**	0.14	0.40**	0.15	0.35**	0.15	0.34**	0.15	0.31**	0.13	0.34**	0.14
RKTresidual			0.10	0.15	0.14†	0.15	0.07	0.15	0.06	0.15	0.13	0.16	0.06	0.14	0.08	0.13
AC	0.17†	0.13	0.14†	0.12	0.23**	0.12	0.12	0.12	0.14	0.12	0.15	0.12	0.21**	0.11	0.27**	0.10
SV	0.52**	0.14	0.52**	0.12	0.42**	0.12	0.53**	0.12	0.45**	0.12	0.48**	0.14	0.39**	0.12	0.30**	0.12
PS	0.01	0.13	-0.02	0.11	-0.01	0.11	-0.07	0.12	0.02	0.11	-0.01	0.12	0.05	0.11	0.02	0.10
Interactions																
KT X AC					-0.25**	0.11									-0.20**	0.11
KT X SV							0.19*	0.16							0.20**	0.13
KT X PS									0.19*	0.21					-0.06	0.27
RKT X SV											-0.08	0.18			-0.05	0.15
RKT X PS													0.34**	0.15	0.39**	0.20
Control Variables																
Subsidiary age	0.00	0.01	0.01	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.05	0.01	0.09	0.01
Subsidiary size	-0.03	0.20	-0.03	0.18	-0.01	0.17	-0.02	0.18	-0.03	0.18	-0.01	0.19	-0.05	0.16	-0.02	0.16
Number of expatriates	0.32**	0.21	0.18†	0.20	0.18†	0.19	0.16†	0.19	0.18†	0.19	0.17†	0.20	0.16†	0.18	0.12	0.16
Sales	0.06	0.00	0.04	0.00	0.04	0.00	0.04	0.00	0.05	0.00	0.04	0.00	0.07	0.00	0.08	0.00
R&D expenditure	0.06	0.00	0.02	0.00	0.01	0.00	0.01	0.00	-0.01	0.00	0.01	0.00	0.00	0.00	-0.01	0.00
Sales within corporation	-0.13	0.00	-0.04	0.00	0.01	0.00	-0.01	0.00	-0.07	0.00	-0.03	0.00	-0.05	0.00	0.04	0.00
Purchase within corporation	-0.08	0.00	-0.17†	0.00	-0.18*	0.00	-0.18*	0.00	-0.16†	0.00	-0.17*	0.00	-0.12	0.00	-0.14	0.00
FR–R&D (dummy)	0.14	0.24	0.13	0.22	0.07	0.21	0.12	0.21	0.14	0.21	0.11	0.22	0.16†	0.25	0.05	0.19
FR–Sales/ marketing (dummy)	-0.05	0.23	-0.05	0.21	-0.08	0.20	-0.05	0.20	-0.06	0.20	-0.05	0.21	-0.05	0.26	-0.12	0.18
FR–Manufacturing (dummy)	-0.01	0.20	-0.01	0.18	-0.02	0.17	-0.04	0.18	0.04	0.18	-0.01	0.18	0.12	0.22	0.02	0.16
FR–Distribution (dummy)	-0.05	0.17	-0.05	0.15	-0.02	0.15	-0.01	0.15	-0.05	0.15	-0.03	0.16	-0.04	0.18	0.01	0.13
FR–Regional HQ (dummy)	-0.06	0.17	-0.07	0.15	-0.07	0.15	-0.07	0.15	-0.06	0.15	-0.07	0.15	0.11	0.40	-0.10	0.13
Scope of functional role	0.11	0.44	0.06	0.40	0.06	0.38	0.05	0.39	0.07	0.39	0.08	0.42	-0.15	0.14	0.10	0.35
Industrial goods (dummy)	0.02	0.23	0.04	0.21	0.04	0.20	0.02	0.20	0.10	0.21	0.03	0.21	0.09	0.19	0.06	0.18
Sector–Electronic (dummy)	-0.08	0.25	-0.02	0.23	-0.03	0.22	-0.08	0.23	-0.02	0.23	-0.02	0.23	-0.03	0.21	-0.08	0.20
Sector–Food (dummy)	-0.06	0.29	0.00	0.27	-0.03	0.25	0.02	0.26	0.00	0.26	0.00	0.27	0.02	0.24	0.03	0.22
Sector–Pharmaceuticals (dummy)	-0.14	0.32	-0.09	0.29	-0.15†	0.28	-0.07	0.28	-0.09	0.28	-0.11	0.29	-0.10	0.26	-0.12	0.25
Sector–IT (dummy)	-0.12	0.29	-0.14†	0.26	-0.16†	0.25	-0.12	0.26	-0.13	0.26	-0.13	0.26	-0.16†	0.24	-0.18†	0.22
Sector–Automobiles (dummy)	0.03	0.37	0.00	0.33	-0.02	0.31	0.01	0.32	0.00	0.32	0.01	0.33	0.02	0.30	0.01	0.28
Sector–FMCG (dummy)	-0.11	0.35	-0.04	0.32	-0.11	0.31	-0.06	0.31	-0.02	0.31	-0.04	0.32	-0.05	0.29	-0.13	0.27
Asia HQ origin (dummy)	0.14	0.30	0.16	0.22	0.13	0.29	0.15	0.30	0.19†	0.30	0.16	0.32	0.11	0.22	0.05	0.20
North America HQ origin (dummy)	-0.13	0.39	-0.12	0.31	-0.13	0.28	-0.14	0.29	-0.12	0.30	-0.16	0.31	-0.18†	0.24	-0.16†	0.19
Oceania HQ origin (dummy)	-0.02	0.46	0.00	0.40	0.02	0.38	0.00	0.39	-0.03	0.39	0.02	0.41	-0.05	0.35	-0.01	0.32
France HQ origin (dummy)	-0.16	0.51	-0.02	0.45	-0.06	0.43	-0.01	0.44	0.02	0.45	-0.04	0.47	0.03	0.40	-0.01	0.37
Germany HQ origin (dummy)	-0.02	0.39	0.03	0.35	0.02	0.33	0.08	0.35	0.04	0.34	0.01	0.36	0.03	0.32	0.07	0.30
Italy HQ origin (dummy)	-0.18†	0.51	-0.16†	0.46	-0.18†	0.44	-0.16	0.45	-0.16†	0.45	-0.18†	0.46	-0.14	0.42	-0.14	0.38
Netherlands HQ origin (dummy)	0.00	0.48	-0.01	0.42	0.00	0.39	-0.02	0.41	-0.01	0.41	-0.01	0.42	-0.03	0.37	-0.04	0.33
Ireland HQ origin (dummy)	0.07	0.49	0.07	0.42	0.15†	0.40	0.05	0.41	0.13	0.42	0.08	0.42	0.19†	0.37	0.18†	0.34
U.K. HQ origin (dummy)	-0.15†	0.40	-0.09	0.36	-0.12	0.35	-0.08	0.35	-0.08	0.35	-0.09	0.36	-0.09	0.33	-0.11	0.30
U.S. HQ origin (dummy)	-0.16	0.44	-0.12	0.37	0.01	0.35	-0.12	0.35	-0.16†	0.36	-0.11	0.37	-0.08	0.31	0.06	0.28
GDP deflator (% GDP)	-0.20	0.09	-0.11	0.08	-0.15	0.08	-0.06	0.08	-0.07	0.08	-0.10	0.09	-0.09	0.08	-0.09	0.07
Imports (% GDP)	-0.14	0.01	-0.12	0.00	-0.09	0.00	-0.14	0.00	-0.16	0.00	-0.12	0.00	-0.16	0.00	-0.15	0.00

Geographic distance	0.15†	0.23	0.13	0.21	0.13	0.20	0.13	0.20	0.13	0.20	0.13	0.21	0.15	0.19	0.18†	0.17
Cultural distance 1	0.05	0.12	0.06	0.11	0.06	0.10	0.05	0.10	0.08	0.10	0.07	0.11	0.03	0.10	0.02	0.09
Cultural distance 2	-0.06	0.09	-0.01	0.08	-0.05	0.07	-0.01	0.07	-0.01	0.07	-0.06	0.08	0.04	0.07	0.01	0.07
Highest VIF	1.98		2.04		2.29		2.05		2.28		2.34		2.29		2.48	
F	2.95**		4.14**		4.73**		4.40**		4.36**		4.04**		5.44**		6.46**	
Adjusted R^2	0.37		0.49		0.54		0.52		0.52		0.49		0.59		0.66	
Cohen's f^2 for effect size	0.16		0.32		0.41		0.37		0.37		0.32		0.53		0.77	

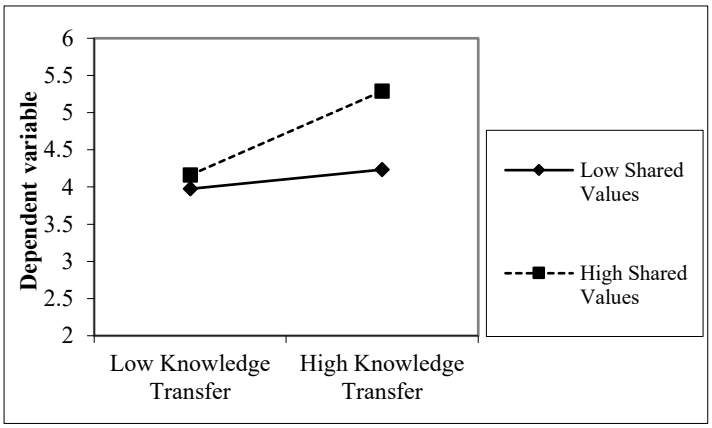
Note 1: KT = knowledge transfer, RKT = reverse knowledge transfer, AC = absorptive capacity, SV = shared values, PS = psychological safety, FR = functional role
Note 2: we used residuals for both KT and RKT in line with residual-based 3SLS approach
** $p < 0.01$, * $p < 0.05$, † $p < 0.1$ (two-tailed test, n = 173)

Figure 2: Plots of moderation findings

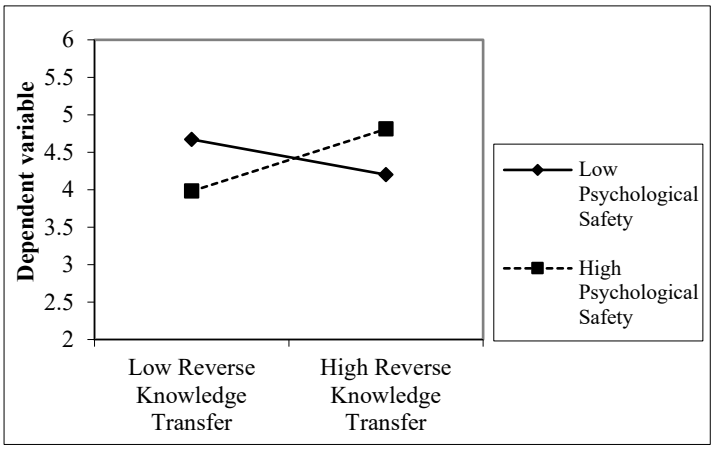
a) Knowledge transfer and absorptive capacity with local responsiveness



b) Knowledge transfer and shared values with local responsiveness



c) Reverse knowledge transfer and psychological safety with local responsiveness

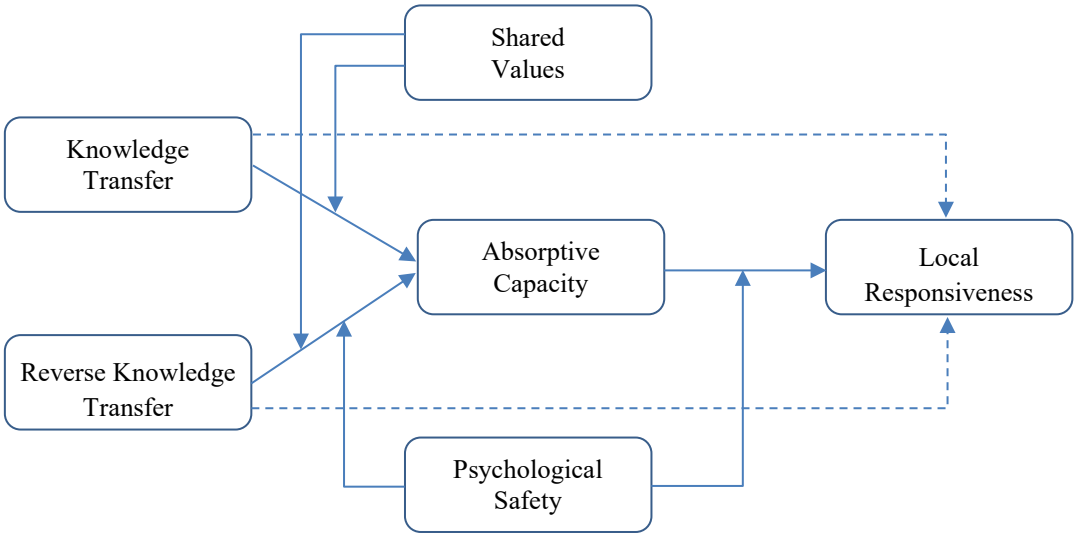


Online Appendix: Alternative mediation models

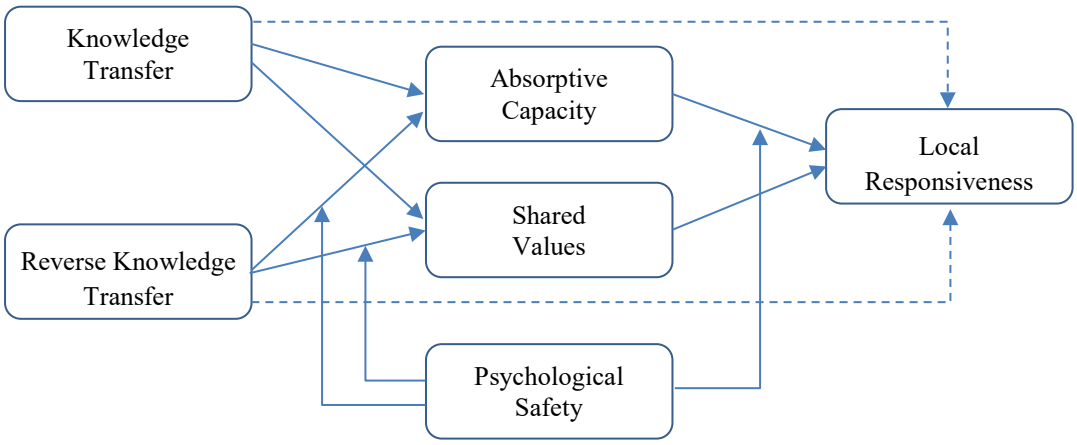
We examined two plausible mediation model scenarios (Peltokorpi, 2017). In the first, we considered absorptive capacity as a mediator of the paths from knowledge transfer and reverse knowledge transfer to local responsiveness. In the second scenario, we considered both absorptive capacity and shared values as mediators of the same paths (see Figure 3). Interaction terms for moderation effects were added to the structural models in line with the suggestions of Ping (1995). Pertinent independent variables were mean-centered before the calculation of interaction terms. The structural models were tested using AMOS 22.

Figure 3: Alternative mediation models

a) Scenario 1: Absorptive capacity mediation



b) Scenario 2: Absorptive capacity and shared values mediation



Note: in both scenarios, dashed lines denote direct paths added to the models to test for partial mediation.

In each scenario, we ran a full mediation model and compared this again a partial mediation one; we added direct links from both knowledge transfer and reverse knowledge transfer to local responsiveness (shown by dash lines in Figure 3). The structural model fit statistics for the full and partial mediation models, for each scenario, are provided in Table 3. In both scenarios, the full mediation model performs worse than the partial mediation model. The addition of the direct links significantly improved the models (for Scenario 1: $\Delta\chi^2_{d.f.=2} = 55.16$, $p < 0.01$; for Scenario 2: $\Delta\chi^2_{d.f.=2} = 49.76$, $p < 0.01$). Crucially, the path estimates for absorptive capacity to local responsiveness in Scenario 1 ($\beta = 0.08$, $p > 0.1$) and for absorptive capacity and shared values to local responsiveness in Scenario 2 ($\beta = 0.12$, $p > 0.1$ and $\beta = 0.06$, $p > 0.1$, respectively), were not significant. Taken together, these analyses indicate that absorptive capacity and shared values do not mediate paths from knowledge transfer and reverse knowledge transfer to local responsiveness.

Table 3: Results of structural model fit statistics

	Scenario 1		Scenario 2	
Fit Statistics	**Full Mediation Model**	**Partial Mediation Model**	**Full Mediation Model**	**Partial Mediation Model**
χ^2	434.49	379.33	423.78	374.02
d.f.	206	204	183	181
RMSEA	0.08	0.07	0.09	0.08
CFI	0.86	0.89	0.86	0.89