REVERSE KNOWLEDGE ABSORPTIVE CAPACITY OF MNE-HQ (RKAC): CONCEPTUALIZATION, THEORETICAL FRAMEWORK, AND EMPIRICAL TESTING

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by

YIWEN CHEN

Dr. Shaoming Zou, Dissertation Co-supervisor

Dr. Christopher Robert, Dissertation Co-supervisor

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The undersigned, appointed by the dean of the Graduate School, have examined the dissertation entitled

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presented by Yiwen Chen,

a candidate for the degree of Doctor of Philosophy,

and hereby certify that, in their opinion, it is worthy of acceptance.

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Professor Shaoming Zou

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Professor Christopher Robert

_____

Professor Xinran (Joyce) Wang

_____

Professor Xinghe Wang

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REVERSE KNOWLEDGE ABSORPTIVE CAPACITY IN MNE-HQ (RKAC): CONCEPTUALIZATION, THEORETICAL FRAMEWORK, AND EMPRICAL TESTING

Yiwen Chen

Dr. Shaoming Zou, Dr. Chris Robert, Dissertation Chair

ABSTRACT

Despite the increasing importance of reverse knowledge for innovation and competitive advantage of multinational enterprises (MNEs), the issue of how to make reverse knowledge transfer (RKT) more effective is under-explored. Specifically, what constitutes the absorptive capacity of MNEs' headquarters (HQ), the receiver of reverse knowledge, remains conceptually vague and empirically inconsistent. This study develops a broad conceptualization of MNE-HQs' reverse knowledge absorptive capacity—the RKAC—that integrates two major perspectives, namely motivation-ability view, and process-based view of absorptive capacity. Departing from previous studies that treat absorptive capacity as a generic construct, the broad construct of RKAC is developed for each specific HQ-subsidiary dyad. This study also proposes a theoretical framework that accounts for the antecedents, outcomes, and boundary conditions of RKAC. The proposed model was empirically tested with survey data collected from 206 executive mangers of subsidiaries operating in China. The results supported the theoretical conceptualization and the majority of the proposed hypotheses.

CHAPTER 1: INTRODUCTION

1.1 Motivation and Research Questions

1.1.1 Embrace a reverse logic

Innovation ideas and knowledge lie at the heart of the competitiveness of multinational enterprises (MNEs). To compete effectively worldwide, MNEs need to constantly come up with innovative ideas and bring to the forefront contemporary products and services. Apart from its importance for new product development (NPD), ideas and knowledge also constitute the lifeblood for firms in generating new business models, new processes, and bringing about general organizational or strategic changes (van den Ende, Frederiksen, & Prencipe, 2015). Therefore, being able to identify and tap into up-to-date innovation ideas and knowledge is pivotal for MNEs to stay relevant and competitive.

Advanced industrialized countries[1] have long been the center and origin of the global diffusion of innovation (Cantwell, 1995; Zedtwitz, Corsi, Søberg, & Frega, 2015). Innovation ideas and market knowledge have been primarily inspired by consumers in advanced markets, who are more brand-conscious, performance-sensitive, and sophisticated. According to the well-established international product life cycle theory (Vernon, 1992), new products and technologies are only *later* introduced and commercialized in less developed countries when they become mature, out-of-date, and obsolete in advanced markets (Zedtwitz et al., 2015). When MNEs try to target consumers out of

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[1] Countries are classified as "advanced" or "developing" according to the International Monetary Fund (2012, pp.180-183). Authors sometimes use terms such as "industrially advanced country", "advanced country", "developed country", "mature markets" interchangeably.

their home countries, they at most *adapt* an existing product to meet local conditions. This globalization approach has generally been successful in the past decades (Szymanski, Bharadwaj, & Varadarajan, 1993).

While this globalization approach worked fine in an era when advanced countries accounted for the vast majority of the market and other countries did not offer many opportunities, the rapid development of emerging markets calls for scholars and practitioners to reconsider this dominant logic of innovation and the direction of globalization (Immelt, Govindarajan, & Trimble, 2009). Customer demand is increasing rapidly in emerging markets, while advanced markets witness a relatively stable or even decreased growth. According to the International Monetary Fund[2], the share of developing countries in the world gross domestic product (GDP) grew from 36% in 1980 to 60% in 2019. Emerging markets such as China and India contributed 20% and 8.3% of world GDP in 2019, respectively. Besides, the GDP has been growing at an annual rate above 6.5% in China since 1975, while the annual growth rate in traditional triad countries (i.e., United States, European countries, and Japan) is below 1% or even negative. Anecdotal evidence suggests that by 2030, Asia could represent 2/3 of the global middle-class population (Brookings), becoming a major battlefield for MNEs. The discrepancy in both market size and growth potential thus forces MNEs to spare attention to customers in these markets, and to source knowledge locally. Put simply, home countries are no longer the default primary market for advanced MNEs (Zedtwitz et al., 2015).

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[2]https://www.imf.org/external/datamapper/PPPSH@WEO/OEMDC/ADVEC/WEOWORLD/IND

Meanwhile, MNEs are gradually losing ground to their counterparts from emerging markets. In industries such as internet retailing and consumer appliances, emerging markets MNEs outperform advanced MNEs in market share. One reason is that customers in emerging markets are relatively impatient, frugal, and sophisticated. They demand products that are essentially different from those preferred by western customers, such as good-enough products or frugal innovations (Cavusgil, Ghauri, & Akcal, 2012). Especially in China, these products feature new functionality, unprecedentedly low price, and rapid delivery (Steinfeld & Beltoft, 2014). These new product preferences pose challenges to advanced MNEs regarding product innovation and marketing. In contrast, emerging markets MNEs have a competitive edge given their unique advantage of deeply engaging with customers and end users in emerging markets (MIT Sloan Management Review, 2015). In particular, emerging markets are becoming centers of innovation in fields such as low-cost healthcare devices, carbon sequestration, solar and wind power, biofuels, distributed power generation, microfinance, electronic cars, and even ultra-low-cost homes (Immelt et al., 2009). The once-dominant role of advanced MNEs as the innovation powerhouse is now gradually changing, as global economic power shifts to emerging markets.

Against this backdrop, the long-established globalization approach might not suffice for advanced MNEs to continually survive and thrive in the next decade. Instead, companies need to proactively embrace a *reverse* logic (e.g., reverse innovation, reverse knowledge transfer) and actively source knowledge and innovation ideas from emerging markets.

1.1.2 Reverse knowledge types

In particular, two types of knowledge from emerging markets are especially valuable for advanced MNEs as innovation inspirations. First, *demand-side knowledge*. Because the locus of customer demand is shifting to markets outside the home country of advanced MNEs, the proportion of sales in emerging markets has increased dramatically and even dominates for certain industries and companies. For example, 48% of GE's revenue was from Asia in 2018, and 58% in 2017 (*source: GE financial statement 2018*). For Apple Inc, China contributed 20% of its total sales in 2017 and 2018 (*source: Apple financial statement 2018*). Apart from product ideas (e.g., good-enough products), emerging markets may also supply advanced MNEs with the market knowledge and business model ideas. For example, China's smartphone manufacture Xiaomi is catching up with incumbents with a unique business models (e.g., reduced cost and accelerated commercialization), which differs dramatically from advanced MNEs' well-planned, R&D intensive innovation strategy. As customer demands continue to increase in emerging markets, emerging markets provide ample opportunities for advanced MNEs to gain demand-side knowledge.

Spatial knowledge of the global operation constitutes another important part of demand-side knowledge. It refers to knowledge about geographical and contextual factors across different cultures (Sidhu, Commandeur, & Volberda, 2007). Failing to incorporate this type of knowledge would likely lead to failure of both exploitative (i.e., extending existing knowledge and seeking greater efficiency for incremental innovation) and explorative innovation (i.e.,

developing new knowledge and fostering novelty for radical innovation) for MNEs (Andriopoulos & Lewis, 2009; Atuahene-Gima, 2005; Sidhu et al., 2007). Emerging markets differ from advanced markets in culture, social norms, and customer preferences, providing new market knowledge and potential product-diversification ideas. For example, Nestle developed a low-cost low-fat dried noodle for India and Pakistan. Later, they found a market for this product in Australia and New Zealand as a healthy and budget-friendly alternative. GE developed a portable, battery-operated electrocardiogram machine that is substantially cheaper for the Indian market, and the product was successfully reintroduced back to the United States, becoming the most famous example of a *reverse innovated product*. This product further encouraged product diversification in GE and provided the company with market opportunities they would have otherwise ignored. Therefore, mastering spatial knowledge in emerging markets has strategic implications for MNEs.

Second, *supply-side knowledge*—knowledge that can be used to facilitate the manufacturing and supply of products. Emerging markets such as China have the potential to become a new source of supply-side knowledge, as they gradually establish systematic manufacturing capabilities. By 2018, China led the world in terms of manufacturing output ($2010 billion), followed by the United States and Japan (West & Lansang, 2018). The increased manufacturing capacity also comes with engineering production know-how and process skills, *i.e.*, knowledge manufacturing workers learned on the job and well known but impossible to describe in a way that is helpful (Ferdows, 2006). Advanced MNEs may leverage this knowledge to facilitate the NPD process. For example,

unlike experienced advanced MNEs that often have fully integrated operations, Chinese companies tend to survive by carving out niche specialization in the production process and then partnering with other businesses that can perform the remaining functions—the so-called *networked production* (Steinfeld & Beltoft, 2014). This type of production mode enables Chinese companies to reduce production costs and time so that they can accelerate commercialization. This supply-side knowledge also pertains to knowledge in related and supporting industries, such as distribution and logistics. In addition, R&D centers in emerging markets have been accumulating advanced technical capabilities. Among 2500 of the worlds' top R&D investors, 770 companies are from the US, and 438 are from China (*source: 2018 EU Industrial R&D Investment Scoreboard*). Forward-looking companies, especially those in the pharmaceuticals and electronics industries, have already made efforts to integrate their R&D with the latest research coming out of Chinese institutions (Jolly, Mackern, & Yip, 2015).

Both demand- and supply-side reverse knowledge are important for advanced MNEs' global innovation. Reverse knowledge expands the knowledge base of advanced MNEs' by increasing market knowledge *breath* (the number of different knowledge domains with which the firm is familiar), *depth* (the level of sophistication and complexity of a firm's knowledge of its customers and competitors), *tastiness* (the extent to which market knowledge is not explicit but rather is difficult to codify and communicate), and *specificity* (the extent to which the firm's knowledge is tailored to the requirements of specific contexts), all of which are positively associated with product innovation performance (De

Luca & Atuahene-Gima, 2007). The importance of both demand- and supply-side reverse knowledge also echoes the idea that global discovery management (i.e., MNE's ability to organize NPD-related activities across national borders such as worldwide idea scanning and ideation) is critical for global innovation performance (De Brentani & Kleinschmidt, 2015).

Therefore, advanced MNEs should be well-aware of innovation ideas and knowledge outside the home countries, and make efforts to identify and leverage knowledge from its globally dispersed subsidiary network. In essence, MNEs' competitive position is increasingly shaped by their ability to improve their capacity to mobilize knowledge that languishes underexploited within their far-flung network of subsidiaries (Edwards & Tempel, 2010). In this research setting, whether advanced markets MNEs can unleash underexploited yet valuable knowledge from emerging markets may determine their competitiveness.

1.1.3 Obstacles to reverse knowledge transfer

Knowledge mobilization and transfer are never smooth (Jensen & Szulanski, 2004). MNE-HQs differ dramatically in terms of absorbing and leveraging knowledge from their network of subsidiaries (i.e., reverse knowledge). Obstacles exist at different levels of the organization. For example, some headquarters lack receptivity of reverse knowledge, usually due to a lack of a systematic mechanisms/structures that allow for reverse knowledge transfer or a lack of global mindset (Oddou, Osland, & Blakeney, 2009). Resistance from MNE-HQ's innovators may present another challenge, as exemplified by "not-invented-here syndrome" (Antons & Piller, 2015; Katz &

Allen, 1982). In addition, there is difficulty in managing cross-border knowledge transfer, because cultures influence how people process, interpret and make use of knowledge (Van Wijk, Jansen, & Lyles, 2008). Unfortunately, regardless of various obstacles that permeate the knowledge transfer process, most studies assume a default role of the MNE-HQ in successfully managing reverse knowledge. It remains theoretically and empirically unclear that (1) *whether* MNE-HQs can absorb knowledge from their subsidiaries, (2) *what* organizational factors may facilitate or hinder the process of reverse knowledge absorption, and (3) *what* are the performance implications of such reverse knowledge transfer practices. In this dissertation, I intend to shed light on these issues by focusing on the reverse knowledge transfer between MNE-HQ and its subsidiaries. Specifically, I introduce the concept of *MNE-HQ's reverse knowledge absorptive capacity (RKAC)* and develop a systematic framework that accounts for the antecedents and outcomes of RKAC.

1.2 Research Gaps in the Existing Literature

1.2.1 Inconclusive effect of absorptive capacity in RKT

Knowledge is the key to firm survival and success (Grant, 1996). This is especially relevant for multinational enterprises (MNEs), which have been described as a differentiated network of knowledge flows (Gupta & Govindarajan, 1994). Scholars argue that whether MNEs can manage the flows of knowledge within their global networks largely determines their competitive advantage internationally (Minbaeva, Pedersen, Björkman, Fey, & Park, 2003; Schleimer & Pedersen, 2013). This opinion echoes Dunning's eclectic paradigm

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(Dunning, 1994), which suggests that MNEs have the advantage when it comes to internationalizing their strategic assets (i.e., knowledge in this case). Some scholars thus argue that "the ability to share knowledge across borders is the prime reason behind the formation of MNEs" (Noorderhaven & Harzing, 2009, p. 720). To quote:

The MNE as an organizational form arises …because of its "superior efficiency as an organizational vehicle by which to transfer knowledge across the border"(Kogut & Zander, 1993). It is the "synthesis" of knowledge originating in diverse locations that is seen to be the prime source of MNE innovation" (Noorderhaven & Harzing, 2009, p. 720).

Against this backdrop, many research efforts have been made to investigate effective knowledge management within MNEs (Ado, Su, & Wanjiru, 2017; Andersson, Buckley, & Dellestrand, 2015). Of especial interest to scholars in international business and management are parent-subsidiary knowledge flows. While previous studies mainly focus on the knowledge flows from MNE's headquarters (HQs) to its subsidiaries (Björkman, Barner-Rasmussen, & Li, 2004; Ciabuschi, Martín, & Ståhl, 2010), the past two decades have witnessed an increasing number of studies that inform on the phenomenon of *reverse knowledge transfer (RKT)*, i.e., a knowledge transfer process in which knowledge flows into MNEs' HQs from their geographically dispersed subsidiaries (Michailova & Mustaffa, 2012).

The reasons why studies on RKT are gaining momentum can be attributed to the increasing importance of knowledge originating from subsidiaries, especially subsidiaries in emerging markets. To compete effectively

on a global scope, MNEs must incorporate knowledge and ideas from their subsidiaries into their new product development and international marketing (Johnson & Medcof, 2007). This is especially true for MNEs with target customers in culturally distant markets, where customer needs may differ dramatically from those in their home countries. Subsidiaries have access to diverse sources of new ideas and knowledge originating from their local environment, thus becoming a critical source of knowledge for MNEs (Najafi-Tavani, Giroud, & Sinkovics, 2012). This may explain why more subsidiaries are being assigned to seek knowledge over the past decades (Birkinshaw & Hood, 1998; Cantwell & Mudambi, 2005). To some extent, the primary source of knowledge and competence is not exclusively from MNE-HQ; subsidiaries become an increasingly important source (Achcaoucaou, Miravitlles, & León-Darder, 2014). MNE-HQs are now more engaged in the role of *knowledge receiver* (Achcaoucaou et al., 2014). For this reason, whether MNE-HQs can effectively absorb and leverage the knowledge from its subsidiaries is critical for its global success.

Over the last decades, researchers have identified several factors that impact the effectiveness of RKT, including knowledge characteristics (Håkanson & Nobel, 2000; Yang, Mudambi, & Meyer, 2008), relationships and interactions between actors (Chung, 2014; Noorderhaven & Harzing, 2009; Persson, 2006), language and context of host countries (Ambos, Ambos, & Schlegelmilch, 2006; Peltokorpi, 2015), subsidiary characteristics (Mudambi, Piscitello, & Rabbiosi, 2014) and headquarters' characteristics (Kumar, 2013). However, MNE-HQ's characteristics are relatively less studied. In particular, MNE-HQ's absorptive

capacity, which is regarded as a critical factor in the general knowledge transfer process (Caligiuri, 2014; Lane, Salk, & Lyles, 2001; Minbaeva, Pedersen, Bjorkman, Fey, & Park, 2014), has received very limited attention in the existing literature.

A comprehensive literature review on RKT indicates that only two studies have explicitly investigated MNE-HQ's absorptive capacity in the RKT process (Ambos et al., 2006; Nair, Demirbag, & Mellahi, 2016), and two studies relegated HQ's absorptive capacity to a control variable (Nair, Demirbag, & Mellahi, 2015; Rabbiosi & Santangelo, 2013). Although these studies shed some initial light on how the absorptive capacity of MNE-HQ may impact RKT effectiveness, the empirical findings are mixed and inconclusive. Apart from Rabbiosi and Santangelo (2013) that focuses on parent-subsidiary dyad, the other three articles treat MNE-HQ's absorptive capacity as a firm level variable. In terms of measurement, Rabbiosi and Santangelo (2013) operationalized absorptive capacity as the technological and organizational distance between each parent-subsidiary dyad, while others operationalized it as firm-level knowledge stock or training activities. In terms of results, while two studies find a positive effect of parent's absorptive capacity on RKT (Ambos et al., 2006; Nair et al., 2016), the other two studies revealed that this effect is not significant (Nair et al., 2015; Rabbiosi & Santangelo, 2013). Therefore, whether and how MNE-HQ's absorptive capacity affects RKT remains an unanswered question.

1.2.2 Reasons of Ambiguity in the Literature

Two factors can be identified to account for the current ambiguity in the literature. First, there has been no attempt to *contextualize* absorptive capacity in an RKT research setting. Learning may happen under various situations for MNE-HQs, such as inter-firm alliances, intra-firm knowledge transfer, and open innovation. Theoretically, absorptive capacity in different learning situations should be different (Lane, Koka, & Pathak, 2006). For instance, an MNE that is good at absorbing knowledge from external sources for open innovation does not necessarily excel in absorbing knowledge from its overseas subsidiaries. However, the current studies in RKT treat headquarters' absorptive capacity of reverse knowledge as a *general-purpose* construct. Most scholars regard it as a byproduct of firms' prior knowledge and experience, implying that the firm's absorptive capacity of incoming knowledge is the same regardless of the learning situations. In effect, in the context of RKT, one would have to assume (incorrectly) that MNC-HQs are equally capable of absorbing *any* reverse knowledge from *any* subsidiary. In reality, however, such an assumption might rarely hold. Knowledge senders' characteristics should surely affect the absorptive capacity of the knowledge receiver. Treating the absorptive capacity of reverse knowledge as a generic construct masks the variations among subsidiaries.

In terms of operationalizations, the measurement of AC in the RKT context is rudimentary and lacks contextualization. The current literature treats AC as a *unidimensional* construct and identified MNE-HQs' AC as its

knowledge base. This operationalization oversimplifies the construct by ignoring the process of absorptive capacity including identification, assimilation, and application (Cohen & Levinthal, 1990; Lane et al., 2006; Pak & Park, 2004), rendering the appropriateness and validity of these measures very questionable. Whether and how headquarters identifies, assimilates, and applies reverse knowledge is largely ignored in the existing literature. Therefore, defining *what* an MNE-HQ's absorptive capacity *is*, and *how* it should be measured, is unclear.

Second, there has been no attempt to *integrate* the diverse perspectives of AC. For example, Rabbiosi and Santangelo (2013) believed that AC is developed for each parent-subsidiary dyad. Therefore, the differences between parent-subsidiary dyad factor in AC. Ambos et al. (2006) adopted the process-based view of AC, and regarded it as courses of action including recognition, assimilation, and application of knowledge. Because these studies used different views to interpret AC, the conceptualization and operationalization of AC were different. It is thus difficult to compare and reconcile results. In addition, the very different views these studies adopted each only explained one aspect of AC, leaving our understanding of AC incomplete. As a result, there lacks a unified theoretical foundation based on which findings of different studies can be meaningfully compared. This lack of integration is probably the main reason for the ambiguity in the literature. Without a unified framework to integrate these diverse perspectives, ambiguity and confusion are likely to persist. This would further lead to contradicting theories and discouraging practical application of knowledge. Hence, these diverse perspectives must be integrated to provide a complete explanation of AC in the RKT context.

To summarize the existing literature, it is conceptually vague and empirically inconsistent about what headquarters' absorptive capacity of reverse knowledge is. Scholars tend to (incorrectly) assume that MNE-HQ's absorptive capacity of reverse knowledge is a generic construct that does not vary according to subsidiaries, and draw on only one perspective of AC for investigation. For these reasons, the insights we draw from previous studies are at best incomplete and at worst incorrect. Scholars have long suggested that existing empirical studies on AC suffer from several issues, such as indirect measurement, unidimensional operationalization, and lack of attention to the context (Volberda, Foss, & Lyles, 2010). The unique context of reverse knowledge transfer between MNE-HQs and subsidiaries only amplifies these issues. A clear definition of MNE-HQ's absorptive capacity of reverse knowledge is imperative.

1.3 Research Questions

The lack of a good understanding of absorptive capacity in the RKT process is unfortunate for the following reasons. First, absorptive capacity is a well-documented determining factor of knowledge transfer effectiveness (Van Wijk et al., 2008). Previous studies show that the absorptive capacity of the receiving unit is the most significant determinant of internal knowledge transfer in MNEs (Anil K. Gupta & Vijay Govindarajan, 2000). As RKT becomes an increasingly important form of intra-organizational knowledge flow, it is imperative to investigate MNE-HQ's absorptive capacity to fully understand the RKT effectiveness. Second, absorptive capacity on a general

level is an important aspect of organizational learning, which may affect a firm's innovation and other strategic decisions (Argote, 2015; Hotho, Lyles, & Easterby-Smith, 2015). Stated differently, absorptive capacity is critical for MNEs to leverage their dispersed knowledge and has a long-lasting effect on MNC's competitive advantages. Therefore, a clear conceptualization of MNE-HQ's absorptive capacity in the RKT process is needed to fill the research gaps. Without a clarification of the concept and its measurement, confusion exists regarding the actual effect of MNE-HQ's absorptive capacity in influencing RKT effectiveness and MNEs' competitive edge. This confusion would further hinder the knowledge advancement on RKT in international business, and knowledge development of organizational learning.

In light of these two gaps in the literature, this study aims to conceptualize a multidimensional construct of MNE-HQs' AC of reverse knowledge in the RKT process, denoted as *reverse knowledge absorptive capacity (RKAC)*. RKAC is supposed to reflect the unique context of RKT and integrate the diverse theoretical perspectives. It would further help reduce the ambiguity and confusion in the current literature. In addition, this study develops a systematic framework that accounts for the antecedents and outcomes of RKAC. Doing so allows us to address three fundamental questions in the international business (IB) literature:

RQ1: How do we define MNE-HQ's absorptive capacity of reverse knowledge?

RQ2: Does it matter whether the MNE-HQs have such a capacity?

RQ3: How do we promote such capacity in MNE-HQs?

1.4 Overview and Organization of the Dissertation

This dissertation centers on the theoretical development and conceptualization of the construct of RKAC. Chapter 2 presents a literature review of RKT in the international business domain, and absorptive capacity in the organizational learning literature. In Chapter 2, I first focus on discussing the unique contextual features of RKT to justify a distinct conceptualization of RKAC. My second focus is on a systematic review of absorptive capacity in related domains for a summary of predominant perspectives conceptualizing absorptive capacity (i.e., relative view, motivation-ability view, process-based view). Each perspective focuses on one aspect of AC, but each is important to understand AC in the context of RKT. The theoretical underpinning of each approach and its relevance to RKAC are carefully discussed to jointly form the theoretical foundation of the new conceptualization.

After a theoretical foundation is laid, Chapter 3 proposes an *integrative* approach towards the conceptualization of an MNE-HQ's RKAC. Specifically, due to the unique characteristics of reverse knowledge transfer—including bottom-up transfer, low power to high power transfer, high risk, and cross-culture transfer—MNE-HQs need to be motivated to initiate knowledge absorption and establish a recognition, assimilation, and application process to facilitate reverse knowledge transfer. The following steps are carried out to develop a conceptualization of RKAC. First, I identify two broad dimensions of RKAC: *reverse knowledge absorptive motivation (RKAM)* and *reverse knowledge absorptive ability (RKAA),* based on the motivation-ability framework of

absorptive capacity. Second, I integrate the process-based view of absorptive capacity, namely *identification, assimilation, and application*, to propose an overarching framework for RKAC. Third, I elaborate on each dimension of MNE-HQs' RKAC.

In Chapter 4, I focus on a systematic examination of antecedents and outcomes of RKAC. Previous studies have suggested that knowledge transfer should be regarded as an endogenous part of organizational processes (Minbaeva, Pedersen, Björkman, & Fey, 2014). That is, MNEs can develop RKAC by employing appropriate organizational designs and management practices. Therefore, the following research questions guide Chapter 4:

RQ 4 How do MNE-HQs foster reverse knowledge absorptive capacity?

RQ 5: What are the performance implications of RKAC?

Inquiry into the building mechanism of RKAC is especially valuable for MNEs. It provides MNEs with detailed guidance on how to develop such capacity within MNE-HQ. Drawing on the literature, I identify three antecedents for reverse knowledge absorptive motivation (RKAM): trust towards subsidiary, host country competitiveness, and subsidiary power; three antecedents for reverse knowledge absorptive ability (RKAA): prior subsidiary knowledge, HQ-subsidiary communication, and cultural distance. Two outcomes of RKAC are examined: (1) RKT effectiveness; and (2) MNE's innovation performance. Lastly, two sets of organizational level variables are included in the model as moderators: (1) organizational innovative culture and global orientation; and (2) centralization, and cross-cultural competence.

Chapter 5 and 6 describe the data collection methods and empirical testing results. Chapter 7 concludes this dissertation with a discussion of the findings and contributions.

1.5 Intended Contributions

This dissertation intends to make three key contributions. First and foremost, this study contributes to the RKT literature by introducing a new construct—MNE-HQs' RKAC. Specifically, I structure RKAA, reverse knowledge absorptive *ability*, and RKAM, reverse knowledge absorptive *motivation* into one congruent concept of RKAC, with each subdimension including three second-order dimensions. This broad conceptualization provides a comprehensive view and unified theoretical framework to interpret MNE-HQs' absorption of reverse knowledge. By testing the measurement model of RKAC and its fundamental effect on knowledge transfer effectiveness, we are able to answer two fundamental questions: (1) how do we define MNE-HQs' RKAC? and (2) Does it matter in the RKT process?

Second, this study contributes to the literature of RKAC by developing a model that systematically accounts for its antecedents and outcomes. Reviewing RKAC as a subsidiary-specific construct, I identify distinctive subsidiary-specific antecedents for RKAA and RKAM. The fundamental logic is that both subsidiary-level institutions and HQ-subsidiary level dyadic factors would affect RKAC. In addition, I also identify firm-level factors that moderate the link between antecedents and RKAC. In this way, this study further adds knowledge

to RKT studies by answering the following question: how do MNE-HQs foster RKAC?

Third, this study contributes to the organizational learning literature by enriching the meaning of absorptive capacity. Scholars have suggested that AC has become a *taken-for-granted* concept in that (1) few papers have tried to extend the construct's definition, and (2) few studies have discussed the multiple dimensions of the construct (Lane et al., 2006). Among a limited number of papers that attempt to enrich the definition of AC, each draws on a different theoretical perspective (Lane & Lubatkin, 1998; Szulanski, 1996; Zahra & George, 2002). Scholars conclude that "there has been no significant attempt to *integrate* these different studies into a new reconceptualization of the construct based on a critical evaluation of the research context" (Lane et al., 2006, p. 846). This paper fills the gap by proposing an integrative conceptualization of absorptive capacity based on an in-depth analysis of RKT context.

CHAPTER 2: THEORETICAL FOUNDATION OF MNE-HQ'S RKAC

2.1 Background: Reverse Knowledge Transfer

In this section, I first discuss the context of RKT and explain why its contextual characteristics should be taken into consideration when defining RKAC. Following that, I review three perspectives of absorptive capacity and explain how each perspective defines a feature of MNE-HQ's RKAC. The contextual features of the RKT context and the relevance of three theoretical perspectives jointly form the theoretical foundation of RKAC.

Previous studies define knowledge transfer between organizations as "a process that covers several stages starting from *identifying* the knowledge to the actual process of *transferring* the knowledge to its final *utilization* by the receiving unit" (Minbaeva et al., 2003, p. 587). In the context of reverse knowledge transfer (RKT), the sending unit is a subsidiary while the receiving unit is the MNE headquarters. Compared with knowledge flows from headquarters to subsidiaries (i.e., forward knowledge transfer), RKT presents unique characteristics.

First, RKT is a knowledge transfer process from a low-power unit to a high-power unit. Scholars have long realized that "knowledge is linked to power, and that the decision to share, request or transfer knowledge is frequently a political act" (Easterby-Smith, Graca, Antonacopoulou, & Ferdinand, 2008, p. 495). In forward knowledge flows, the sender and the recipient are often in a situation of power asymmetry with the former being in a more superior position

(Easterby-Smith, Lyles, & Tsang, 2008). This is due to the inherently dominant status of headquarters in MNEs. Therefore, the knowledge sender (i.e., HQs) determines whether to initiate the knowledge transfer or not. However, RKT occurs when knowledge from a low-power unit (i.e., subsidiary) flows into a high-power unit (i.e., headquarters). In this case, it is the knowledge receiver rather than the knowledge sender that takes a major role in ensuring the occurrence of reverse knowledge transfer (Mudambi et al., 2014).

Because of this power asymmetry, subsidiaries would likely encounter many obstacles in sending the knowledge back to their headquarters. Examples of obstacles include a lack of an established mechanism for bottom-up knowledge transfer, headquarters' lack of attention/interest/trust in knowledge from subsidiaries (Kumar, 2013), language and cultural barriers (Peltokorpi, 2015), and even psychological resistance from headquarters. Previous studies show that such transfers require "parent companies that are committed to learning from their subsidiaries and willingness to recognize the potential benefits of subsidiaries' knowledge" (Mudambi et al., 2014, p. 50). This implies that RKT does not happen by default. Instead, MNE-HQs need to pay extra effort or commit extra resources to smooth the RKT process. In particular, a certain level of intent or willingness, and actual ability to transfer knowledge are necessary. However, this unique power-related dynamic between HQs and subsidiaries in the context of RKT is not captured in the previous conceptualizations (Hotho et al., 2015).

Second, RKT differs from the forward knowledge transfer in *knowledge flow direction and structure.* While knowledge transfers from HQs to their subsidiaries can be visualized as a one-to-many and top-down relationship, RKT is a many-to-one and bottom-up relationship (See Figure 1 for illustration). This further amplifies the power asymmetry between HQs and subsidiaries. In particular, HQs have the power to choose which subsidiary knowledge to absorb. Theoretically, knowledge from each subsidiary might be equally valuable for headquarters. In reality, since headquarters has limited time and effort to evaluate every single knowledge input, some subsidiaries would likely be prioritized while others ignored in the RKT. This echoes the attention-based view of MNEs, which argues that HQs cannot "give full attention to all subsidiary units around the world" (Bouquet & Birkinshaw, 2008b, p. 577). Under this scenario, the MNE-HQ must become selective in absorbing reverse-transferred knowledge. The assumption that MNE-HQs equally desire *any* reverse knowledge from *any* subsidiary is thus not valid. Rather, an identification and selection process must be in place in the headquarters to facilitate knowledge identification and absorption. However, the existing literature on absorptive capacity in RKT fails to capture the selection/evaluation part of the knowledge absorption process. Factors that underly the selection process remain under-explored.

Figure 1: Knowledge Flows in MNCs

Knowledge flows from HQ-subsidiary (One-to-Many)

Reverse knowledge flows from Subsidiary-HQ (Many-to-One)
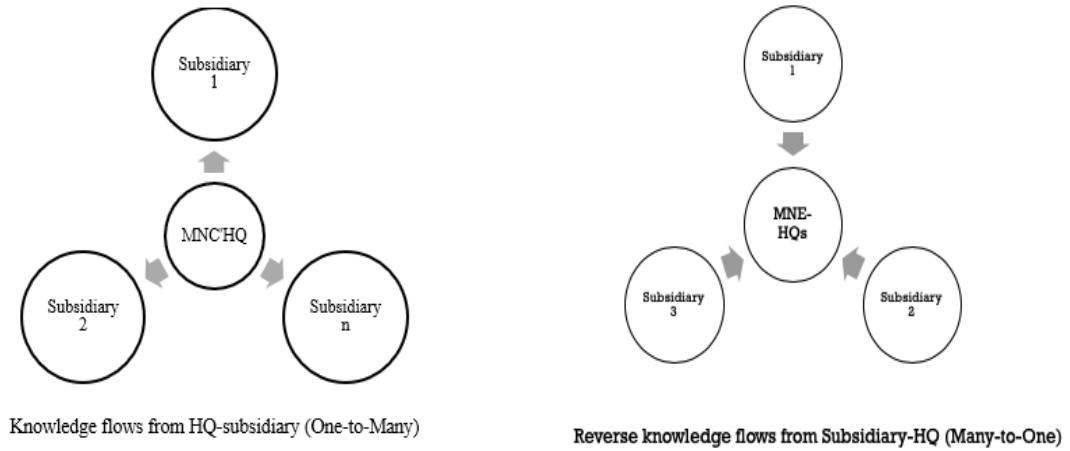
Third, RKT differs from forward knowledge transfer in terms of the *risk* for knowledge receivers. The HQ-subsidiary relationship can be portrayed as a principal-agent relationship, where conflicts of interest exist between two parties (Hoenen & Kostova, 2015; Mudambi & Navarra, 2015). As agents, subsidiaries may not always act in the best interest of their principals (i.e. the headquarters). Unlike forward knowledge transfer, where the source of knowledge is usually reliable and legitimate, headquarters faces different levels of risks when absorbing reversed knowledge from different sources (i.e., different agents).

Because RKT is a many-to-one knowledge transfer process, the recipient may face the risk that the knowledge it receives is not useful or not of high quality. Knowledge from certain subsidiaries may be more valuable than that from other subsidiaries, thus creating an issue of "source credibility" (Easterby-Smith et al., 2008). This would further affect HQ's motivation to absorb reverse

knowledge. While this is usually not a problem for general knowledge transfer from headquarters to subsidiaries given the natural legitimacy of headquarters, it can become a salient problem for RKT. This reinforces the importance of the selection and evaluation mechanism in absorbing reverse knowledge. It also implies that factors underlying the selection process should factor into the definition of absorptive capacity. In addition to different levels of risks, effective absorption requires headquarters' ability to recognize the value of knowledge from different sources. Therefore, capturing this ability is critical for conceptualizing MNE-HQs' RKAC.

Fourth, RKT differs from the forward knowledge transfer in terms of the context or cultures in which it takes place. Although both RKT and forward knowledge transfer would involve some cross-border knowledge transfer processes, the complexity of the context differs. MNE-HQs may need to deal with different cultural contexts simultaneously when absorbing reverse knowledge from different subsidiaries that are geographically dispersed. Naturally, the context/culture where the knowledge is originating from would add complication to the knowledge transfer process. In this regard, scholars point out that knowledge cannot easily be separated from its social and organizational context (Inkpen & Tsang, 2005; Kogut & Zander, 1992); the transfer process thus is often very 'sticky' (Jensen & Szulanski, 2004).

Because absorption itself is a cognitive process, culture-related factors such as cultural distance may further factor into the RKT process by affecting the HQs' absorptive capacity (Björkman, Stahl, & Vaara, 2007). Scholars have already noted the 'not-invented-here syndrome', which refers to HQ's

underestimation of the importance of knowledge from abroad (Anil K. Gupta & Vijay Govindarajan, 2000). This implies that HQ's inherent attitude toward subsidiary locations, and their desire to absorb knowledge from those subsidiaries, might vary. So does the ease of assimilating and applying the reverse knowledge into innovation. However, the existing conceptualization of absorptive capacity incorrectly assumes that HQs are equally capable of absorbing any knowledge from any culture. This would largely mask the variation among MNE-HQs' absorptive capacity.

To summarize, RKT is a unique context of knowledge transfer in that: (1) knowledge sender and receiver are power-asymmetric, with the latter being more powerful; (2) it is a many-to-one, bottom-up transfer so that subsidiaries need to compete for MNE-HQs' selective attention; (3) it involves more risks for the knowledge receiver; and (4) culture complicates this process. These unique characteristics give rise to certain prerequisites for headquarters to effectively absorb reverse knowledge (See Table 1 for the summary), including (1)the knowledge recipient's intent/willingness/motivation to initiate the RKT; (2) selection and evaluation of benefits and risks of the incoming knowledge; and (3) well-established mechanisms to overcome barriers such as cultural distance. These factors not only distinguish reverse knowledge transfer from forward knowledge transfer, but also make RKT different for each subsidiary.

Table 1: Contextual Features of Reverse Knowledge Transfer

Knowledge Transfer Types	Power Holder	Direction	Risk for recipient	Context
HQ➔Subsidiary	sender	one-to-many/top-down	Low	Simple
Subsidiary➔HQ	recipient	many-to-one/bottom-up	High	Complex
Obstacles	HQs' lack of interest	HQs' limited attention	HQ's cognitive bias	Lack of ability/interest
Requirement for HQ in RKT	intent/willingness to receive knowledge	attention, selection, and evaluation	selection and evaluation	Norms, rules, and cross-cultural ability

However, existing studies largely ignore these characteristics when investigating HQs' absorptive capacity. Instead, the literature has typically defined HQs' absorptive capacity as a general-purpose construct. This creates a false assumption that MNE-HQs are equally capable of absorbing *any* reverse knowledge from *any* subsidiary. Hence, it is theoretically imperative to conceptualize reverse knowledge absorptive capacity (RKAC) as a distinct construct. This construct should be grounded in the context of RKT and reflect the above-mentioned contextual characteristics.

To do that, in the next section, I first screen the existing approaches to conceptualizing absorptive capacity in the organizational learning and international business literature, and discuss how each perspective relates to and defines a feature of RKAC. The goal of the literature review is to lay the theoretical framework and logic for conceptualizing RKAC.

2.2 Literature Review: Absorptive Capacity

Absorptive capacity refers to a firm's fundamental learning process: the ability to identify, assimilate, and exploit knowledge from the environment (Cohen & Levinthal, 1990). Since its introduction, the concept of absorptive capacity has received much academic attention from a wide array of theoretical perspectives (Volberda et al., 2010). However, the literature offers multiple methods to conceptualize and operationalize absorptive capacity, often not capturing the various facets of absorptive capacity (Minbaeva et al., 2003). Each perspective is likely to touch on *one* aspect of absorptive capacity as more broadly defined in the current research. To serve the purpose of this study, I focus on the following three approaches to conceptualizing absorptive capacity: (1) a relative absorptive capacity view; (2) a motivation-ability view; and (3) a process-based view.

Based on the contextual features as discussed above, these perspectives are each highly relevant for scholars to understand the absorptive capacity in the RKT context. Each defines a key feature of MNE-HQ's RKAC. The core argument of each approach and its relevance to the conceptualization of RKAC are discussed in detail in the following sections (See Table 2 for a summary). Three theoretical lenses and their complementarity jointly form the theoretical underpinning of this study.

Table 2: Different Approaches to Conceptualize Absorptive Capacity

Approach	Unit of Analysis	Dimensions	Measurement	Weakness	Relevance to RKAC
Relative Absorptive Capacity	Teacher-student dyad	Identify, Assimilate, and Apply	Indirect	Fail to **directly** capture the multidimensions of absorptive capacity	**subsidiary-specific**
Motivation-Ability view	Firm	Ability and Motivation	Direct	**General** measure of ability and motivation; fail to capture the **process** of absorptive capacity	**emphasizes the value of motivation**
Process view	Firm	Identify, assimilate, and apply	Direct	Measurement needs an **update** to reflect reverse knowledge transfer context	**process-based; multi-dimensional**

2.2.1 Approach one: a relative view of absorptive capacity

When first introduced, absorptive capacity is defined as "the ability to recognize the value of new external information, assimilate it, and apply it to commercial ends" (Cohen & Levinthal, 1990, p. 128). Over the decades, many studies have investigated absorptive capacity in different contexts (e.g., international joint venture's knowledge acquisition, MNC knowledge transfer, innovation, etc.). While some studies treat absorptive capacity as a generic firm-level construct, others believe that it is a *dyad-level* construct. For example, much of the literature identified absorptive capacity as a firm's knowledge accumulation and used a firm's R&D intensity, patents, and cross-citation as proxies of a firm's absorptive capacity (Meeus, Oerlemans, & Hage, 2001; Mowery, Oxley, & Silverman, 1996; Tsai, 2001). Some studies adopted a capability view of absorptive capacity and measured it with proxies such as age and size (Rao & Drazin, 2002; Sørensen & Stuart, 2000). In the RKT literature, scholars similarly used knowledge stock or capability-building activities to measure absorptive capacity. By so doing, these studies assume that a firm's absorptive capacity is a firm-level construct that does not vary according to the learning partners. However, mixed findings are observed in empirical studies about the effect of absorptive capacity. While Ambos et al., (2006) found a positive effect of absorptive capacity on HQs' benefit from RKT, Nair et al., (2016) found that MNE-HQs' absorptive capacity has no significant effect on RKT. These mixed findings question the validity and accuracy of this approach.

Scholars have long advocated a relative view of absorptive capacity. This theoretical perspective suggests that "a firm's ability to identity, assimilate, and apply another firm's knowledge is based on the 'sociological interactions' and collaborative process that the partners develop, as well as the relationships between the members of those firms" (Lane et al., 2006, p. 845). Land and Lubatkin (1998) were the first to conceptualize absorptive capacity as a dyad-level construct and termed it *relative absorptive capacity*. The authors argued that firms' absorptive capacity to learn from external organizations depends on the *similarity* of both firms' (1) knowledge base, (2) organizational structures and compensation policies, and (3) dominant logic (Lane & Lubatkin, 1998). Specifically, the ability to *recognize* is operationalized as the relevance of the student firm's basic and specialized knowledge. The ability to *assimilate* new external knowledge is measured by the similarity of compensation practices and organizational structures. The ability to *commercialize* new external knowledge is reflected in the similarity of dominant logics. They further showed that their measure of relative absorptive capacity explained much more variance in inter-organizational learning than the traditional measure of R&D intensity (Lane & Lubatkin, 1998; Lane et al., 2001). The authors thus concluded that "relative absorptive capacity is more important to inter-organizational learning than the commonly used measure of absolute absorptive capacity' (Lane & Lubatkin, 1998, p. 473).

Conceptualizing absorptive capacity as a relative construct has important implications. First, it points out the fact that absorptive capacity, instead of being a generic construct, varies according to different learning partners.

Stated differently, absorptive capacity is *source-specific*. Second, it suggests the multidimensionality of absorptive capacity. Scholars adopting this approach view absorptive capacity as including the ability to understand, assimilate, and apply the knowledge.

However, this approach has mainly focused on the specific context of international joint ventures (Dyer & Singh, 1998). In addition, the authors use indirect measures (e.g., knowledge stock, organizational process) to capture the processes of identifying, assimilating, and applying knowledge. Third, these indirect measures cannot fully reflect how MNE-HQs absorb reverse knowledge in the context of RKT. Therefore, a new conceptualization of RKAC is warranted to remedy these shortcomings.

Although the relative view of absorptive capacity allows for a more specific approach to understanding it, the vast majority of scholars still adopt an absolute measure of firm-level absorptive capacity when investigating the intra-organizational knowledge flows. They argue that compared with inter-organizational learning where knowledge flows between two independent firms, intra-organizational knowledge transfer happens between two units within the same organization, which are supposed to share more similarities regarding knowledge base, organizational design, and compensation systems, etc. For this reason, some have concluded 'the relative absorptive capacity is of minor importance in the context of internal MNE knowledge transfer' (Minbaeva et al., 2003). Consequently, most studies use firm-level variables such as R&D intensity (Tsai, 2001), or relevant prior knowledge and organizational

structures (Zhao & Anand, 2009) to approximate knowledge receivers' absorptive capacity.

I argue that, in the context of RKT, variations among subsidiaries are substantial enough to justify adopting a relative view of MNE-HQ's absorptive capacity. That is, MNE-HQs' absorptive capacity is indeed *MNE-HQs' absorptive capacity to knowledge from a certain subsidiary*; it is source-specific.

Ample evidence supports this argument. Previous studies have shown that subsidiaries vary in the integration level with their headquarters and local embeddedness in host countries, and these differences influence the reverse transfer of technology (Håkanson & Nobel, 2001). Subsidiaries also vary in their strategic orientation (Borini, de Miranda Oliveira, Silveira, & de Oliveira Concer, 2012) and reverse knowledge quality (Mudambi et al., 2014; Nair et al., 2016; Najafi-Tavani, Giroud, & Andersson, 2014), which further affect RKT effectiveness. Finally, subsidiaries are located in geographically dispersed areas and vary in the cultural distance and host country competence (Nair et al., 2015). Hence, assuming that headquarters has the same level of ability to absorb any knowledge from any subsidiary is not correct. This conclusion is consistent with industrial practices. For instance, Siemens would not ignore reverse knowledge from its North American market given its contribution to overall sales. Similarly, since China has become the second-largest market for Apple, the US-based company is more adept at absorbing knowledge from its Chinese subsidiaries. Realizing that not including China in the initial launch countries

for iPhone 6 resulted in sales loss, the company quickly adjusted its strategy
and managed to ship the iPhone 6S and iPhone 6S Plus on day one to China.

2.2.2 Approach Two: A motivation-ability view

Drawing on the organizational behavior literature, the pioneering work
of (Minbaeva et al., 2003) conceptualized a firm's absorptive capacity as
employees' motivation and ability to transfer knowledge. The authors proposed
that "*neither* employees' ability nor motivation by themselves is sufficient to
facilitate knowledge transfer. The significant interaction of motivation and
ability shows that, to facilitate knowledge transfer both aspects of absorptive
capacity are needed. (P. 596)". Measuring absorptive capacity as an interaction
between employee's motivation and ability to transfer knowledge, the authors
found that this approach had a much higher explanatory power than the
traditional measure of R&D intensity. This conceptualization was further
adopted by other studies (Björkman et al., 2007; Volberda et al., 2010).

Several important conclusions can be drawn from Minbaeva et al. (2003).
First, the motivation-ability perspective provides a valuable theoretical lens to
study absorptive capacity. Second, only focusing on the ability aspect of
absorptive capacity is not sufficient. Instead, it is equally critical to have
intensity of effort for firms to effectively absorb knowledge (Cohen and
Levinthal 1999). This echoes the previous critiques of operationalizing
absorptive capacity as R&D intensity or prior knowledge stock. This is also in
line with Zahra and George (2002) who distinguish between *potential* absorptive
capacity and *realized* absorptive capacity. In fact, Minbaeva et al. (2003) treated

employees' ability as the potential absorptive capacity and motivation as realized absorptive capacity. Third, it implies that organizations should take on a more proactive role in absorbing knowledge. As Cohen and Levinthal (1990) put it, absorptive capacity should reflect a certain level of "organizational aspiration". Some MNEs may fail to absorb knowledge, not for a lack of ability but because of a lack of motivation.

Although this conceptualization of AC explains more variance in knowledge transfer (Minbaeva et al., 2003), subsequent studies "rarely explicitly theorized about the synergistic effect of employees' abilities and motivation" (Dana Minbaeva et al., 2014, p. 54). In particular, this approach receives limited application in investigating MNE-HQs' absorptive capacity of reverse knowledge.

One notably shortcoming of this approach is that motivation and ability were measured in a general way (Minbaeva et al., 2003); items were not specifically designed for accessing employees' capability in absorbing reverse knowledge (items such as "whether the employees behave in ways that help company performance"). A new measurement model is needed to further clarify the construct.

The motivation-ability framework of absorptive capacity serves as a good theoretical lens to conceptualize RKAC. The reasons are rooted in the unique dynamics between the headquarters and subsidiaries in RKT. As pointed out by Cohen and Levinthal (1990), absorptive capacity of a recipient unit should reflect certain levels of "organizational aspiration". This implies that absorbing

knowledge is not a passive or automatic activity, and motivation is a critical element.

On the one hand, headquarters as recipients are in a more powerful position and have multiple knowledge sources to choose from. On the other hand, headquarters' time, efforts, and attention are limited. Inevitably, headquarters must become selective about reverse knowledge. In reality, we observe several examples where the recipient unit fails to absorb the knowledge from overseas subsidiaries, not for a lack of ability, but a lack of motivation (Hussinger & Wastyn, 2016). Under this situation, motivation factors into the absorptive capacity of reverse knowledge by influencing the selection process. In addition, the complicated context where RKT takes place calls for headquarters to exert more control/efforts to overcome obstacles (e.g., cultural interpretation, language translation). Motivation underlies the efforts with this regard. Lastly, subsidiaries inherently have different mandates ranging from competence-exploitation to knowledge-seeking. While the former focuses more on increasing market share, the latter is more oriented toward tapping into new knowledge. This difference in the subsidiary mission would naturally affect headquarters' motivation to absorb knowledge from different subsidiaries (Birkinshaw & Hood, 1998; Frost, Birkinshaw, & Ensign, 2002).

Based on these discussions, I suggest that a more thorough conceptualization of RKAC will integrate (1) MNE-HQ's motivation to absorb reverse knowledge (RKAM); and (2) MNE-HQ's ability to absorb reverse knowledge (RKAA). In this sense, RKAC reflects not only headquarter's desire for reverse knowledge, but also the actual ability to absorb reverse knowledge.

2.2.3 Approach Three: A process-based view of RKAC

According to its original definition, absorptive capacity entails the ability to *identify, assimilate, and exploit* the external knowledge (Cohen & Levinthal, 1990). Despite the multidimensional nature of the construct, most studies treat absorptive capacity as a unidimensional construct (Ambos et al., 2006; Lane et al., 2006; Nair et al., 2015). In particular, no efforts have been made to understand the process of absorptive capacity in the RKT context. How MNE-HQs identifies, assimilates, and exploits reverse knowledge remains unclear in the existing literature.

In other research settings, recent studies have begun to adopt a process-based view of absorptive capacity and treat it as a multidimensional construct (Lichtenthaler, 2009; Schleimer & Pedersen, 2013; Zobel, 2017). Scholars argue that "…explicitly separating absorptive capacity into multi-dimensions is necessary, because each of these dimensions requires different processes within the organization. Explicitly separating the dimensions forces researchers to recognize the different nature of the processes underlying these constructs, as well as the interrelationships among them" (Lane et al., 2006, p. 857).

Process-based view of AC is highly relevant to the conceptualization of RKAC. First, without separating absorptive capacity into different processes, how MNE-HQs identifies, assimilates, and exploits knowledge would remain unclear. Second, the context of RKT adds complication to the underlying processes of absorptive capacity, thus calls for a new operationalization and measurement to reflect the uniqueness. For example, how MNE-HQ identifies reverse knowledge that originates from culturally different contexts is not

documented in the current literature. Unique organizational mechanisms and procedures (e.g., cultural interpretation) may be employed to facilitate the reverse knowledge identification process. In addition, how MNE-HQs exploits reverse knowledge differs from general knowledge exploitation. MNE-HQs may apply the reverse knowledge in the domestic market, or develop new products for the market where the reverse knowledge originates or apply the knowledge to another different subsidiary. Hence, the existing measurement model of absorptive capacity does not readily apply to this new context. Theoretical and substantial pieces of evidence thus converge and point to the imperative to explore the underlying processes of reverse knowledge absorption in MNE-HQs.

2.3 Comparison and Summary of Three Approaches

In this section, I reviewed three approaches that have been used to conceptualize absorptive capacity. Each has its own strengthens and weaknesses and provides insights from different perspectives (see Table 2). Given the unique context of RKT, each perspective helps explain one aspect of absorptive capacity and defines a feature of the construct of RKAC.

Adopting the *relative view* suggests a teacher-student learning interaction between headquarters and subsidiary, and thus defines RKAC as *subsidiary specific*. This approach allows us to compare MNE-HQs' absorptive capacity of reverse knowledge from different subsidiaries. The second approach tackles the behavioral foundation of absorptive capacity by incorporating both the motivation and ability of absorptive capacity. The third approach emphasizes the *process* of absorptive capacity and is closely tied to its original definition.

This approach allows us to c better understand how MNE-HQs identifies, assimilates, and applies reverse knowledge.

Based on these discussions, I argue an integrative approach that incorporates three different approaches should be used to conceptualize RKAC. In the next chapter, I discuss the integrative approach in more detail.

CHAPTER 3: CONCEPTUALIZATION OF REVERSE KNOWLEDGE ABSORPTIVE CAPACITY

3.1 An Integrated View of MNE-HQs' RKAC

The prominence of the three perspectives of absorptive capacity in the literature suggests that a new conceptualization of reverse knowledge absorptive capacity should be sufficiently broad to accommodate all three perspectives. This is feasible on two grounds. First, each perspective focuses on different aspects of MNE-HQs' reverse knowledge absorption but with the same goal: maximizing RKT effectiveness. Each offers a partial explanation of how to do that. Specifically, the relative view of AC emphasizes maximizing the similarities between parent-subsidiary dyads to improve AC. The motivation-ability framework focuses on the recipient's motivation and ability to increase AC, while the process-based view stresses the development of actual behavior/procedures/processes to realize such capacity.

Second, the theoretical logic of how to enhance RKT effectiveness that underlies each perspective is different but not mutually exclusive. Focusing on one perspective does not preclude a firm from focusing another. Indeed, three perspectives are complementary.

Building on the literature and the rationale advanced previously, I define MNE-HQs' absorptive capacity to a certain subsidiary (RKAC) as (1) motivation and (2) ability *to identify the knowledge from the subsidiary, assimilate the knowledge from the subsidiary within the headquarters, and apply the reverse knowledge to global innovation*. The following steps are taken to integrate three perspectives and

define RKAC. First, I identify two broad dimensions of RKAC: *reverse knowledge absorptive motivation (RKAM)*, and *reverse knowledge absorptive ability (RKAA)*, based on the motivation-ability framework of absorptive capacity (See Figure 2). Second, I integrate the process-based view of absorptive capacity, namely *identification, assimilation, and application*, to enrich the sub-dimensions of RKAM and RKAC, respectively (See Table 3). Third, I propose an overarching framework for RKAC and elaborate on each unique dimension of MNE-HQs' RKAC. Table 4 shows the multidimensional construct of RKAC. These RKAC dimensions capture diverse perspectives to examine MNE-HQs' reverse knowledge management. The definition of the six dimensions is presented in Table 4.

The construct of RKAC has two key characteristics. First, the RKAC effectively integrates three major perspectives of absorptive capacity. Thus, each perspective becomes a specific case of the RKAC. Compared with previous studies, the RKAC offers a more complete explanation of how MNE-HQs absorbs reverse knowledge from different subsidiaries. Second, distinctive RKAC dimensions are used to represent each of the three perspectives of RKAC. For example, the motivation perspective is captured by the motivation of three processes: motivation to identify, motivation to assimilate, and motivation to apply. By conceptualizing RKAC as a multidimensional construct, this study provides an encompassing but coherent definition that captures the richness and essence of the concept. In the following sections, I develop the content and theoretical grounding of six dimensions.

Figure 2: Two broad subdimension of RKAC
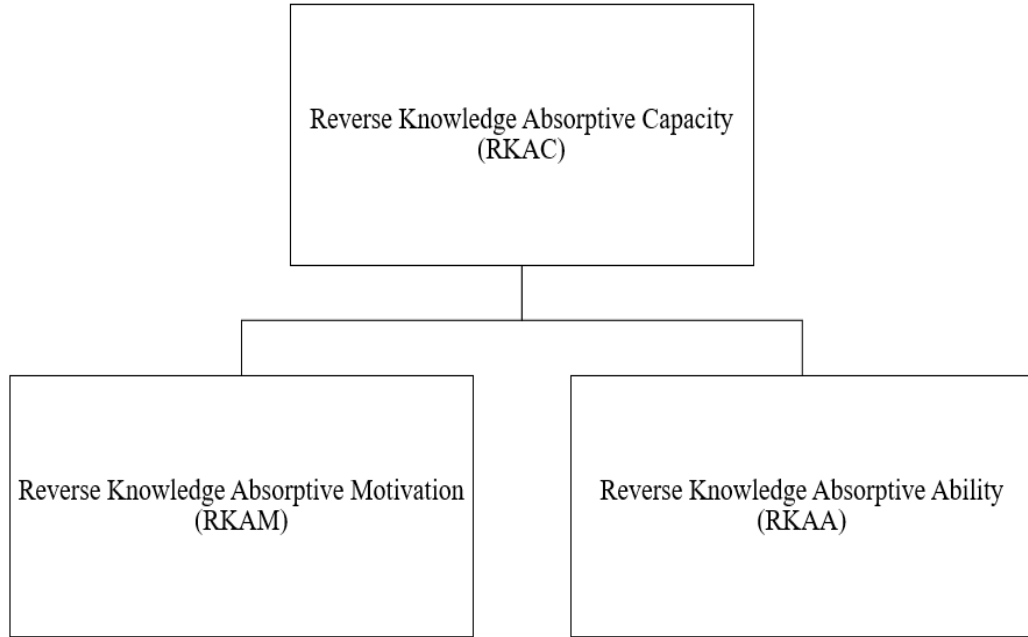
Table 3: An Integrated View of RKAC

Table 4: Definitions of RKAC dimensions

RKAC board subdimensions	RKAC dimensions	Definition
	Dimension 1: identification motivation	Identification motivation refers to the degree of desire to *explore, recognize, and evaluate* reverse knowledge from a certain subsidiary.
RKAM	Dimension 2: assimilation motivation	Assimilation motivation refers to the degree of desire to *analyze, integrate, and diffuse* reverse knowledge from a certain subsidiary.
	Dimension 3: exploitation/application motivation	Exploitation motivation refers to the degree of desire to *refine, extend, and apply* reverse knowledge from a certain subsidiary.
	Dimension 4: identification ability	Identification ability refers to MNE-HQ's ability to *explore, recognize, and evaluate* reverse knowledge from a certain subsidiary.
RKAA	Dimension 5: assimilation ability	Assimilation ability refers to MNE-HQ's ability to *analyze, integrate, and diffuse* reverse knowledge from a certain subsidiary.
	Dimension 6: exploitation/application ability	Exploitation ability refers to MNE-HQ's ability to *refine, extend, and apply* reverse knowledge from a certain subsidiary.

3.2 RKAC: A Multidimensional Construct

3.2.1 Motivation to identify reverse knowledge—identification motivation

Identification motivation refers to the degree of the desire of MNE-HQs to explore, recognize, and evaluate reverse knowledge from a certain subsidiary. Recognition is the first step towards knowledge acquisition and utilization (Cohen & Levinthal, 1990; Todorova & Durisin, 2007). While studies have touched on the ability aspect of recognition (Lichtenthaler, 2009; Schleimer & Pedersen, 2013; Zobel, 2017), the motivation aspect of knowledge recognition is largely ignored. In the RKT context, scholars assume that HQs are equally motivated to recognize *any knowledge* from *any subsidiary*. This assumption leaves our understanding of RKAC incomplete. In this study, I argue that identification motivation is a specific component of RKAC.

Theoretically, it is not feasible for MNE-HQs to be equally motivated to identify reverse knowledge from all of their dispersed subsidiaries. On the one hand, reverse knowledge transfer is a many-to-one, bottom-up process, indicating that MNE-HQs must be selective about knowledge intake. On the other hand, related theorizing on the "attention-based" view of the firm emphasizes the constraints on the organization in identifying new external knowledge (Ocasio, 1997). In MNEs, executives at corporate headquarters cannot give full attention to all subsidiary units around the world since international attention is a limited and perishable resource (Bouquet & Birkinshaw, 2009; Conroy & Collings, 2016). Rather, their attention is typically divided among subsidiaries in ways that do not give an equal hearing to all

parties (Bouquet & Birkinshaw, 2008b). Consequently, not all knowledge from all subsidiaries receives equal attention from MNE-HQs. Some subsidiaries would be prioritized while others are ignored given their attractiveness (Pérez-Nordtvedt, Kedia, Datta, & Rasheed, 2008). Indeed, in cross-border knowledge transfer, subsidiary importance (Yang et al., 2008) and knowledge characteristics (Pérez-Nordtvedt et al., 2008) largely affect the recipient's learning intent. In this case, if MNE-HQs are not motivated enough, the knowledge absorption process would never be initiated, regardless of the ability to do so.

Practically, MNEs set up subsidiaries for different purposes, and these purposes reflect headquarters' desire for knowledge from a certain subsidiary. For instance, many MNEs purposely establish subsidiaries or R&D centers to gain new knowledge and innovation ideas and learn skills (Florida, 1997; Janne & Cantwell, 1999; Kuemmerle, 1999; Wilbur Chung & Juan Alcácer, 2002). In this case, MNE-HQs are more motivated to identify reverse knowledge from these knowledge-seeking subsidiaries than from other subsidiaries that mainly focus on the market expansion (Wang & Suh, 2009).

Taken together, I argue identification motivation is a specific component of RKAC in that (1) MNE-HQs need to be motivated to initiate reverse knowledge absorption; (2) it varies according to teaching subsidiaries.

3.2.2 Motivation to assimilate reverse Knowledge—assimilation motivation

Assimilation motivation refers to the degree of desire to *analyze, integrate, and diffuse* reverse knowledge from a certain subsidiary. Following knowledge identification, the assimilation process ensures that reverse knowledge is fully understood by the MNE-HQs through interpretation, comprehension, and learning (Zahra & George, 2002). The challenge behind this process is that, reverse knowledge is not necessarily compatible with the existing knowledge in MNE-HQs. Such incompatibility may result from language barriers (Peltokorpi, 2015), cultural distance (Frost & Zhou, 2005), cognitive barriers (Millar & Choi, 2009), and even organizational inertia. Therefore, headquarters must exert deliberate effort to overcome the barriers to integrate reverse knowledge. It is not reasonable to assume that any reverse knowledge transferred back to the headquarters will be well-integrated or sufficiently assimilated. Instead, a lot of valuable reverse knowledge may end up being unexploited due to MNE-HQ's lack of motivation to assimilate such knowledge. Based on these arguments, assimilation identify is another specific component of RKAC.

Though existing literature in reverse knowledge does not provide many insights on assimilation motivation, studies on repatriate knowledge transfer shed light on this issue. Repatriate knowledge is a specific type of reverse knowledge that is generated and carried by individual expatriates. MNEs spend millions of dollars on international assignments to expose expatriates to local markets, ideas, customers and gain cross-cultural competence. However, when expatriates return from overseas, some MNE-HQs show a lack of interest in

integrating and harnessing their knowledge (Oddou et al., 2009). In this case, although the MNE-HQs demonstrate the motivation to identify reverse knowledge (i.e., assigning expatriates), there is an obvious lack of assimilation motivation. Drawing on the analogy of repatriate knowledge transfer, I argue that assimilation motivation of reverse knowledge is a critical and specific component of RKAC.

Anecdotal evidence exists that MNE-HQs vary in terms of assimilation motivation. For example, in 2005, when GE's regional manager in India first proposed to sell a simpler, easier-to-use, and substantially cheaper x-ray imaging product to GE's headquarters, his idea seemed quite incompatible with GE's main product lines. The company had been selling a high-quality, high-priced product designed for hospitals in wealthy countries for decades, and had no knowledge of customer needs in small clinics in rural India (Immelt et al., 2009). It thus takes extra effort for the manager to convince top executives in the headquarters about the potential of a cheaper version of the product, and motivate them to comprehend the idea and integrate it into existing marketing strategy and new product development logic.

In contrast, Caterpillar failed to capitalize on the reverse knowledge from its subsidiaries in China due to a lack of motivation to assimilate the knowledge (Gadiesh, Leung, & Vestring, 2007). Caterpillar entered the Chinese market in 1975 and had gained a competitive edge in the premium market segment through selling to the Chinese government. However, when the middle and low market segments began to emerge after 1980, Caterpillar failed to seize this "good-enough" market due to a lack of assimilation motivation. The

company had been so successful in selling premium products that they did not realize the criticality of producing low-end, substantially cheaper products for the Chinese private sectors (partially due to the cannibalization and brand image concern). As a result, Caterpillar lost ground to domestic competitors who engaged deeply with local customers at the beginning of the 21st century. Now aware of the importance of emerging markets, Caterpillar made formal effort to listen to customers' needs in Asian markets and integrate reverse knowledge from its overseas subsidiaries into its existing knowledge systems.

These two cases indicate that: (1) reverse knowledge is not automatically integrated into MNE-HQs, making assimilation a critical step for reverse knowledge absorption; (2) assimilation motivation varies across subsidiaries based on different factors (e.g., knowledge criticality, management persuasion efforts).

3.2.3 Motivation to apply reverse knowledge—application motivation

Exploitation motivation refers to the degree of desire to *refine, extend, and apply* reverse knowledge from a certain subsidiary to develop new products and commercialization ideas. Knowledge application follows knowledge assimilation and is the last step of knowledge absorption. This process is associated with (1) identifying potential application; and (2) matching knowledge and market (Lenox & King, 2004). I argue that MNE-HQs' motivation to apply reverse knowledge is not the same for any reverse knowledge from any subsidiary.

Reverse knowledge usually falls into two general categories: technology know-how and market know-how (Ambos et al., 2006). This difference affects the ease of application of reverse knowledge and shapes MNE-HQs' exploitation motivation. Specifically, while technology know-how is less context-dependent (e.g., 3D printing), market know-how about local customers and cultures are more context-specific (e.g., good-enough products). In this case, the cost of identifying potential applications may vary, as will the ease of matching knowledge to the market. For instance, GE gained market know-how about customer needs of portable and low-cost ultrasound machines in China and transferred this knowledge back to its headquarters in the USA. However, to further use this knowledge for innovation and commercialization in home countries, GE needed to be highly motivated given the potential cannibalization risk and perceived product adaption efforts.

In addition, reverse knowledge is not always readily applicable to MNEs' existing global new product development and commercialization efforts. In many situations, adaption, refinement, and extension are needed before MNE-HQs find the most appropriate application of the knowledge—a process named "exploitative learning" (Kane & Alavi, 2007; Lichtenthaler, 2009). Reverse knowledge from different subsidiaries may vary dramatically in terms of the ease of refinement and adaption, thus affecting MNE-HQ's exploitation motivation. In particular, reverse knowledge from different cultures may add extra complication to exploitation and cause issues such as "not invented here" syndrome (Hussinger & Wastyn, 2016). When it comes to NIH, reverse knowledge from a different context may be rejected, even if it is useful for the

organization (Antons & Piller, 2015). Taken together, I argue exploitation is a specific component of RKAC and varies across subsidiaries. This dimension thus should be included in the RKAC construct to provide a comprehensive understanding of the concept.

3.2.4 Ability to identify reverse knowledge—identification ability

Identification ability refers to MNE-HQ's ability to explore, recognize, and evaluate reverse knowledge from a certain subsidiary (Todorova & Durisin, 2007; Zobel, 2017). For MNE-HQs to efficiently absorb reverse knowledge, accurately identifying valuable reverse knowledge from different subsidiaries is critical and challenging.

In the organizational learning literature, scholars point out that this ability is associated with a scanning mechanism to recognize external knowledge sources and a firm's prior knowledge bases (Cohen & Levinthal, 1990; Lichtenthaler, 2009). In the context of reverse knowledge, it requires MNE-HQs to accumulate prior knowledge of each subsidiary so that MNE-HQs can gain a detailed understanding of all relevant knowledge, as well as to establish organizational mechanisms that enable this process. In addition, the cross-cultural nature of reverse knowledge transfer and the geographic dispersion of the MNE network may complicate the identification task (Asmussen, 2009; Sarala & Vaara, 2010). Scholars argue that people in different cultures process, interpret, and make use of knowledge in very different ways (Sarala & Vaara, 2010; Van Wijk et al., 2008). Taken together, identification ability plays a significant role in reverse knowledge absorption.

However, existing literature on RKT in general and in absorptive capacity largely ignores the criticality of identification ability. What identification ability is and how to measure it remains unclear. Most studies assume that MNE-HQs are inherently good at recognizing reverse knowledge and that this ability is consistent across subsidiaries.

In reality, MNE-HQs' identification ability varies across subsidiaries. For example, while forward-looking companies such as GE proactively set up organizational routines to access knowledge in overseas subsidiaries (e.g., GE's CEO visits China twice a year to listen to local R&D personnel, managers, and customers), other organizations lack such ability and mechanisms to recognize valuable reverse knowledge. MNE-HQs' identification ability may also vary across different knowledge sources. For instance, advanced MNEs may find it much easier to identify new customer needs from traditional triad countries given the similarities in culture, social norms, and technology development. In contrast, they may find it challenging to identify new market trends or customer preferences in less developed areas such as Asia or Africa because advanced MNEs' prior knowledge of these two markets is significantly less than that of advanced markets. In this sense, MNE-HQs' identification ability varies across subsidiaries and should be incorporated into a more useful conceptualization of the construct of RKAC.

3.2.5 Ability to assimilate reverse knowledge—assimilation ability

Assimilation ability refers to MNE-HQ's ability to *analyze, integrate, and diffuse* reverse knowledge from a certain subsidiary (Zahra & George, 2002;

Zobel, 2017). Knowledge identification alone does not guarantee successful knowledge absorption. Previous studies point out that firms have to proactively manage knowledge to avoid knowledge loss and facilitate knowledge exploitation (Argote, McEvily, & Reagans, 2003; Lichtenthaler, 2009). Through knowledge assimilation, organizations can understand situations and ideas, which are initially perceived as incompatible with the current cognitive frames of references (Todorova & Durisin, 2007).

The importance of knowledge integration is well-established in the strategic management literature (Birkinshaw, 1999; Kogut & Zander, 1992; Monteiro & Birkinshaw, 2017), as is its potential as a unique source of value creation for multinationals (Cantwell & Piscitello, 1999). However, little systematic research has been conducted on how MNE-HQs assimilate and integrate reverse knowledge, an important source for MNE value creation.

Two main dimensions underlying the process by which knowledge moves from one sub-unit to another (Frost & Zhou, 2005). The first is whether two subunits have similar knowledge base (Szulanski, 1996). The second is a social dimension, which emphasizes the context of social communities in which knowledge flows take place (Hansen, 1999; Tsai & Ghoshal, 1998). I argue in the RKT context, headquarters' knowledge about different subsidiaries varies. Headquarters may find it easier to assimilate knowledge from a familiar subsidiary e (Lane & Lubatkin, 1998). In terms of the social dimension, because subsidiaries are embedded in different countries and cultures, MNE-HQs confront different levels of geographic and cultural distance in the RKT process (Lau & Ngo, 1996). These distances act as barriers for MNE-HQs to

communicate and understand reverse knowledge (Ambos & Ambos, 2009), affecting MNE-HQ's assimilation ability.

For these reasons, I argue that assimilation ability varies across different subsidiaries. Therefore, assimilation ability should be incorporated into a more useful conceptualization of the construct of RKAC.

3.2.6 Ability to apply reverse knowledge—application ability

Exploitation ability refers to MNE-HQs ability to refine, extend, and apply reverse knowledge from a certain subsidiary. The importance of knowledge exploitation is well-documented in the literature (Cohen & Levinthal, 1990). Scholars point out that exploitation ability is associated with realized absorptive capacity (Zahra & George, 2002). In this sense, the ability to apply is especially important since a firm's absorptive capacity is not fully realized if it fails to capitalize or commercialize the reverse knowledge from its subsidiaries.

However, reverse knowledge exploitation is associated with unique challenges for MNE-HQs. On the one hand, reverse knowledge could be very context-dependent and not readily applicable to innovation or commercialization. For example, Walmart enjoyed huge success in Mexico with Bodega Aurrera Express (i.e., a small-format grocery store) and realized that this mini format may also help tap into middle- or low-income segments in the United States. However, this idea or knowledge is not readily applicable to the U.S. markets, given the difference in economic development and customer preferences between the two countries. The company thus carried out careful marketing research to identify the most appropriate locations and

neighborhoods for this new type of grocery store, and combined its existing logistic and distribution resources to bring out this new store format. In this sense, application ability also entails the MNE-HQ's ability to recognize the business opportunity and the ability to combine existing resources.

While Walmart applied the reverse knowledge to its domestic market, MNE-HQs may also apply the reverse knowledge from one subsidiary to another. This implies the multi-directional nature of MNEs' reverse knowledge application. In 2010, Levi's (a U.S. jeans company) launched its Denizen brand jeans in China as an effort to target young and low-income consumers. This was the company's first brand launched outside of the United States. With success, the brand quickly spread to India, South Korea, Singapore, and the U.S. In this case, the company applied the product idea from one subsidiary (i.e., China) to other subsidiaries. This type of horizontal knowledge application also entails a change in design (given the different body types and style preference), rearrangement of manufacturing sites, and choice of retail outlets, highlighting the importance of the reverse knowledge application ability for MNEs global innovation and product launch.

In addition, knowledge application is also based on appropriability (i.e., ability to protect innovation) (Cohen & Levinthal, 1990). MNEs are a geographically dispersed network with subsidiaries operating in different countries. While some countries have more sophisticated IP protection practices and systems, others do not (Zhao, 2006). Therefore, MNE-HQs' ability to exploit knowledge (especially advanced technology) may also vary across subsidiaries. Taken together, I argue that the ability to apply reverse

knowledge should be incorporated into a more useful conceptualization of the construct of RKAC.

3.3. Summary

Integrating the relative view, motivation-ability view, and process-based view of AC, I propose a construct that reflects MNE-HQ's AC to a specific subsidiary—the RKAC. RKAC consists of two broad dimensions of RKAA and RKAM. These two broad dimensions further incorporate the process of identification, assimilation, and exploitation. Taken together, I structure six lower-order dimensions to a congruent construct of RKAC. For each dimension, I further define and explain the significance of each one based on existing literature and industrial observations. In the next section, I focus on my second research question: *what are the antecedents and outcomes of MNE-HQ's RKAC?*

CHAPTER 4: FRAMEWORK OF REVERSE KNOWLEDGE ABSORPTIVE CAPACITY

The value of the RKAC construct is not fully realized unless the firms know how to foster such capacity in MNEs. In this section, I propose a conceptual framework that accounts for the antecedents and outcomes of RKAC. Argote et al. (2003) proposed an integrative model that accounts for learning and knowledge management in organizations. In this framework, the authors contend that properties of units (i.e., knowledge receiver and sender), properties of the relationships between units, and properties of knowledge, jointly affect knowledge creation, retention, and transfer (Argote et al., 2003). In this study, I adopt this framework to explain the formation of MNE-HQs' RKAC with a particular focus on properties of units and properties of the relationships between units (See Table 5 for an overview). In addition, I link the core construct of RKAC to two important performance indicators: (1) RKT outcomes and (2) Innovation performance. Figure 3 illustrates the conceptual framework. In the next section, I first explain the outcomes of MNE-HQs' RKAC, followed by the antecedents of it.

Table 5: Category of Antecedents

		Properties of the Units		Properties of the Relationship
Antecedents	Subsidiary-specific (internal factors)	- Subsidiary power - Relevance of subsidiary knowledge		- Trust towards subsidiary - HQ-subsidiary interaction
	Subsidiary-specific (external factors)	- Host country competitiveness		- Cultural distance
Moderators	Organization Level	- Innovation Culture - Global Orientation		- Centralization - Cross-culture competence

Figure 3: A framework of RKAC
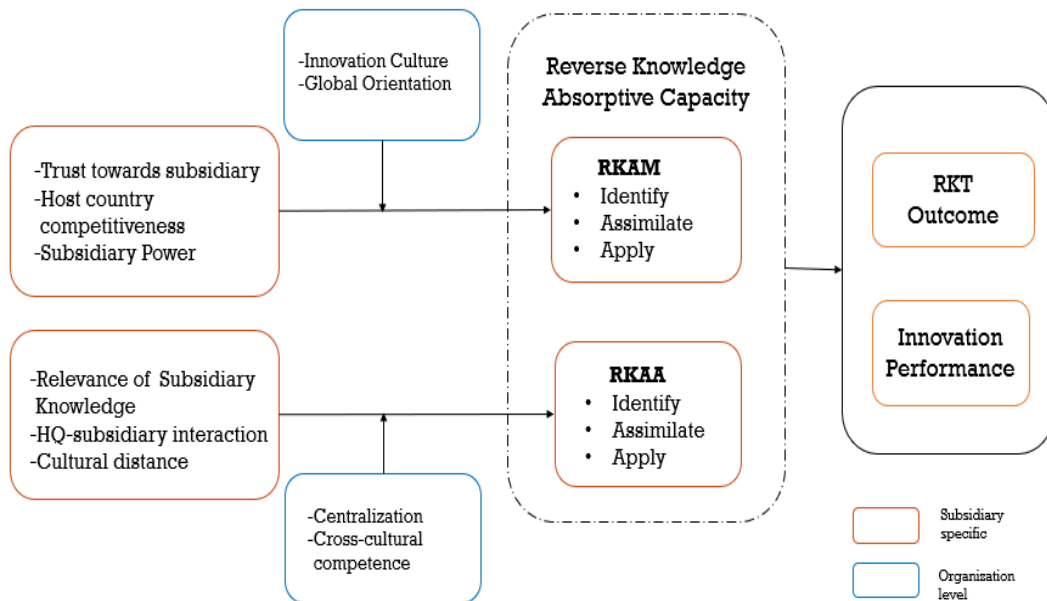
4.1 Hypothesis development: Outcomes of RKAC

The importance of absorptive capacity in driving general knowledge transfer has been well-documented in the literature (Easterby-Smith et al., 2008). This study focuses on two relevant categories of independent variables: (1) *the outcome of RKT from a certain subsidiary to parent* (A. K. Gupta & V. J. S. m. j. Govindarajan, 2000; Yang et al., 2008), and (2) *the effectiveness of RKT*, defined as the adoption and use of the transferred knowledge within the receiving unit for innovation (Andersson et al., 2015).

Notably, while previous studies mainly focus on the *degree* of knowledge transfer as an outcome indicator, this study argues that RKT outcomes should be broad enough to include the RKT degree, quality, and speed (Anil K Gupta & Vijay Govindarajan, 2000; Hansen, 2002; Sheremata, 2000). Incorporating different aspects would allow us to have a more fine-grained and comprehensive conceptualization of knowledge transfer outcomes (Van Wijk et al., 2008). I argue that RKAC has a positive effect on RKT outcomes for the following two reasons.

From one perspective, RKAM helps MNE-HQs overcome various barriers to absorb reverse knowledge, such as organizational inertia or the not-invented-here syndrome. This means that headquarters with a high level of RKAC are more likely to initiate the reverse knowledge transfer process. For example, highly motivated MNEs set up subsidiaries overseas as a means to absorb knowledge at first hand (Frost et al., 2002). This organizational inspiration or desire for reverse knowledge would likely lead to investment in

knowledge infrastructure and personnel training, which would facilitate the knowledge transfer between HQs and their subsidiaries (Naqshbandi & Jasimuddin, 2018). In this sense, reverse knowledge absorptive motivation increases the potential knowledge inflows from headquarters' subsidiaries.

From another perspective, RKAA helps MNE-HQs better locate, select, and integrate the reverse knowledge. As discussed in previous sections, not all reverse knowledge inflows are equally useful or valuable for the headquarters. Therefore, it requires a selection process for the headquarter to transfer reverse knowledge efficiently and effectively. MNEs with a high level of absorptive ability can easily evaluate the importance and value of different knowledge inflows. Also, they can better integrate the knowledge into the existing knowledge system in the headquarter by decoding and recontextualizing the reverse knowledge. With such ability, the degree, quality, and speed of RKT would also improve. Taken together, I propose that:

H_{1a}: MNE-HQ's RKAC is positively related to the degree of reverse knowledge transfer.

H_{1b}: MNE-HQ's RKAC is positively related to the quality of reverse knowledge transfer.

H_{1c}: MNE-HQ's RKAC is positively related to the speed of reverse knowledge transfer.

MNEs rely on the knowledge from their dispersed subsidiary network to carry out innovation activities. Scholars point out that "MNEs' competitive position is increasingly shaped by their ability to improve their capacity to mobilize knowledge that languishes underexploited within their far-flung

network of subsidiaries" (Edwards & Tempel, 2010, p. 19). For this reason, whether headquarters can effectively absorb reverse knowledge plays an important role in determining a firm's innovation performance. In this research context, I argue that three innovation performance indicators are relevant: (1) innovativeness of the MNE's new product; (2) the MNE's transnational product development capability; and (3) RKT contribution to firm innovation.

MNE-HQ's reverse knowledge absorptive capacity is positively related to innovation performance for the following reasons. First, RKAC deepens the knowledge base of MNEs. The more capable the firm is in absorbing reverse knowledge, the wider the knowledge base is for the firm. This enlarged knowledge base would further contribute to innovation performance (Cohen & Levinthal, 1990; Laursen & Salter, 2006). Apart from a knowledge base, reverse knowledge absorptive capacity also contributes to the knowledge diversity in the headquarters. This is especially true for advanced MNEs that source knowledge from emerging markets, from where the reverse knowledge is very different (especially the market knowledge). For example, customer preferences, manufacturing skills, and even business models in emerging markets follow a different logic from that in advanced markets. A higher RKAC ensures the knowledge diversity of the headquarters, which further leads to better innovation performance (Dell'Era & Verganti, 2010; Laursen & Salter, 2006). This knowledge diversity not only pertains to technology or skills but also pertains to the understanding of cultures. MNEs that are capable of absorbing reverse knowledge can better understand cultural diversity and innovation ideas (Hewlett, Marshall, & Sherbin, 2013). Reverse innovation is a perfect

example where MNE-HQ's reverse knowledge absorptive ability contributes to innovation performance.

Second, RKAC facilitates both exploitation and exploration, two approaches for innovation (Jansen, Van Den Bosch, & Volberda, 2006). Lichtenthal (2009) conceptualized absorptive capacity as three learning processes: exploratory learning, transformative learning, and exploitative learning, indicating that absorptive capacity is inherently related to explorative and exploitative innovation. For MNEs with a high level of RKAC, they can identify new knowledge from different subsidiaries and use the knowledge for explorative innovation. Or they can easily apply reverse knowledge from one subsidiary to the rest of the subsidiaries, giving rise to exploitative innovation. Both exploitation and exploration are beneficial for firm innovation (He & Wong, 2004; Sidhu et al., 2007). Taken together, I propose that:

H_{2a}: MNE-HQ's RKAC is positively related to MNE's innovativeness.

H_{2b}: MNE-HQ's RKAC is positively related to MNE's transnational new product development capability.

H_{2c}: MNE-HQ's RKAC is positively related to RKT's contribution to firm innovation.

4.2 Hypothesis development: Antecedents of RKAM

4.2.1 Relationship Factors

Scholars in organizational learning argue that the properties of the relationship between units play an important role in knowledge management (Argote et al., 2003). In a knowledge transfer setting, scholars have called for studies to look into the effect of both positive and dysfunctional relationships to examine knowledge transfer (Argote et al., 2003). This dissertation focuses on *trust towards subsidiary* and *subsidiary bargaining power* in the RKT process.

Trust towards subsidiary: Scholars argue that the headquarters-subsidiary relationship can be portrayed as a principal-agent relationship, and therefore conflicts of interest exist between headquarters and its subsidiaries (Hoenen & Kostova, 2015; Mudambi & Navarra, 2015). As agents, subsidiaries may not always act in the best interest of their principal (i.e., the headquarters). This issue could be especially salient for MNEs that aggressively expand to emerging markets. Scholars point out that "operating in emerging markets, especially at the higher value-added spectrum, also increases the risks of unpredictable action and misconduct of the subsidiary such as … feeding false information back to headquarters… " (Hoenen & Kostova, 2015, p. 105). This implies that subsidiaries locating in different countries present different levels of risks to their headquarters (O'Donnell, 2000). When it comes to reverse knowledge, the authenticity, veracity, and usefulness may vary from one subsidiary to another (Hoenen & Kostova, 2015).

Under this situation, whether headquarters trusts the subsidiary plays an important role in reverse knowledge transfer (Chung, 2014). In particular, the trust would affect headquarters' motivation to initiate reverse knowledge absorption. Two types of trust matter in this context: *benevolence-based* and *competence-based trust* (Levin & Cross, 2004). While benevolence-based trust reflects the degree to which a trustee is believed to do good to the trustor, competence-based trust reflects the faith in people's skills and knowledge(Mayer, Davis, & Schoorman, 1995).

I argue that MNE-HQs' trust towards subsidiaries would improve headquarters' motivation to absorb reverse knowledge. The reason is that trust reduces the cost to verify information, and increases the perceived value of information for the headquarters (Levin & Cross, 2004). Benevolence-based trust towards subsidiaries would significantly reduce headquarters' concern that the reverse knowledge would be false or detrimental to the firm. With a belief that the trustee (i.e., subsidiary) holds a similar interest with the headquarters, the headquarters could simplify the process of screening out false information and verifying the veracity of information. In this way, headquarters are more motivated to absorb reverse knowledge from a trusted subsidiary due to a decrease in perceived risk and cost. Previous studies show that headquarters are more like to source knowledge from a subsidiary with which it has a strong tie because a strong tie also signals lower risk and higher benevolence trust (Currall & Judge, 1995; Glaeser, Laibson, Scheinkman, & Soutter, 2000).

Competence-based trust reflects the faith in people's skills and knowledge. Scholars have shown that trust in another's competence would affect the perceived usefulness of knowledge (Levin & Cross, 2004). Hence, headquarters would be more motivated to absorb reverse knowledge towards subsidiaries in which they have competence-based trust, because they perceive knowledge from these trusted subsidiaries to be more useful and important. A good example is Siemens. Since its North American subsidiaries are so competitive and experienced, the German-based company is very motivated to source knowledge from their U.S. subsidiaries. This example reflects the role competence-trust plays in driving MNEs to source reverse knowledge and form competitiveness. Taken together, I propose that:

> H3: MNE-HQ's trust towards the subsidiary is positively related to its reverse knowledge absorptive motivation.

Subsidiary power: Subsidiary power is defined as the ability to influence or shape parent-company decision-making (Luo, 2005). Scholars have pointed out that "MNE-HQs divide their attention among subsidiaries in ways that do not give an equal hearing to all parties" (Bouquet & Birkinshaw, 2008b, p. 577). Drawing on this attention-based view of MNEs, international business scholars argue that RKT can be regarded as a process of issue selling in which lower-level subsidiary managers direct and compete for the higher-level management attention to the issues (i.e., subsidiary knowledge in this case) that are strategic for the organizations (Conroy & Collings, 2016; Wang, Hua, Wu, Zhao, & Wang, 2019a). Scholars have also mentioned that, a subsidiary's power

significantly influences the issue selling results (Gammelgaard, 2009). Drawing on this analogy, I argue that subsidiary power influences MNE-HQs' RKAM in that subsidiary with more power would attract more attention from the headquarters (Bouquet & Birkinshaw, 2008a; Conroy & Collings, 2016). This attention would further translate into a higher level of motivation for the headquarters to identify, assimilate, and exploit the knowledge from these subsidiaries.

For example, Philips' U.S. subsidiary is so powerful and influential because the Dutch company is very motivated to absorb knowledge from the US. Similarly, as emerging markets become more important for global competition, the power of Chinese subsidiaries increases for companies such as Apple. As a result, the company is now willing to proactively identify knowledge from the Chinese market and adjust strategy accordingly (Yuan, 2019). As another example, emerging markets' MNEs set up subsidiaries in advanced economies such as the U.S. intending to tap into technologies and innovations. Given headquarters' resource dependence on the knowledge and technology from their overseas subsidiaries, they are more motivated to understand and identify the reverse knowledge. In contrast, subsidiaries with little power would exert less influence on their headquarters in the process of reverse knowledge transfer. As a results, headquarters would feel less motivated to absorb knowledge from these subsidiaries. Taken together, I propose that:

> H4: Subsidiary power is positively related to MNE-HQ's reverse
> knowledge absorptive motivation.

4.2.2. Knowledge Sender Factors

Host country competitiveness: Host country competitiveness is defined as the relative advantage of the target country's industry over the source country's industry (Ambos & Ambos, 2011). In this dissertation, the target country refers to the country where a subsidiary is located, and the source country refers to the home country of a MNE. I argue that host country competitiveness is positively related to MNE-HQ's reverse knowledge absorptive motivation.

Subsidiaries operate in different countries that vary in industry competitiveness. One prominent aspect of this competitiveness is advanced technology. Previous studies have shown that economically advanced countries are more likely to be part of superior industrial clusters that possess advanced knowledge (Nair et al., 2015), thus making the country more attractive for MNEs to source knowledge. Stated differently, subsidiaries in competitive host countries are associated with higher knowledge stock and complementarity, and potential innovation capabilities, endowments that motivate MNE-HQs to source the knowledge (Cantwell & Mudambi, 2005; Siedschlag, Smith, Turcu, & Zhang, 2013).

This is best exemplified by offshore R&D investment decisions, for which host country competitive advantages remain a critical determining factor (Ambos & Ambos, 2011). Tapping into local pocket-of-innovation and advanced technology is an important motivation behind MNE's R&D internationalization and subsidiary establishment (Boutellier, Gassmann, Macho, & Roux, 1998; Kuemmerle, 1999). In this situation, MNEs are motivated to obtain knowledge

from countries that can complement their existing technology, which in turn provides MNEs with a competitive advantage. RKT is similar to R&D internationalization in that both are deliberate efforts to expand the knowledge base and keep competitive (Ambos et al., 2006; Pearce, 1999). In the RKT context, the more competitive the host country is, the more motivated the MNE-HQs would be to absorb the reverse knowledge.

While previous studies mainly focus on technology-based competitiveness and thus downplay the attractiveness of less developed countries such as China and India, other knowledge may also contribute to host country competitiveness. Porter's diamond theory (1993) argues that apart from technology, demand conditions, related and supporting industries, and firm strategy also factor into the formation of competitive advantage (Porter, 1993). While economically advanced countries are superior in technology development, less developed countries form competitiveness through other channels. Porter (1993) mentioned that "nations gain competitive advantage in industries where the home demand gives their companies a clearer or earlier picture of emerging buyer needs, and where demanding buyers pressure companies to innovate faster and achieve more sophisticated competitive advantages than their foreign rivals (p. 79)". Industry competition in the source country may also give rise to host country competitiveness.

China's mobile payment and micro-finance industries are excellent examples of demanding and impatient customers pushing multinational companies such Tencent and Alibaba to innovate faster and achieve competitive advantages (Buchholz, 2019). In these cases, competitors such as PayPal and

commercial banks would find the knowledge from Chinese customers especially valuable, given their sophistication and the ability to participate in global trends. Knowledge from demanding customers may in turn help these industries quickly update technology and generate innovative ideas. In this sense, demanding customers also contribute to the technology competitiveness of a host country.

Another example of competitiveness pertains to the systematic manufacturing capacity in China. Specifically, China's vast ecosystems of suppliers, workers, service companies, and logistics providers arose around its manufacturing industry, making it possible for companies to innovate and commercialize efficiently and rapidly (source: McKinney Global Institute). This agile manufacturing ability forms a unique source of country competitiveness. Under these situations, knowledge from these leading industries in the host country would complement the knowledge of the home country.

Taken together, host country competitiveness is reflected by the industry competitiveness and pertains to the (1) technology competitiveness; (2) industry competition (i.e., whether customers are demanding and advanced); (3) supporting industry competitiveness' and (4) competitors' firm strategy in the host country. The more competitive the industry is, the more attractive the reverse knowledge is. That is, host country competitiveness would positively affect MNE-HQs reverse knowledge absorptive motivation. Therefore, I propose that:

> H5: Subsidiary's host country competitiveness is positively related to MNE-HQ's reverse knowledge absorptive motivation.

4.3 Hypothesis development: Antecedents of RKAA

4.3.1 Relationship Factor

HQ-subsidiary interaction: Subsidiaries interact with their headquarters with different levels of frequency. Previous studies have indicated that a firm's absorptive capacity is based on the collaborative processes that the partners develop, as well as the relationships between the members of those firms (Dyer & Singh, 1998; Lane et al., 2006; Noorderhaven & Harzing, 2009). Based on this conclusion, I argue that HQ-subsidiary interaction is an important antecedent of MNE-HQ's reverse knowledge absorptive ability, because it reflects the integration and collaboration between two parties.

Following previous studies in IB, I define HQ-subsidiary interaction as "the various forms of communication between headquarters and its subsidiaries (Noorderhaven & Harzing, 2009, p. 724)". Specifically, I include both *personnel*-related interaction (e.g., job rotation, expatriates) and *information*-related interaction (e.g., formal and informal communication) between headquarters and subsidiaries. HQ-subsidiary interaction is positively related to reverse knowledge absorptive ability for the following reasons.

First, HQ-subsidiary interaction can help solve problems in the reverse knowledge absorption process. As mentioned above, headquarters may need interpretations and translations to better understand knowledge from a certain subsidiary. Social interactions such as international assignments and job rotations help MNE-HQs better understand reverse knowledge and enhance global control and coordination (Gonzalez & Chakraborty, 2014; Vlajčić, Caputo,

Marzi, & Dabić, 2019; Wang, Tong, Chen, & Kim, 2009). For this reason, cognitive barriers or potential obstacles to learning can be effectively eliminated with frequent interaction.

Second, HQ-subsidiary interaction helps build a social tie between the headquarters and its subsidiaries. Scholars argue that social ties and embeddedness play an important role in knowledge transfer (Dhanaraj, Lyles, Steensma, & Tihanyi, 2004). Through social interactions, headquarters are more likely to develop strong ties with their subsidiaries. Social relationships should facilitate learning by smoothing the learning process (Zhou, Siu, & Wang, 2010). For example, through frequent social interactions, the headquarters' ability to communicate with its subsidiaries would increase, especially with those in institutionally distant countries. Increased communication ability further leads to an increase in reverse knowledge absorptive ability (Van Den Bosch, Van Wijk, & Volberda, 2003). Therefore, I propose that:

> H6: HQ-subsidiary social interaction is positively related to MNE-HQ's reverse knowledge absorptive ability.

4.3.2 Knowledge Receiver Factors

Relevance of subsidiary knowledge: Learning is cumulative, and learning performance is greatest when the object of learning is related to what is already known (Cohen & Levinthal, 1990). In this dissertation, relevance of subsidiary knowledge is defined as the degree to which headquarters know about a certain subsidiary with regard to its market, customers, and competitors. If the subsidiary knowledge has high relevance to its headquarters, it is more likely

that the incoming reverse knowledge would somehow relate to what the headquarters already knows. Under this situation, the headquarters can better identify the value of the reverse knowledge, assimilate the reverse knowledge into the headquarters' knowledge system, and eventually commercialize this reverse knowledge. Stated differently, similar knowledge provides a basis or foundation for the headquarters to understand the knowledge.

For example, headquarters' knowledge about customer preference in an emerging market can facilitate their identification and recognition of new product innovation models and processes (e.g., good-enough products, frugal innovation). This knowledge can further facilitate the knowledge exploitation stage in that it guides potential product modifications and promotion strategies. In other words, it helps headquarters to evaluate the fit between the reverse knowledge and new commercialization opportunities. Taken together, I propose that:

> H7: Relevance of subsidiary knowledge is positively related to MNE-HQ's reverse knowledge absorptive ability.

Cultural distance: Cultural distance is defined as the degree of difference of the cultural cluster to which the target foreign country (i.e., the host country of a subsidiary) belongs from the cultural cluster to which the home country belongs (Clark & Pugh, 2001). I argue that cultural distance is negatively related to MNE-HQ's RKAA for the following reasons.

When reverse knowledge is from a different culture from the home country of MNEs, headquarters may find it cognitively difficult to recognize, understand and interpret (Markus & Zajonc, 1985). A good example is different commercialization practices in advanced and emerging markets. While advanced MNEs usually wait to launch a product until it is fully-fledged, emerging markets MNEs adopt a very aggressive and rushed manner towards commercialization. Companies such as Tencent and Xiaomi routinely launch new products with limited functions and quickly provide updates. However, given the very different product definitions, innovation logic, and cognitive schemas caused by different cultures, MNE-HQs in advanced markets may find this practice difficult to understand. Also, this commercialization practice may conflict with the normal business practices in the home country, where the MNEs value comprehensive analysis, in-depth research, and state-of-the-art technology. Reverse knowledge from a culturally distant country would likely encounter resistance from the headquarters. Previous studies show that value systems of the national cultures of the subsidiary countries must be taken into consideration when companies engage in transnational strategic practices such as reverse knowledge transfer (Schneider, 1988).

In addition, to accurately evaluate reverse knowledge, the headquarters needs to have a good understanding of local contexts so that they can appreciate knowledge embedded in these contexts (Johnson, Lenartowicz, & Apud, 2006). However, as cultural distance increases, it becomes cognitively more complicated for MNE-HQs to recognize the value of knowledge from different subsidiaries and thus call for additional efforts to exploit the

knowledge (because the headquarters cannot readily apply the knowledge in the home country). Taken together, I argue that cultural distance is negatively related to MNE-HQ's reverse knowledge absorptive ability.

> H8: Cultural distance is negatively related to MNE-HQ's reverse
> knowledge absorptive ability.

4.4 Hypothesis development: Moderators

4.4.1 Moderating effects on RKAM

Organizational innovation culture: Innovation culture is defined as an MNE's culture for including encouraging creativity, being receptive to new ideas, decentralizing decision-making, and encouraging open communication (Deshpandé, Farley, & Webster Jr, 1993). I argue that organizational level innovative culture strengthens the positive effect of (1) trust towards subsidiary, (2) host country competitiveness, and (3) subsidiary power on RKAM.

Two reasons explain the positive moderating effect of innovation culture. First, it reduces the potential cognitive bias towards reverse knowledge in MNEs. In MNEs with an innovative culture, companies as a whole are more open to ideas, encourage an active exchange of ideas, and promote communication flows with both internal and external entities (Deshpandé et al., 1993; Menon & Varadarajan, 1992). This organizational-level positive attitude towards new ideas and innovations would reduce not-invented-here syndrome between different organizational units (Ruekert & Walker Jr, 1987; Schleimer & Pedersen, 2013; Slater & Narver, 1994). In addition, innovative culture helps

break existing norms and encourages experimenting with new ideas (Wei, O'Neill, Lee, & Zhou, 2013). For this reason, an innovative culture mitigates the potential cognitive bias towards reverse knowledge held by the headquarters, which acts as a barrier to initiate reverse knowledge transfer. With less bias, subsidiary power, trust, and host country competitiveness are more likely to increase reverse knowledge absorptive motivation given the reduced cognitive bias towards reverse knowledge held by the headquarters.

Second, innovation culture cultivates employees' interest in and commitment to innovation (Wei et al., 2013). Innovative culture shapes employees' attitude towards experimenting with new ideas and alternatives, and their perception of uncertainty and potential failure in the new product development process (Peng, 2001; Wei et al., 2013; Zahra & Garvis, 2000). Reverse knowledge can be very new and different to employees in the headquarters. The organizational level innovative culture encourages employees to experiment with new ideas from subsidiaries and take risks. It would smooth the reverse knowledge transfer between headquarters and subsidiaries. When the headquarter realizes that a certain subsidiary is powerful, trustworthy, and comes from a competitive country, the headquarters is more likely to absorb the knowledge from this subsidiary if employees are open to new ideas and potential failure. Collectively, I propose that:

> H_{9a}: MNE's innovation culture strengthens the positive link between trust towards subsidiary and MNE-HQ's reverse knowledge absorptive motivation.

> H_{9b}: MNE's innovation culture strengthens the positive link between host country competitiveness and MNE-HQ's reverse knowledge absorptive motivation.

H$_{9c}$: MNE's innovation culture strengthens the positive link between subsidiary power and MNE-HQ's reverse knowledge absorptive motivation.

Global orientation: Following previous studies, I define a firm's global orientation as "one that combines an openness to and *awareness* of diversity across cultures and markets with a propensity and *ability* to synthesize across this diversity (Gupta & Govindarajan, 2002, p. 117)". That is, a firm with a global mindset should be high in its openness to diverse cultures and its ability to integrate such diversity. In this study, I argue that headquarters managers' global orientation strengthens the positive effect of (1) trust towards the subsidiary, (2) host country competitiveness on RKAM, and (3) subsidiary power on RKAM.

Specifically, a global mindset helps headquarters overcome domestic myopia and an ethnocentric mindset (Levy, Beechler, Taylor, & Boyacigiller, 2007). MNE's domestic myopic and ethnocentric mindset act as a hindrance to RKT. On the one hand, domestic myopia reflects MNE-HQs' disproportional focus on domestic customers and operations. This implies that the company is likely to ignore or undervalue the knowledge from its overseas markets. Or MNEs at most make adaptions to existing products when targeting markets outside of the home country (Vernon, 1992). On the other hand, an ethnocentric mindset indicates national superiority attitudes held by the headquarters (Levy et al., 2007). For example, managers believe that the home country of the company is superior to any other country in many aspects including customer

sophistication, technology advancement, and manufacturing capacity. Under both situations, at an organizational level, managers would undervalue or ignore the reverse knowledge from other countries that may outperform their home country in some regards. Therefore, domestic myopia and an ethnocentric mindset both can discourage headquarters from absorbing reverse knowledge.

Contemporary MNEs should proactively focus on (1) internal differentiation, which calls for variations in management processes between various countries, products, and functions; and (2) information intensity, which highlights the importance of knowledge flows as a source of competitive advantage (Doz & Prahalad, 1991). Applying these practices to the RKT context, MNEs should not limit their focus to domestic customers but rather spare attention to other markets. At the same time, MNEs should realize the strategic importance of reverse knowledge in sustaining competitive advantage. Researchers and practitioners alike suggest that MNEs that are globally oriented are more capable of dealing with internal differentiation and information intensity (Levy et al., 2007). Stated differently, they are more likely to overcome domestic myopia and an ethnocentric mindset. As a result, MNEs can have a more open attitude toward absorbing reverse knowledge. Influenced by this organizational level openness to reverse knowledge, when it comes to reverse knowledge transfer, MNEs are more likely to be motivated by subsidiary power, trust, and host country competitiveness to identify, assimilate, and apply reverse knowledge. Global mindset can also reduce the perceived risk of reverse knowledge that is caused by domestic myopia and an ethnocentric

mindset. In this way, the negative effect of psychic distance on reverse

knowledge absorptive motivation is weakened. Taken together, I propose that:

> H_{10a}: MNE's global mindset strengthens the positive link between trust towards subsidiary and MNE-HQ's reverse knowledge absorptive motivation.

> H_{10b}: MNE's global mindset strengthens the positive link between host country competitiveness and MNE-HQ's reverse knowledge absorptive motivation.

> H_{10c}: MNE's global mindset strengthens the positive link between subsidiary power and MNE-HQ's reverse knowledge absorptive motivation.

4.4.2 Moderating effects on RKAA

To ensure knowledge acquisition and transfer, effective organizational

integration mechanisms within the MNE are critical. Integration mechanisms

enable MNEs to coordinate and control business activities by developing,

utilizing, and recombining resources and capabilities across borders (Cray, 1984;

Kim, Park, & Prescott, 2003; Yaprak, Xu, & Cavusgil, 2011; Zeng, Grøgaard, &

Steel, 2018). In this study, I focus on two integration mechanisms:(1)

centralization of decision-making, and (2) cross-cultural competence.

Centralization of decision-making: Absorptive capacity in essence is a

cognitive process that entails knowledge identification, assimilation, and

application. Therefore, factors that may promote or hinder this learning process

act as moderators. Centralization is defined as the degree to which the decision-

making power is vested in an MNE's headquarters as opposed to in its

subsidiaries (Chen, Zou, Xu, & Chen, 2019). I argue that organizational level

centralization would weaken the positive effect of (1) relevance of subsidiary knowledge and (2) HQ-subsidiary interaction on RKAA, and strengthen the negative effect of cultural distance on RKAA for the following reasons.

First, centralization may decrease the likelihood of subsidiary cooperation in reverse knowledge transfer (Anil K. Gupta & Vijay Govindarajan, 2000). Reverse knowledge absorption could not happen without cooperation from subsidiaries. For example, in the identification process, subsidiaries should proactively engage in sharing information and even champion their ideas. In the assimilation process, interpretation, explanations, and contextualizing are often required from subsidiaries (Michailova & Zhan, 2015). However, high centralization may create possible tension between subsidiary autonomy and HQ control (Rabbiosi, 2011), and this tension would decrease the efficiency at which knowledge relevance and social interaction transfer to RKAA. Meanwhile, it would strengthen the negative effect of cultural distance on RKAA, due to a lack of subsidiary cooperation on understanding and interpreting reverse knowledge. For example, subsidiaries may be discouraged from updating their knowledge to the headquarters on time, or become reluctant to report issues/problems they encounter in the communication process. Under this situation, the positive effect of knowledge relevance and social interaction on RKAA would be weakened.

Second, an MNE's centralization may cause bounded rationality in the MNEs, defined as managers' limited cognitive capabilities in the decision-making processes (Ghoshal & Nohria, 1989; Zeng et al., 2018). Specifically, centralization may lead to managers' under-investment in knowledge transfer-

related infrastructures and programs. Under this condition, managers in a centralized organization may fail to effectively coordinate resources. This can negatively affect the formation of RKAA. Headquarters engages in sourcing prior subsidiary knowledge and frequent interactions with subsidiaries to cultivate RKAA. Organizational support is necessary in terms of channeling these activities effectively to RKAA, such as knowledge retrieval and storage systems, communication channels, and cultural-specific training. Managers with bounded rationality may be less likely to commit resources and investments to support capability building at the organizational level. In this case, the positive effects of knowledge relevance and social interaction are less likely to lead to RKAA. Taken together, I propose that:

H_{11a}: Centralization weakens the positive link between the relevance of subsidiary knowledge and MNE-HQ's reverse knowledge absorptive ability.

H_{11b}: Centralization weakens the positive link between HQ-subsidiary social interaction and MNE-HQ's reverse knowledge absorptive ability.

H_{11c}: Centralization strengthens the negative link between subsidiary power and MNE-HQ's reverse knowledge absorptive ability.

Cross-cultural competence: Cross-cultural competence is defined as a set of congruent behaviors, attitudes, and policies that enable MNEs to work effectively in cross-cultural situations (Johnson et al., 2006). In this study, we regard cross-cultural competence as a firm-level construct that represents an MNE's overall ability to interact effectively with people from different cultures, whether that interaction takes place in its home culture or other culture. I

argue MNE-HQ's cross-cultural competence strengthens the positive effect of subsidiary knowledge relevance and social interaction on RKAA, and weakens the negative effect of cultural distance on RKAA.

Cross-cultural competence can smooth the interactions between headquarters and their subsidiaries. Previous studies have shown that cultural competence enhances intercultural communication and exchange (Peltokorpi, 2010). Therefore, it is also critical for reverse knowledge transfer, which in most cases, involves intercultural communications. This is because, people in different cultures may interpret things differently, which may further lead to misunderstanding and conflicts. Cross-cultural competence enables MNEs to have a flexible mindset when going into intercultural communication, and to stay sensitive and non-judgmental to possible differences in styles (Johnson et al., 2006). Consequently, the knowledge generated from social interaction between the headquarters and its subsidiaries can be more effectively transferred to RKAA when both sides use the same language. In a similar vein, cross-cultural competence can help resolve the conflict between headquarters and subsidiaries resulting from cultural distance. The negative effect of cultural distance on RKAA would be weakened.

In addition, to leveraging prior knowledge about a subsidiary to advance RKAA is not always smooth, especially with regard to knowledge application. Cross-cultural competence ensures that MNE-HQs can effectively and accurately link the relevant subsidiary knowledge to the current situation. For example, a U.S.-based MNE may have accumulated a lot of knowledge of its

Chinese subsidiaries. In order to utilize such knowledge to build RKAA, a thorough examination of the current market situation in China is needed. MNEs with cross-cultural competence are more likely to work hard to communicate and understand the new situations in another culture. As a result, knowledge about a subsidiary could be more effectively translated to RKAA. Taken together, we propose that:

H_{12a}: Cross-culture competence strengthens the positive link between relevance of subsidiary knowledge and MNE-HQ's reverse knowledge absorptive ability.

H_{12b}: Cross-culture competence strengthens the positive link between HQ-subsidiary communication and MNE-HQ's reverse knowledge absorptive ability.

H_{12c}: Cross-culture competence weakens the negative link between cultural distance and MNE-HQ's reverse knowledge absorptive ability.

CHAPTER 5: METHOD

5.1 Methodology Overview

The research context in this study is Chinese subsidiaries of advanced market MNEs. China is one of the largest emerging markets in the world and a popular foreign direct investment destination in the last two decades. China's market has become increasingly important for many MNEs aspiring to global success. Due to its substantial market size and rapid economic growth, many MNEs from advanced markets have established subsidiaries in China. Thus, this context is appropriate for the current research purpose.

An online survey was conducted to collect data for testing the conceptual model. The survey questionnaire was initially developed in English, then translated into Chinese by two translators. The back-translation approach was utilized by two independent bilingual translators to ensure that the English and Chinese versions are conceptually equivalent. One translator was a native English speaker who obtained a master's degree in China, and she translated the survey to Chinese; the other translator was a native Chinese-speaker who obtained both bachelors' and master's degree in the U.S., and he back-translated the survey to English. Conflicts of the translation were resolved by holding discussions and reaching agreement.

The key informant technique was used to gather information. Specifically, we identified international managers at the subsidiary level as the key informant of this study. They were asked to answer subsidiary-specific questions as well as organizational-level questions. While it is true that it

would be most ideal to collect dyad data for model testing, *i.e.*, match subsidiary level data from subsidiary managers with organizational level data from headquarters managers, it is difficult to do so in international business studies. For this reason, data was collected from subsidiary-level managers only.

A manager from a subsidiary is the best informant in this research setting. Compared with their counterparts at the headquarters, managers in subsidiaries are less likely to have biases such as "not-invented-here" syndrome or ethnocentrism. Therefore, managers in subsidiaries are more likely to objectively evaluate the role subsidiaries play as well as the value of reverse knowledge. In addition, subsidiary managers are more likely to have a better sense for the value of the subsidiary-level information shared with headquarters, and how headquarters reacts to it. Lastly, answers from subsidiary managers ensure that the measurement model of RKAC is subsidiary-specific. For these reasons, subsidiary managers were identified as key informant in this dissertation.

Several criteria were used to qualify the informants. The first criterion was that the firm has to be a subsidiary of a multinational enterprise headquartered in another country. Secondly, the informant has to be a middle or senior-level manager. Third, the informant has to meet one of the following criteria as a demonstration of his/her knowledge: (1) he/she is familiar with the knowledge transfer practices between the subsidiary and its headquarters; (2) he/she has participated in knowledge transfer activities; and (3) he/she has taken charge of knowledge transfer activities. Lastly, the informant must obtain a score of five or above on a seven-point scale indicating his/her confidence in

answers to organization-related questions such as the overall innovation culture in MNEs and the decision-making style.

5.2 Instrument Development

I developed a structured survey instrument through the following steps. First, I screened the literature on organizational learning, international business, absorptive capacity, and innovation to identify verified scale items for measuring the factors in this research. Second, a list of items that would be potentially useful as measures of the factors was developed based on the literature. The items were then expanded into either Likert-type statements anchored by a seven-point scale ranging from "strongly disagree (1)" to "strongly agree (7)" or semantic differential scales (e.g., "not interested (1)" to "very interested"). Based on these items, an English version of the questionnaire was developed. The questionnaire was then translated into Chinese and back-translated into English by two independent bilingual translators to ensure their equivalency (Brislin, 1970). Third, discussions were held with two scholars familiar with organizational studies and international marketing studies. Both were asked to evaluate whether the statements are meaningful and understandable. After soliciting feedback from these discussions, I refined the survey and sent it back to the same scholars to ensure that they were satisfied with the changes. Several changes include the time needed to complete the survey, the sequence of questions, and the format of certain questions.

5.3 Measurement Scales

5.3.1 Measurement Scale of RKAC

In this study, reverse knowledge absorptive capacity (RKAC) was conceptualized as a broad construct that consists of two sub-dimensions: reverse knowledge absorptive motivation (RKAM) and reverse knowledge absorptive ability (RKAA). RKAM and RKAA are further conceptualized as second-order reflective constructs with reflective first-order dimensions, respectively (See Figure 4). Based on this conceptualization, RKAM is defined by the simultaneous presence of MNE-HQ's motivation to identify, assimilate, and apply reverse knowledge; RKAA is defined by the simultaneous presence of MNE-HQ's ability to identify, assimilate, and apply reverse knowledge.

Because there was no existing measure of RKAM, I developed the scales based on previous literature. Specifically, MNE-HQs' motivation about knowledge absorption was adapted from the construct of *expatriate motivation (to transfer knowledge)* from Chang, Gong, and Peng (2012). Motivation is captured by four items that reflect the *efforts* exerted by the MNE-HQs as well as their *interest* in such knowledge. Specifically, identification motivation captures MNE-HQ's willingness to explore and recognize reverse knowledge from a certain subsidiary. Assimilation motivation reflects MNE-HQ's willingness to analyze and integrate reverse knowledge from a certain subsidiary. Application motivation captures MNE-HQ's willingness to refine and apply reverse knowledge from a certain subsidiary. Sample items include "Our headquarters exert considerable effort to explore and recognize knowledge from our subsidiary" (for identification motivation); "our headquarters tries to

understand and integrate as much knowledge as they can from our subsidiary" (for assimilation motivation); and "our headquarters has a strong desire to refine and apply knowledge from our subsidiary" (for application motivation).

Identification ability is adopted from Schleimer and Pedersen (2013) to capture MNE-HQ's ability to explore, recognize, and evaluate reverse knowledge from a certain subsidiary. A sample item is "Our headquarters recognizes the benefits of knowledge from our subsidiary". Assimilation ability is adapted from Schleimer and Pedersen (2013), Cui, Griffith, and Cavusgil (2005), and Xie, Zou, and Qi (2018) to capture MNE-HQ's ability to analyze, integrate, and diffuse reverse knowledge from a certain subsidiary. A sample item is "our headquarters understand the key components of knowledge from our subsidiary". Application ability is adapted from Schleimer and Pedersen (2013), Cui et al. (2005), and Lichtenthaler (2009) to capture MNE-HQ's ability to refine, extend, and apply reverse knowledge from a certain subsidiary. A sample item is " our headquarters can further adapt the knowledge from our subsidiary if changes are necessary for application".

Figure 4: Higher order construct of RKAC
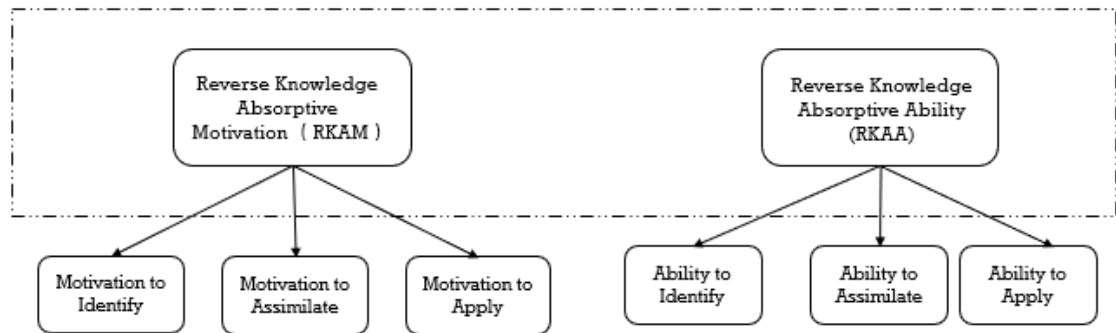
5.3.2 Measurement Scale of Other Variables

Antecedent variables: Trust towards the subsidiary is adopted from Chung (2014) to capture MNE-HQ's trust in the subsidiary staff. A sample item is "our headquarters trusts us". Host country competitiveness is adopted from Asmussen, Pedersen, and Dhanaraj (2009) to measure the host country's competitiveness in technology advancement and industry competition. A sample item is "availability of supply material is strong in the host country of this subsidiary". Subsidiary power is adapted from Ciabuschi, Forsgren, and Martin (2012) and Wang, Hua, Wu, Zhao, and Wang (2019b) to capture the extent to which a subsidiary has authority conferred by the parent company on some strategic decisions (Najafi-Tavani et al., 2015). A sample item is "headquarters confer authority to my subsidiary regarding developing new market in the host country".

Relevance of subsidiary knowledge is adapted from Yang et al. (2008) to capture the similarity between subsidiary knowledge and headquarters knowledge concerning technology, product range, market, customers, and

competition. A sample item is "subsidiary and headquarters have similar knowledge with respect to market". HQ-subsidiary interaction is adopted from Björkman et al. (2004), Noorderhaven and Harzing (2009)and Peltokorpi (2015)to capture the various forms of interactions between headquarters and its subsidiaries including international taskforces, international training programs, informal communications, and other types of virtual communication methods. A sample item is "our subsidiary interacts with the headquarters frequently by using international teams and taskforces". Cultural distance is calculated following the cluster approach proposed by Clark and Pugh (2001). In this approach, different cultures belong to a specific cultural cluster. Cultural distance then is calculated as the degree of difference of the cultural cluster to which the target foreign country belongs from the cultural cluster to which China belongs.

Outcome variables: While existing studies mainly focus on the *extent* of knowledge transfer as the outcome indicator of RKT, scholars in the general knowledge transfer domain have called for papers to incorporate other dimensions for a comprehensive investigation of knowledge transfer outcomes (Van Wijk et al., 2008), such as knowledge transfer *speed* (Hansen, 2002; Zander & Kogut, 1995), and knowledge transfer *quality* (Sheremata, 2000). In this study, we measured the following three aspects of RKT outcome: degree, quality, and speed.

Specifically, RKT degree is adopted from Ambos et al. (2006) and Anil K Gupta and Vijay Govindarajan (2000)to measure the degree to which one

subsidiary provides knowledge to its headquarters in areas such as marketing know-how, distribution know-how, and technology knowledge know-how. A sample item is "to which degree your subsidiary provides knowledge to the headquarters with regard to marketing know-how". RKT quality is adopted from Pérez-Nordtvedt et al. (2008) to capture the usefulness of reverse knowledge transferred to the headquarters, as well as the extent to which such knowledge was relevant and salient to the organization success. A sample item is "the knowledge from our subsidiary has contributed a great to our headquarters". RKT speed is adopted from Pérez-Nordtvedt et al. (2008) to capture how rapidly the headquarters acquire new knowledge, skills, and insights from a certain subsidiary. A sample item is "the rate at which knowledge was transferred to our headquarters was very fast".

Innovation Performance is also measured from three aspects: (1) new product innovativeness; (2) transnational new product development capability; and (3) (subsidiary's) contribution to MNE-HQ's innovation.

Specifically, new product innovativeness is adopted from Fang (2008) to capture the extent to which the developed product is novel to the industry and offers new ideas. A sample item is "new products in our headquarters are very novel for our industry". Transnational new product development capability is adopted from Subramaniam (2006) to capture MNE-HQ's ability to consistently and successfully introduce new products simultaneously in multiple country markets. A sample item is "our products outperform our competitors in terms of frequency of new product introduction". Subsidiary's contribution to innovation

is developed to capture the degree to which subsidiary's knowledge contributes to MNE-HQ's innovation in areas including product design, quality, functionality, application, and overall innovation capabilities. A sample item is "knowledge from our subsidiary contributed to the design of the products".

Moderating variables: Innovation culture is adopted from Aksoy (2017) to capture the extent to which a firm values innovation. A sample item is "our whole company encourages creative ideas in our organizations". Global orientation is adopted from Nummela, Saarenketo, and Puumalainen (2004) to capture organizational-level proactiveness and vision towards internationalization. A sample item is "internationalization is the only way to achieve our growth objectives". Centralization is adopted from Schminke, Ambrose, and Cropanzano (2000) to capture the concentration of power in the MNE-HQ. A sample item is "our headquarters participate in the decision on the adoption of new programs in our subsidiary". Cross-cultural competence is adapted from Johnson et al. (2006) to capture MNE's ability to work effectively in cross-cultural situations. A sample item is "our headquarters is familiar with the legal and economic systems in this country".

Control variables: The following two sets of variables were measured to use as controls in this study. The first set of variables is MNE-HQ-related characteristics, including MNE age, size, and industry (Nair et al., 2016). MNE age was coded as 2 if its history is longer than 30 years, and 1 if otherwise. MNE size was measured with the number of employees in the headquarters (Size=2 if the number of employees > 1000; otherwise, 1). Industry was

measured by asking respondents to indicate whether the firm is in a manufacturing or services industry (Industry=1 if a manufacturing industry and Industry=2 if services industry).

The second set of variables were subsidiary-related characteristics, including subsidiary age Nair et al. (2016), size (Persson, 2006), major function (Cantwell & Mudambi, 2005), ownership (Mudambi et al., 2014), entry mode (Rabbiosi, 2011), and the number of expatriates (Choi & Johanson, 2012). Subsidiary age was coded as 2 if it has operated in the Chinese market for more than 10 years, and 1 otherwise. Subsidiary size was measured with the number of employees in the informant's specific subsidiary (Size=2 if the number of employees >500; otherwise=1). Subsidiary's function is coded as 1 if it focuses on market development and 0 if otherwise. Subsidiary's ownership is coded as 1 if it is wholly owned by the headquarters and 0 if otherwise. Whether the subsidiary started as an acquired firm or a greenfield subsidiary if also controlled (Greenfield=1 if the subsidiary entry mode was greenfield; Greenfield=0 if otherwise).

5.4 Sample and Data Collection Procedures

An informant panel provided by Sojump was utilized to identify potential respondents. Sojump is an independent research firm in China and is similar to Qualtrics in the United States. Although the company did not have a readily usable panel that records subsidiary managers of MNEs, it does have a panel of over 200,000 employees working for foreign companies. Sojump was instructed to invite respondents from this panel to participate. The invitation was based on

the following criteria: (1) the type of companies (whether it is a domestic company or a multinational company; (2) position (whether the position is management-related or not); and (3) the working experience of participants. A total of 5,700 invitations were sent.

Several criteria were used to qualify the informants. First, informants must have worked for a subsidiary of a multinational enterprise that is headquartered in a foreign country. Second, the subsidiary in which these informants work must have been located in China. Third, informants had to be middle or senior-level managers. Fourth, informants must have demonstrated their knowledge about the knowledge transfer at one of the following three levels: (1) be familiar with the knowledge transfer and general interactions between the subsidiary and its headquarters; (2) have participated in such activities; and (3) have taken charge of such activities.

The data collection lasted for three weeks. With several rounds of reminders, 1507 respondents clicked on the survey link, and 426 completed the survey. Several methods were used for quality checks. First, informants who did not pass the attention filter question were screened out (the screening question asked the capital city of China). Second, informants whose IP was unrecognizable were removed. Third, informants who could not write down the MNE's home country were removed. Fourth, informants whose time to fill out the survey was less than 10 minutes were removed. Fifth, informants whose responses were considered straight-lining were also removed. Lastly, at the end of the survey, a question was asked about the respondent's confidence in his/her answers. Respondents who failed to obtain a score of five or above on a seven-

point scale indicating his/her confidence in answers were removed. The data filtering process resulted in 212 completed, quality responses, with an effective response rate of 14.7%.

A further check was conducted manually of the 212 responses. First, both MNE's and subsidiary' major industries were asked in the survey. Cases in which there was no overlap between the industries were removed from the dataset. Second, one MNE may have multiple subsidiaries in China. Cases where informants work for the same MNE but not the same subsidiary (respondents can choose to reveal the company name or not) were also removed to reduce dependencies in the data. After the screening process, 206 responses were left for the final data analysis. For those informants who do not reveal their company names, cross-validation of the firm profiles were performed. Information such as the home country, MNE-HQ age, industry, size, entry mode, subsidiary size was included in the profile. The results indicated that none of the firms had an identical profile and that the responses were from 206 independent subsidiaries.

Specifically, 63.29% of the sample belong to the manufacturing industry and 36.71% are in the service sector. Among these responses, 31.55% of the sample were headquartered in Japan, 29.61% are in the United States, 11.17% are in Germany, 7.77% are in Hong Kong, and 19.41% in other countries (e.g., Italy, France, Korea, Spain, etc.). The average age of MNE-HQs is 28.93 years, and the average employee number of MNE-HQ is 2441. In terms of the characteristics of subsidiaries, on average, these subsidiaries have been operating in China for 13.90 years. The average number of subsidiary

employees is 1142. Function-wise, 18.95% of the sampled subsidiaries are R&D focused, while 68.45% center on market development. In addition, 66.02% of the subsidiaries are wholly owned by their headquarters, and 68.45% are greenfield subsidiaries. On average, each subsidiary has 4.45 expatriates assigned by the headquarters.

In terms of the characteristics of the informants, 61.17% of them assume mid-level management positions in the subsidiary. In addition, 18.45% of them are familiar with the HQ-subsidiary interactions, 50.49% have participated in such interactions, and 31.07% have been in charge of such interactions. On average, the informants have worked at the subsidiary for 6.94 years, and it took each informant around 17 minutes to finish the survey. Table 6 and Table 7 summarize the sample profile and the characteristics of the key informants.

Table 6: Sample Profile

Sample Characteristics	
MNE-HQ characteristics	
Manufacturing Industry	63.29%
Country of Origin of MNE	
Japan	31.55%
USA	29.61%
German	11.17%
HK	7.77%
Others	19.42%
MNE-HQ age	
1-10 years	9.71%
10-30 years	53.40%
30-50 years	21.84%
>50 years	15.05%
MNE-HQ size (# of employees)	
1-100	3.40%
101-500	16.99%
500-1000	27.18%
1000-5000	32.04%
>5000	20.39%
Subsidiary Characteristics	
Subsidiary age	
0-5 years	8.96%
5-10 years	32.55%
11-20 years	41.51%
20-40 years	16.51%
Subsidiary size (# of employees)	
1-100	12.62%
101-500	38.83%
500-1000	29.13%
1000-5000	12.14%
>5000	7.28%
Subsidiary's Major Function	
R&D oriented	18.93%
Market Development	68.45%
Others	12.62%
Wholly Owned Subsidiaries	66.02%
Greenfield Subsidiaries	68.45%
Average Number of Patriates	4.45

Table 7: Informant Profile

Informant Characteristics	
Mid-level Management Position (%)	61.17%
High-level Management Position (%)	38.83%
Informant Experience with HQ-subsidiary Interactions	
Familiar	18.45%
Have Participated in such interactions	50.49%
Have been in charge of such interactions	31.07%
Mean informant Tenure (in years)	6.94
Mean Answering Time (in minutes)	16.9

5.5 Non-response and Common-Method Bias

To check for the non-response bias, I compared early and late responders. Specifically, response time was calculated as the time lag between the day the survey was sent and the day the survey was completed (both pieces of information were recorded automatically by the online survey system). Mean response time was then calculated and used to split the sample. Those whose response time was shorter than the mean were defined as early responses, and those longer were defined as late responses. Several independent sample t-tests were performed on key variables. The results indicated no significant differences between early and late responses on RKAM (mean difference=-0.05, t=-0.561, p>0.1), RKAA (mean=-0.02, t=-0.267, p>0.1), degree of reverse knowledge transfer (mean difference=0.03, t=0.221, p>0.1), quality of reverse knowledge transfer (mean difference=0.13, t=1.25, p>0.1), speed of reverse knowledge transfer (mean difference=0.08, t=0.68, p>0.1), innovativeness (mean difference=-0.03, t=-0.31, p>0.1), transnational NPD capacity (mean

difference=-0.09, t=-0.82, p>0.1), RKT contribution to firm innovation (mean difference=-0.05, t=-0.49, p>0.1), trust in subsidiary (mean difference=0.01, t=0.14, p>0.1), host country competitiveness (mean difference=-0.01, t=-0.15, p>0.1), subsidiary power (mean difference=0.03, t=0.23, p> 0.1), relevance of subsidiary knowledge (mean difference=-0.21, t=-1.54, p>0.1), HQ-subsidiary interaction (mean difference=0.02, t=0.19, p>0.05), innovation culture (mean difference=-0.03, t=-0.28, p>0.1), global orientation (mean difference=0.01, t=0.08, p>0.1), centralization (mean difference=-0.12, t=-0.82, p>0.1), informant tenure (mean difference=0.15, t=0.484, p>0.1), number of expatriates (mean difference=-0.18, t=-0.89, p>0.1), management level (mean difference=-0.18, t=0.97, p>0.1). A two-way chi-square analysis was also conducted. The results showed that whether the response was early or late was not associated with MNE-HQ's age distribution (Pearson Chi-square=3.42, d.f.=3, p>0.1), or subsidiary age distribution (Pearson Chi-square=2.15, d.f.=4, p>0.1), or subsidiary function (Pearson Chi-square=0.83, d.f.=2, p>0.1). However, early responders appeared to take more time completing the survey than the late ones (mean difference=2.72, t=1.89, p<0.1). These results indicate that non-response bias does not seem to be a serious concern in this dataset.

Both procedural steps and statistical analysis were taken to reduce and assess potential common-method bias in this study. First, several rounds of revision were undertaken to ensure the questionnaire design was effective. Specifically, ambiguous items were identified and revised or dropped through pretesting. Second, independent and dependent variables were separated proximally in the survey to reduce respondents' ability and motivation to use

responses to prior questions to motivate subsequent responses (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Third, different response formats were used for different variables to create a psychological separation of the measures. Fourth, I assured respondents of anonymity and emphasized that there were no right or wrong answers to encourage honest responses.

Harman's One Factor Analysis was conducted to assess the potential common method variance (CMV) bias in our data. If a single factor emerges to account for the majority of the covariance among the measures, then it is concluded that a substantial amount of common method variance is present. To test it (Harman, 1976), I subjected all relevant items to exploratory factor analysis (EFA) to examine the unrotated factor solution. I found that the first factor accounted for 26.23% of the total variance, which suggested that the first variable was not the dominant variable and that a single factor could not explain the variance in the dataset (Harman, 1976).

A marker variable approach was also used to account for the effects of the common method as suggested by previous studies (Murray, Gao, & Kotabe, 2011). Informant's tenure was selected as the marker variable—a variable that is theoretically unrelated to the latent variables in the model—since there is no reason to assume a significant correlation between informant's tenure and MNE-HQ's reverse knowledge absorptive capacity or organizational culture (Lindell & Whitney, 2001). No significant correlation between the informant's tenure and any other latent variable was observed in this study (See Table 13), suggesting that common method bias was not a significant concern in our data.

5.6 Measurement Models

5.6.1 Measurement Model of RKAC

Given its accommodation to a small sample size, the partial least square-structural equation model (PLS-SEM) was utilized for data analysis (Hair, Hult, Ringle, Sarstedt, & Thiele, 2017). Following steps recommended by (Hair, Sarstedt, Ringle, & Mena, 2012), we first assessed the reliability and validity of the measurement model. Table 8 presents the analysis results. All item loadings were significant ranging from 0.61 to 0.83, meeting the recommended cut-off value of 0.4 (Bagozzi & Baumgartner, 1994; Joe F Hair et al., 2012). Cronbach's alpha ranged from 0.70 to 0.93, lending support to the reliability of measures (Hair, Sarstedt, Pieper, & Ringle, 2012). Cronbach's alpha for identification ability was 0.68, which is below the threshold of 0.7. Scholars have shown that 0.68 is still an acceptable level although it is "slightly low" (Taber, 2018). Convergent validity was demonstrated by the average variance extracted (AVE) in Table 8. Most constructs have an AVE greater than 0.5, suggesting satisfactory convergent validity. The AVE for assimilation ability is 0.46, which is less than 0.5. Previous studies have shown that in a case where AVE is less than 0.5 but composite reliability is higher than 0.6, the convergent validity of the construct is still adequate(Fornell & Larcker, 1981). The compositive reliability of assimilation ability was 0.81, which well exceeded 0.6, thus reaching the convergent validity. The same case held for RKAA. Table 8 and Figure 5 summarizes the measurement model of RKAC.

Table 8: Measurement Model of RKAC

Dimension	Sub-construct Item	Standardized Factor Loading	t-value
Identification Motivation	Cronbach's Alpha=0.85, AVE=0.68 Composite Reliability=0.90		
	1. Our headquarters exert considerable effort to explore and recognize knowledge from our subsidiary.	0.80	27.39
	2. Our headquarters tries to explore and recognize as much knowledge as they can from our subsidiary.	0.83	37.97
	3. Our headquarters has a strong desire to explore and recognize knowledge from our subsidiary.	0.84	34.46
	4. Our headquarters attaches greater importance to explore and recognize knowledge from our subsidiary.	0.83	37.01
Assimilation Motivation	Cronbach's Alpha=0.78, AVE=0.60 Composite Reliability=0.86		
	1. Our headquarters exert considerable effort to understand and integrate knowledge from our subsidiary.	0.78	24.23
	2. Our headquarters tries to understand and integrate as much knowledge as they can from our subsidiary.	0.73	18.42
	3. Our headquarters has a strong desire to understand and integrate knowledge from our subsidiary.	0.79	23.89
	4. Our headquarters attaches greater importance to understand and recognize knowledge from our subsidiary.	0.80	27.52
Application Motivation	Cronbach's Alpha=0.83, AVE=0.66 Composite Reliability=0.89		
	1. Our headquarters exert considerable effort to refine and apply knowledge from our subsidiary.	0.82	36.40
	2. Our headquarters tries to refine and apply as much knowledge as they can from our subsidiary.	0.78	26.46
	3. Our headquarters has a strong desire to refine and apply knowledge from our subsidiary.	0.84	37.92
	4. Our headquarters attaches greater importance to understand and knowledge from our subsidiary.	0.80	23.95
Identification Ability	Cronbach's Alpha=0.68, AVE=0.51 Composite Reliability=0.81		
	1. Our headquarters recognizes the benefits of knowledge from our subsidiary.	0.65	11.82
	2. Our headquarters understands the importance of knowledge from our subsidiary.	0.75	20.37
	3. Our headquarters recognizes the potential value of knowledge from our subsidiary for the organization.	0.71	16.61

	4. Our headquarters believe that the justification for absorbing knowledge from our subsidiary makes sense.	0.75	23.36
Assimilation Ability	Cronbach's Alpha=0.71, AVE=0.46 Composite Reliability=0.81		
	1. Our headquarters understand the key components of knowledge from our subsidiary.	0.60	11.57
	2. Our headquarters understand how knowledge from our subsidiary fits together into our organization.	0.70	17.95
	3. Even if the knowledge from our subsidiary includes some new components compared to what our headquarters previously know, management is still able to understand or analyze it.	0.66	11.31
	4. Our headquarters converts the knowledge from our subsidiary into the design of new products or services.	0.69	16.81
	5. Our headquarters organizes and integrates knowledge from our subsidiary.	0.74	18.29
Application Ability	Cronbach's Alpha=0.74, AVE=0.50 Composite Reliability=0.83		
	1. Our headquarters can further adapt the knowledge from our subsidiary if changes are necessary for application.	0.66	11.45
	2. Our headquarters can monitor the performance/application of the knowledge from our subsidiary and correct problems as they surface.	0.68	13.70
	3. Our headquarters can fine-tune some components of the knowledge to make it work successfully.	0.67	14.55
	4. Our headquarters can apply knowledge learned from our subsidiary.	0.79	26.63
	5. Our headquarters can use knowledge from our subsidiary to solve new problems.	0.70	12.84
RKAM	Cronbach's Alpha=0.93, AVE=0.56 Composite Reliability=0.94		
	1. Identification Motivation	0.93	97.34
	2. Assimilation Motivation	0.92	56.45
	3. Application Motivation	0.93	73.26
RKAA	Cronbach's Alpha=0.89, AVE=0.47 Composite Reliability=0.91		
	4. Identification Ability	0.90	52.50
	5. Assimilation Ability	0.93	87.76
	6. Application Ability	0.93	87.62

Figure 5: Measurement model of RKAC
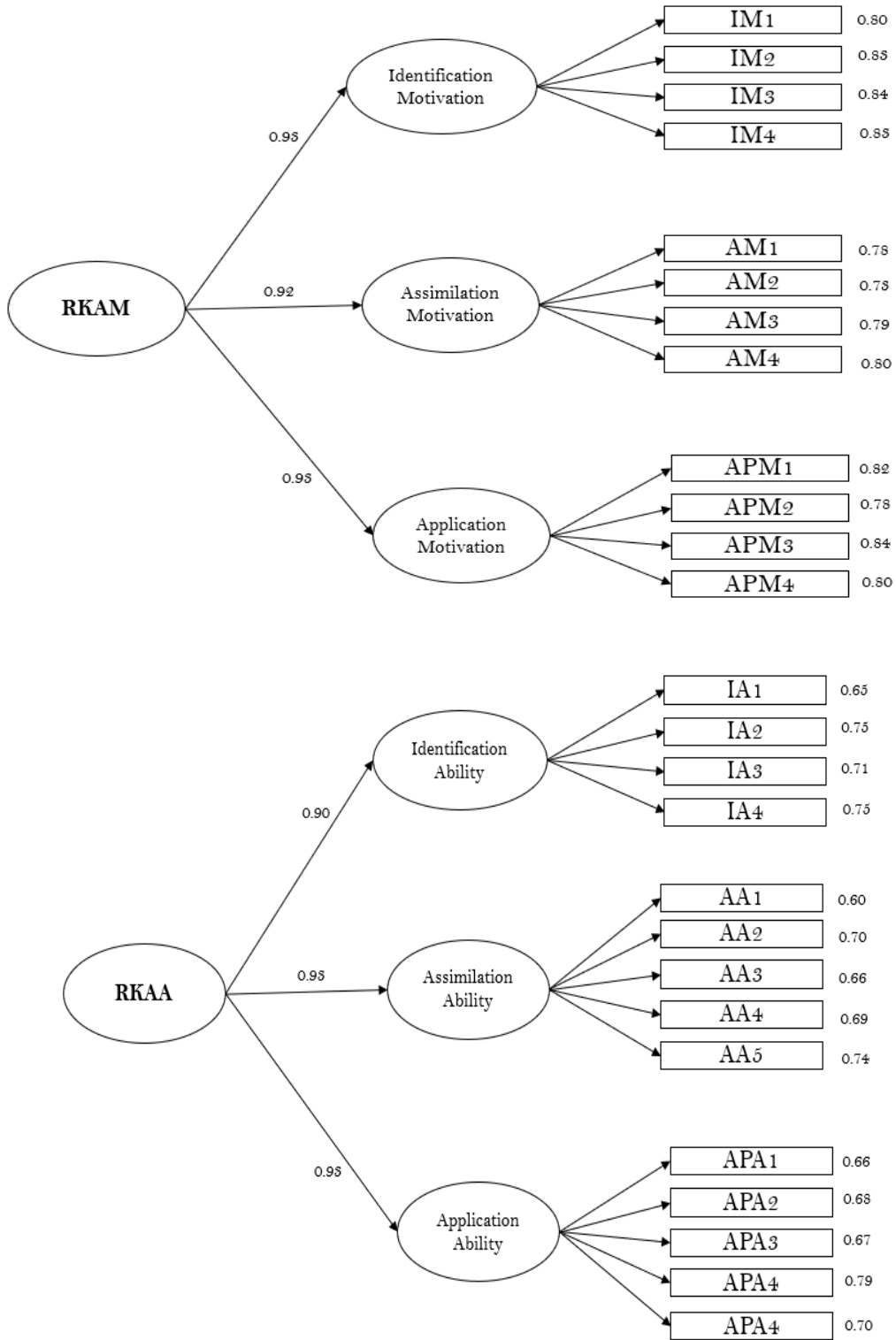
Because a core argument in this dissertation is that RKAM and RKAA are unique and that RKAM and RKAA are better perceived as second-order constructs, chi-square difference tests were compared for three CFA models for RKAM and RKAA: (1) Model 1 with a single CFA solution; (2) Model 2 with a two-factor CFA solution; and (3) Model 3 with a second-order two-factor CFA solution. Table 9 summarizes the goodness-of-fit statistics for alternative models of RKAC. Results indicated that the Model 3 fits significantly better than the one-factor model (Model 1), and is also better than Model 2. These results further supported discriminant validity of the constructs (Anderson & Gerbing, 1988).

Table 9: Goodness-of-fit statistics for alternative models of RKAC

	Model 1 One-factor solution for RKAC	Model 2 Two-factor solution for RKAC	Model 3 Second-order two factor solution for RKAC
Chi-square(d.f.)	674.310(299)	447.61 (284)	402.7(277)
GFI	0.79	0.86	0.87
NNFI	0.76	0.84	0.86
RMSEA	0.08	0.05	0.04
CFI	0.85	0.94	0.95

To further assess the discriminant validity, we calculated the heterotrait-monotrait ratio of correlations (HTMT), as scholars have demonstrated this approach's superiority to other approaches such as the Fornell-Larcker criterion or the assessment of (partial) cross-loadings (Henseler, Ringle, & Sarstedt, 2015; Voorhees, Brady, Calantone, & Ramirez, 2016). Specifically, HTMT was calculated by constructing 99.9% bias-corrected confidence intervals around the

correlations. An HTMT less than 0.9 is an indicator of discriminant validity (Voorhees et al., 2016). Table 11 shows the HTMT for all the latent variables included in the model, which are all below the threshold of 0.9.

5.6.2 Measurement Model of Other Variables

Table 10 presents the measurement model of other variables in this study. All item loadings are significant ranging from 0.60 to 0.83, meeting the cut-off value of 0.4 (Bagozzi & Baumgartner, 1994; Joe F Hair et al., 2012). Cronbach's alpha ranged from 0.71 to 0.83, lending support for the reliability of measures. Convergent validity is demonstrated by the average variance extracted (AVE) in Table 9. Most constructs have an AVE greater than 0.5 (ranging from 0.50 to 0.65), suggesting satisfactory convergent validity. Previous studies have shown that in a case where AVE is less than 0.5 but composite reliability is higher than 0.6, the convergent validity of the construct is still adequate (Fornell & Larcker, 1981). This rule applies to the construct of RKT degree (AVE=0.47, compositive reliability=0.86) and Innovation contribution (AVE=0.48, compositive reliability=0.82). Taken together, these results support the convergent validity of the constructs. We further calculated the HTMT to assess discriminant validity. As Table 11 indicates, all HTMT ratios are smaller than the cutoff value of 0.9 (ranging from 0.4 to 0.9), lending support to discriminant validity of these constructs. Based on the above analysis, all latent constructs exhibit adequate measurement and qualify for empirical testing of the hypotheses. The descriptive statistics and correlations of the variables are summarized in Table 12.

Table 10: Measurement Model of Other Variables

Dimension	Sub-construct Item	Standardized Factor Loading	t-value
Trust towards subsidiary	Cronbach's Alpha=0.75, AVE=0.57 Composite Reliability=0.84 From 1= "strongly disagree" to 7= "strongly Agree" to indicate your agreement/disagreement with the following statements:		
	1. Our headquarters trusts us.	0.69	12.62
	2. Our headquarters delegates decisions to us.	0.73	15.44
	3. Our headquarters knows where they stand with us.	0.71	13.59
	4. Our headquarters seldom have conflicts with us.	0.69	10.12
Host Country Competitiveness	Cronbach's Alpha=0.83, AVE=0.53 Composite Reliability=0.87 From 1= "not strong at all" to 7= "very strongly", how would rate the following aspects of the country in which your subsidiary is located in:		
	1. Availability of supply material	0.69	10.22
	2. Existence of research institutions	0.77	18.18
	3. Demanding customers	0.67	9.27
	4. Level of Competition	0.64	10.26
Subsidiary Power	Cronbach's Alpha=0.73, AVE=0.55 Composite Reliability=0.83 From 1= "Not at all" to 7= "A very great deal", to what extent does the headquarters confer authority to your company regarding the following?		
	1. Developing new market in the host country;	0.66	11.14
	2. Restructuring of the subsidiary organization;	0.77	8.06
	3. Introduction of new services and/or new products;	0.67	18.88
	4. Approval of quarterly plans/schedules.	0.64	13.02
Relevance of Subsidiary Knowledge	Cronbach's Alpha=0.77, AVE=0.69 Composite Reliability=0.87 From 1= "Not at all" to 7= "A very great deal", how similar the subsidiary knowledge and headquarters knowledge is with respect to:		
	1. Market;	0.80	21.44
	2. Customers;	0.85	30.46
	3. Competition.	0.72	12.55
HQ-subsidiary Interaction	Cronbach's Alpha=0.75, AVE=0.50 Composite Reliability=0.83 From 1= "Not at all" to 7= "Very Frequently", please indicate the frequency of communication between your subsidiary and headquarters in the following method:		
	1. The use of international teams and	0.67	11.65

	taskforces;		
	2. The use of international training programs;	0.67	11.99
	3. The use of informal communications;	0.68	14.76
	4. The use of trips and visits;	0.71	15.03
	5. Face-to-face communication.	0.80	22.91
Innovation Culture	Cronbach's Alpha=0.71, AVE=0.53 Composite Reliability=0.82		
	From 1= "strongly disagree" to 7= "strongly Agree", please indicate your agreement/disagreement with the following statements:		
	1. Our whole company encourages creative ideas in our organization.	0.69	13.56
	2. Our whole company values a willingness to experiment with new ideas.	0.72	10.57
	3. The most important success factor in our business is to be innovative.	0.75	19.40
	4. Innovation is highly valued in our organization.	0.75	14.38
Global Orientation	Cronbach's Alpha=0.74, AVE=0.50 Composite Reliability=0.83 From 1= "strongly disagree" to 7= "strongly Agree", please indicate your agreement/disagreement with the following statements:		
	1. Internationalization is the only way to achieve our growth objectives.	0.73	13.30
	2. Our company will have to internationalize to succeed in the future.	0.62	10.15
	3. It is important for our company to internationalize rapidly.	0.72	16.04
	4. The company's management uses a lot of time for planning international operations.	0.69	13.34
	5. Our company's growth goal can be achieved mainly through internationalization.	0.74	13.23
Centralization	Cronbach's Alpha=0.81, AVE=0.64 Composite Reliability=0.87 From 1= "Not at all" to 7= "Very Frequently", please indicate the frequency of decision making with regard to:		
	1. Our headquarters participate in the decision on the adoption of new programs in our subsidiaries.	0.79	22.47
	2. Our headquarters participate in decisions on the adoption of new policies in its subsidiaries.	0.75	21.93
	3. Our headquarters participate in the decision to hire new staff in its subsidiaries.	0.80	25.39
	4. Our headquarters usually participate in the decision on the promotions of any of the professional staff in its subsidiaries.	0.85	35.07
Cross-cultural Competence	Cronbach's Alpha=0.78, AVE=0.69 Composite Reliability=0.87 From 1= "strongly disagree" to 7= "strongly Agree", please indicate your agreement/disagreement with the following		

	statements:		
	1. Our headquarters is familiar with the legal and economic systems in this country.	0.76	16.40
	2. Our headquarters is familiar with the cultural values and religious beliefs in this country.	0.74	17.32
	3. Our headquarters can effectively manage relationships with business partners from this country.	0.82	24.46
RKT degree	Cronbach's Alpha=0.81, AVE=0.47 Composite Reliability=0.86 From 1=" Not at all" to "7= A very great deal", please indicate the degree to which your subsidiary provides knowledge to the headquarters in the following areas.		
	1. Marketing know-how;	0.60	7.21
	2. Distribution know-how;	0.65	13.65
	3. Technology know-how;	0.68	12.95
	4. Purchasing know-how;	0.72	16.78
	5. Packaging design/technology;	0.70	15.23
	6. Product designs;	0.67	11.85
	7. Management systems and practices.	0.73	16.83
RKT quality	Cronbach's Alpha=0.73, AVE=0.56 Composite Reliability=0.83 From 1= "strongly disagree" to 7= "strongly Agree" to indicate your agreement/disagreement with the following statements:		
	1. The knowledge from our subsidiary has contributed a great to our headquarters.	0.76	20.83
	2. Headquarters were very satisfied with the quality of the knowledge from our subsidiary.	0.77	23.84
	3. Our headquarters dramatically increased the perception about the efficacy of the knowledge after gaining experience with it.	0.68	14.32
	4. The transfer of knowledge from our subsidiary greatly helped our company to actually improve our organizational capabilities.	0.77	21.78
RKT speed	Cronbach's Alpha=0.73, AVE=0.65 Composite Reliability=0.85 From 1= "strongly disagree" to 7= "strongly Agree" to indicate your agreement/disagreement with the following statements:		
	1. The rate at which knowledge was transferred to our headquarters was very fast.	0.80	20.23
	2. Our knowledge was transferred to our headquarters in a timely fashion.	0.80	22.87
	3. Our headquarters took a short time to acquire and implement the knowledge from our subsidiary.	0.81	24.29

New Product Innovativeness	Cronbach's Alpha=0.80, AVE=0.50 Composite Reliability=0.86		
	From 1= "strongly disagree" to 7= "strongly Agree", please indicate your agreement/disagreement with the following statements:		
	1. New products in our headquarters are very novel for our industry.	0.68	14.73
	2. New products in our headquarters are challenging to existing ideas in our industry.	0.72	17.98
	3. New products in our headquarters offer new ideas to our industry.	0.62	8.62
	4. New products in our headquarters are creative.	0.79	23.76
	5. New products in our headquarters are interesting.	0.69	13.09
	6. New products in our headquarters are capable of generating ideas for other products.	0.72	17.68
Transnational new product development capability	Cronbach's Alpha=0.78, AVE=0.53 Composite Reliability=0.85		
	With respect to your key **competitor**, please rate how your product category currently fares on the following dimensions (1= much worse than competitors; 7= much better than competitors)		
	1. Frequency of new product introductions	0.79	26.17
	2. Being first in the market with new product introductions	0.77	20.47
	3. Ability to introduce new versions simultaneously in several markets	0.74	16.61
	4. Ability to respond to unique requirements of different countries	0.66	10.33
	5. Ability to penetrate the overseas market	0.67	11.31
RKT contribution to Firm Innovation	Cronbach's Alpha=0.73, AVE=0.48 Composite Reliability=0.82		
	Recall products that were launched by your HQs in the past three years. From 1= "strongly disagree" to 7= "strongly Agree", please indicate your agreement/disagreement with the following statements:		
	1. Knowledge from our subsidiary contributed to the design of the products.	0.75	16.64
	2. Knowledge from our subsidiaries improved the quality of these products.	0.71	15.82
	3. Knowledge from our subsidiaries improved the functionality of these products.	0.65	11.10
	4. Knowledge from our subsidiaries improved the application of these products.	0.65	9.33
	5. knowledge from our subsidiary greatly helped our company to improve its innovation capabilities.	0.71	12.95

Table 11: Discriminant Validity of Constructs—HTMT ratio

Constructs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1RKAM	-																
2RKAA	0.87	-															
3Trust	0.81	0.67	-														
4HCC	0.80	0.83	0.90	-													
5SubsidiaryPower	0.67	0.72	0.84	0.78	-												
6Relevance	0.60	0.69	0.65	0.70	0.75	-											
7Interaction	0.66	0.64	0.65	0.76	0.79	0.70	-										
8Innovation Culture	0.62	0.63	0.87	0.82	0.86	0.55	0.52	-									
9Global Orientation	0.75	0.79	0.90	0.88	0.78	0.67	0.57	0.89	-								
10Centralization	0.49	0.51	0.50	0.58	0.56	0.66	0.83	0.40	0.52	-							
11CC	0.67	0.77	0.89	0.86	0.84	0.79	0.67	0.82	0.82	0.57	-						
12Degree	0.76	0.79	0.82	0.80	0.64	0.61	0.86	0.55	0.67	0.81	0.66	-					
13Quality	0.83	0.89	0.88	0.75	0.72	0.51	0.68	0.58	0.72	0.59	0.74	0.90	-				
14Speed	0.74	0.81	0.79	0.76	0.64	0.60	0.64	0.62	0.71	0.45	0.84	0.70	0.80	-			
15Innovativeness	0.68	0.72	0.87	0.76	0.74	0.64	0.74	0.79	0.67	0.57	0.84	0.73	0.75	0.76	-		
16TNPD	0.63	0.67	0.84	0.82	0.71	0.65	0.68	0.76	0.80	0.64	0.64	0.76	0.67	0.62	0.86	-	
17Contribution	0.81	0.83	0.86	0.87	0.71	0.52	0.64	0.79	0.77	0.57	0.70	0.82	0.89	0.70	0.84	0.81	-

Footnote:

1. numbers in this tables are HTMT ratios; a number less than 0.9 indicates good discriminant validity.
2. 3Trust=Trust towards subsidiary; 6Relevance=Relevance of subsidiary knowledge; 8Interaction=HQ-subsidiary interaction; 11CC=cross-cultural competence; 16TNPD=transnational new product development capability;17 Contribution=RKT contribution to firm innovation.

Table 12: Descriptive Statistics and Correlations

Constructs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1RKAM	1																		
2RKAA	0.81	1																	
3Trust	0.60*	0.67*	1																
4HCC	0.59*	0.61*	0.61*	1															
5SubsidiaryPower	0.48*	0.52*	0.53*	0.50*	1														
6Relevance	0.46*	0.54*	0.45*	0.47*	0.51*	1													
7Interaction	0.52	0.51*	0.46*	0.53*	0.56*	0.51*	1												
8Innovation Culture	0.48*	0.49*	0.60*	0.54*	0.58*	0.39*	0.37*	1											
9Global Orientation	0.59*	0.63*	0.64*	0.61*	0.53*	0.48*	0.42*	0.67*	1										
10Centralization	0.41*	0.42*	0.39*	0.42*	0.40*	0.49*	0.64*	0.30*	0.40*	1									
11CC	0.51*	0.58*	0.60*	0.56*	0.55*	0.54*	0.48*	0.56*	0.58*	0.41*	1								
12Degree	0.63*	0.65*	0.60*	0.59*	0.46*	0.46*	0.67*	0.42*	0.52*	0.65*	0.48*	1							
13Quality	0.65*	0.71*	0.61*	0.52*	0.48*	0.36*	0.49*	0.42*	0.54*	0.44*	0.51*	0.70*	1						
14Speed	0.58*	0.64*	0.54*	0.52*	0.43*	0.43*	0.47*	0.45*	0.52*	0.33*	0.58*	0.53*	059*	1					
15Innovativeness	0.56*	0.60*	0.60*	0.55*	0.53*	0.48*	0.56*	0.59*	0.51*	0.45*	0.60*	0.59*	0.56*	0.53*	1				
16TNPD	0.51*	0.55*	0.61*	0.58*	0.49*	0.48*	0.51*	0.57*	0.61*	0.50*	0.46*	0.60*	0.51*	0.47*	0.68*	1			
17Contribution	0.63*	0.66*	0.66*	0.59*	0.47*	0.37*	0.46*	0.57*	0.56*	0.43*	0.49*	0.63*	0.65*	0.51*	0.65*	0.61*	1		
18Tenure	0.05	0.09	0.09	0.08	0.23	0.09	0.10	0.20	0.12	-0.06	0.17*	0.00	0.11	0.18*	0.08	0.06	0.16*	1	
19 Expatriates	-0.04	-0.03	-0.09	-0.02	-0.17	0.02	0.01	-0.08	-0.02	0.08	-0.04	0.08	-0.01	0.01	0.05	-0.01	-0.1	0.01	1
Mean	5.81	5.84	5.78	5.76	5.56	5.39	5.05	5.87	5.69	5.16	5.69	5.47	5.74	5.72	5.70	5.56	5.78	6.94	4.75
Std.Dev.	0.61	0.59	0.73	0.71	0.78	1.00	0.92	0.73	0.76	1.02	0.85	0.83	0.75	0.87	0.73	0.81	0.70	2.28	1.45

Footnote: 1)3Trust=Trust towards subsidiary; 6Relevance=Relevance of subsidiary knowledge; 8Interaction=HQ-subsidiary interaction; 11CC=cross-cultural competence; 16TNPD=transnational new product development capability;17 Contribution=Innovation Contribution

CHAPTER 6: ANALYSIS AND RESULTS

Hypotheses were tested using Ordinary Least Square (OLS) multiple regression models for the following reasons. First, the focal construct of this model is RKAC, and the focus of the empirical test is its antecedents and outcomes. Although the conceptual model implies a mediation role of RKAC, it is not the primary focus of this dissertation. Second and more importantly, since there are multiple antecedents of RKAC as well as multiple outcomes, using OLS regression makes it easier to separately examine these relationships. Third, this model also includes the moderations, which can be tested with moderated regression models.

OLS assumptions were checked before any analyses were conducted. Variables were mean-centered before entering the regression to reduce the potential collinearity among variables (Jaccard, Wan, & Turrisi, 1990). The variance inflation factors (VIFs) of the independent variables are all smaller than 4, significantly below the threshold of 10 (Kutner, Nachtsheim, Neter, & Li, 2005). P-P plot and Q-Q plot suggested that all the independent variables were meeting the normality assumption of OLS. The multicollinearity diagnoses are presented in Table 13.

Table 13: Multicollinearity Diagnosis

	Collinearity Statistics	
	Tolerance	**VIF**
RKAM	0.32	3.11
RKAA	0.27	3.77
Trust in subsidiary	0.40	2.48
Host country competitiveness	0.46	2.19
Subsidiary power	0.49	2.06
Relevance of subsidiary knowledge	0.55	1.82
HQ-subsidiary interaction	0.43	2.34
Innovation culture	0.44	2.27
Global Orientation	0.38	2.61
Centralization	0.54	1.85
Cross-cultural competence	0.47	2.12

6.1 Main Effects of RKAC

6.1.1 RKAC on Reverse Knowledge Transfer

I first tested the main effect of RKAC on three outcomes of reverse knowledge transfer: RKT degree (Model 1), RKT quality (Model 2), and RKT speed (Model 3). The results of the analysis are summarized in Table 14. In each model, the dependent variable is regressed on RKAM and RKAA after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary.

In Model 1, RKT degree was regressed on RKAM and RKAC. Both RKAA (β =0.30, p<0.001) and RKAM (β =0.43, p<0.001) are positively related to RKT degree. Notably, MNE size also has a significant effect on RKT degree (β =0.30,

p<0.001). That is, compared with small MNEs, big MNEs tend to source more knowledge from their overseas subsidiaries. In total, Model 1 explains 46% of the variance in the RKT degree.

In Model 2, RKT quality was regressed on RKAM and RKAC. Both RKAA (β =0.28, p<0.001) and RKAM (β =0.51, p<0.001) are positively related to RKT quality. Subsidiary function (a dummy variable coded as 1 if the subsidiary's major function is market development) has a negative effect on RKT quality (β =-0.22, p<0.001), suggesting that reverse knowledge from R&D focused subsidiaries is perceived as higher quality and more valuable for MNE-HQs. In addition, MNE-HQs are more likely to be satisfied with reverse knowledge from their greenfield subsidiaries (β =0.41, p<0.001).

Model 3 tested the effect of RKAC on RKT speed. As shown in Table 13, both RKAA (β =0.21, p<0.001) and RKAM (β =0.46, p<0.001) are positively related to RKT speed. Interestingly, the results show that subsidiary size has a negative effect on RKT speed (β =-0.10, p<0.001). The bigger the subsidiary is, the slower the reverse knowledge transfer. In addition, we found that knowledge transfer from R&D-focused subsidiaries is slower than that from market development-focused subsidiaries (β =-0.10, p<0.001). Taken together, H_{1a}, H_{1b}, and H_{1c} are supported.

Variable	Model 1 DV= **RKT** degree			Model 2 DV= **RKT** quality			Model 3 DV= **RKT** speed		
	B	S.E.	β	B	S.E.	β	B	S.E.	β
Intercept	-0.22	0.39		-0.16	0.36		-0.58	0.40	
RKAM	0.30	0.09	0.30***	0.28	0.08	0.28***	0.21	0.09	0.21***
RKAA	0.43	0.09	0.43***	0.51	0.08	0.51***	0.46	0.09	0.46***
MNE age	-0.08	0.12	-0.04	-0.12	0.11	-0.06	-0.09	0.13	-0.04
MNE size	0.30	0.13	0.15	0.01	0.12	0.00	0.09	0.17	0.05
Industry	0.02	0.11	0.01	0.03	0.11	0.02	-0.02	0.12	-0.01
Subsidiary age	0.00	0.13	0.00	-0.08	0.12	-0.04	0.24	0.13	0.12
Subsidiary size	-0.07	0.14	-0.04	-0.06	0.13	-0.04	-0.10*	0.14	-0.05
Tenure	-0.04	0.03	-0.09	0.02	0.03	0.05	0.03	0.03	0.07
Expatriates	0.06	0.04	0.09	0.02	0.03	0.03	0.03	0.04	0.05
Subsidiary function	-0.08	0.12	-0.04	-0.22	0.11	-0.10***	-.20*	0.12	-0.09
Greenfield Subsidiary	0.16	0.14	0.06	0.41	0.13	0.16***	0.09	0.14	0.03
Wholly owned subsidiary	-0.18	0.11	-0.08	0.03	0.11	0.14	0.11	0.12	0.05
Adjusted R-squared	46%			53%			43%		
Model significance	F=15.52, d.f.=12 p<0.001			F=20.33, d.f.=12 p<0.001			F=13.84, d.f.=12 p<0.001		

*** significant at p<0.01; ** significant at p<0.05; *significant at p<0.1

6.1.2 Effect of RKAC on Innovation Performance

The effect of RKAC was tested on three types of MNE's innovation performance: new product innovativeness (Model 4), transnational new product development (NPD) capability (Model 5), and RKT contribution to firm innovation (Model 6). In each model, the dependent variable was regressed on RKAM and RKAA after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary.

The results are summarized in Table 15. In Model 4 (DV=new product innovativeness), both RKAA (β =0.26, p<0.001) and RKAM (β =0.39, p<0.001) have a significant positive effect on innovativeness. Notably, MNE age is negatively related to innovativeness (β =-0.21, p<0.001). That is, MNEs with a longer history tend to be less innovative. In total, Model 1 explains 38% of the variance in the RKT degree.

Model 5 regressed MNE-HQ's transnational NPD capacity on RKAC. Both RKAA (β =0.21, p<0.001) and RKAM (β =0.38, p<0.001) were positively related to MNE-HQ's transnational NPD capability. Subsidiary age is also related to transnational NPD capability (β =0.16, p<0.001), suggesting that senior subsidiaries are more likely to contribute to MNE's transnational new product development.

Model 6 tested the effect of RKAC on RKT contribution to firm innovation. As shown in Table 15, both RKAA (β =0.33, p<0.001) and RKAM (β =0.40, p<0.001) are positively related to RKT contribution to firm

innovation. That is, the more capable the MNE-HQs are in terms of absorbing reverse knowledge from a certain subsidiary, the more likely the specific subsidiary would contribute to MNE-HQ's innovation. Not surprisingly, the results show that subsidiary function has a negative effect on subsidiary's contribution to innovation (β =-0.09, p<0.1). This is because innovation is highly R&D intensive; R&D-focused subsidiaries thus are more likely to contribute to MNE-HQ's innovation compared with their counterparts whose major function is market development. Taken together, H_{2a}, H_{2b}, H_{2c} are supported.

Table 15: Main Effect of RKAC on Innovation Performance

Variable	Model 4 DV= **Innovativeness**			Model 5 DV= **Transnational NPD capability**			Model 6 DV= **Innovation Contribution**		
	B	S.E.	β	B	S.E.	β	B	S.E.	β
Intercept	-0.23	0.41		-0.09	0.44		0.04	0.39	
RKAM	0.26	0.10	0.26***	0.21	0.10	0.21***	0.33	0.09	0.33***
RKAA	0.39	0.10	0.39***	0.38	0.10	0.38***	0.40	0.09	0.40***
MNE age	-0.43	0.13	-0.21***	-0.09	0.14	-0.04	-0.14	0.12	-0.07
MNE size	0.23	0.14	0.11	0.13	0.15	0.06	0.06	0.13	0.03
Industry	0.06	0.12	0.03	-0.06	0.13	-0.03	0.07	0.11	0.03
Subsidiary age	0.06	0.14	0.03	0.33	0.15	0.16***	0.07	0.13	0.04
Subsidiary size	0.04	0.15	0.02	-0.18	0.15	-0.09	-0.13	0.14	-0.06
Tenure	0.00	0.03	0.01	-0.02	0.03	-0.05	0.05	0.03	0.11
Expatriates	0.04	0.04	0.06	0.01	0.04	0.01	-0.05	0.04	-0.07
Subsidiary function	-0.11	0.12	-0.05	-0.05	0.13	-0.03	-0.19	0.12	-0.09*
Greenfield Subsidiary	0.13	0.15	0.05	0.09	0.16	0.03	0.07	0.14	0.03
Wholly owned subsidiary	-0.05	0.12	-0.02	-0.08	0.13	-0.04	-0.04	0.11	-0.02
Adjusted R-squared		38%			30%			46%	
Model significance	F=11.58, d.f.=12 p<0.001			F=8.26, d.f.=12 p<0.001			F=15.60, d.f.=12 p<0.001		

*** significant at p<0.01; ** significant at p<0.05; *significant at p<0.1

6.2 Main Effects of Antecedents on RKAC

6.2.1 Antecedents of RKAM

Model 7 tested the antecedents of RKAM. It regressed RKAM on trust in subsidiary, host country competitiveness, and subsidiary power after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary. The results are summarized in Table 16.

The introduction of trust towards subsidiary, host country competitiveness, and subsidiary power after control variables increased the R-squared from 4% to 47%. Trust towards subsidiary (β =0.32, p<0.001), host country competitiveness (β =0.30, p<0.001), and subsidiary power (β =0.18, p<0.001) all are positively related to RKAM, lending support to H3, H4, and H5.

Subsidiary age is negatively related to RKAM (β =-0.11, p<0.001), suggesting that MNE-HQs are more motivated to absorb reverse knowledge from newly established subsidiaries. Subsidiary function is positively related to RKAM (β =0.13, p<0.001). MNE-HQs are more motivated to source knowledge from subsidiaries focused on market development. Whether the subsidiary is greenfield or not is also related to RKAM (β =-0.10, p<0.1). This means that MNE-HQs are more motivated to source knowledge from subsidiaries that are also joint ventures.

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Table 16: Main Effect of Antecedents on RKAM

Variable	Model 7 DV= **RKAM** Main Effect		
	B	S.E.	β
Intercept	0.06	0.39	
Trust towards subsidiary	0.32	0.07	0.32***
Host Country Competitiveness	0.30	0.07	0.30***
Subsidiary Power	0.18	0.07	0.18***
MNE age	0.20	0.12	0.10
MNE size	-0.09	0.13	-0.04
Industry	-0.15	0.11	-0.07
Subsidiary age	-0.23	0.13	-0.11*
Subsidiary size	-0.30	0.13	0.15**
Tenure	-0.02	0.03	-0.05
Expatriates	0.01	0.04	0.01
Subsidiary function	0.27	0.11	0.13**
Greenfield Subsidiary	-0.26	0.14	-0.10*
Wholly owned subsidiary	0.09	0.11	0.04
Adjusted R-squared	47%		
Model significance	F=14.95 d.f.=13 p<0.001		

6.2.2 Antecedents of RKAA

Model 8 tested the antecedents of RKAA. It regressed RKAM on relevance of subsidiary knowledge, HQ-subsidiary interaction, and cultural distance, after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary. The results are summarized in Table 17.

The introduction of the relevance of subsidiary knowledge, HQ-subsidiary interaction, and cultural distance after control variables increased the R-squared from 1% to 34%. Relevance of subsidiary knowledge (β =0.36, p<0.001) and HQ-subsidiary interaction (β =0.33, p<0.001) both are positively related to RKAA, lending support to H6 and H7. However, cultural distance (β =-0.01, p>0.1) does not have a significant relationship with RKAA, although the direction of the effect is negative. Therefore, H8 is not supported.

Table 17: Main Effect of Antecedents on RKAA

Variable	Model 8	DV= **RKAA**	
		Main Effect	
	B	S.E.	β
Intercept	0.22	0.44	
Relevance of Subsidiary knowledge	0.36	0.07	0.36***
HQ-subsidiary interaction	0.33	0.07	0.33***
Cultural distance	-0.01	0.03	-0.02
MNE age	0.05	0.13	0.03
MNE size	-0.23	0.15	-0.12
Industry	-0.17	0.13	-0.08
Subsidiary age	-0.01	0.14	-0.00
Subsidiary size	0.17	0.15	0.08
Tenure	0.02	0.03	0.04
Expatriates	-0.02	0.04	-0.03
Subsidiary function	0.16	0.13	0.07
Greenfield Subsidiary	-0.15	0.16	-0.06
Wholly owned subsidiary	0.13	0.13	0.62
Adjusted R-squared	34%		
Model significance	F=9.23 d.f.=13 p<0.001		

6.3 Moderating Effect on RKAM

6.3.1 The Moderating Effect of Innovation Culture

Model 9 tested the moderating effect of an organization's innovation culture on the link between (1) trust in subsidiary, (2) host country competitiveness, and (3) subsidiary power, after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary. Table 18 summarized the results of the moderated regression.

Surprisingly, the introduction of an innovation culture to the model as a moderator did not significantly increase the R-squared (from 47% to 48%). The moderating effects of innovation culture on the effect of (1) trust towards subsidiary (β =0.11, p>0.1); (2) host country competitiveness (β =0.11, p>0.1); and (3) subsidiary power (β =-0.05, p>0.1) are all not significant. Therefore, H_{9a}, H_{9b}, and H_{9c} are not supported.

Table 18: The Moderating Effect of Innovation Culture

Variable	Main Effect Only			Full Model		
			Model 9: DV=RKAM			
	B	S.E.	β	B	S.E.	β
Intercept	0.06	0.39		-0.05	0.40	
Trust towards subsidiary	0.32	0.07	0.32***	0.31	0.08	0.31***
Host Country Competitiveness	0.30	0.07	0.30***	0.31	0.08	0.31***
Subsidiary Power	0.18	0.07	0.18***	0.16	0.07	0.16***
Innovation Culture				0.11	0.08	0.11
Trust*Innovation Culture				0.08	0.06	0.11
HCC*Innovation Culture				0.07	0.06	0.09
Subsidiary power*Innovation Culture				-0.03	0.05	-0.05
MNE age	0.20	0.12	0.10	0.21	0.12	0.10*
MNE size	-0.09	0.13	-0.04	-0.09	0.13	-0.04
Industry	-0.15	0.11	-0.07	-0.17	0.11	-0.08
Subsidiary age	-0.23	0.13	-0.11*	-0.2	0.13	-0.10
Subsidiary size	-0.30	0.13	0.15**	0.28	0.13	0.14**
Tenure	-0.02	0.03	-0.05	-0.03	0.03	-0.06
Expatriates	0.01	0.04	0.01	0.02	0.04	0.03
Subsidiary function	0.27	0.11	0.13**	0.29	0.11	0.14***
Greenfield Subsidiary	-0.26	0.14	-0.10*	-0.23	0.14	-0.09
Wholly owned subsidiary	0.09	0.11	0.04	0.10	0.11	0.05
Adjusted R-squared		47%			48%	
Model significance		F=14.95 d.f.=13 p<0.001			F=12.07, d.f.=17, p<0.001	

*** significant at p<0.01; ** significant at p<0.05; *significant at p<0.1

6.3.2 The Moderating Effect of Global Orientation

Model 10 tested the moderating effect of an organization's global orientation on the link between (1) trust in subsidiary, (2) host country competitiveness, and (3) subsidiary power, on RKAM after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary. Table 19 summarized the results of the moderated regression.

Compared with the main effects only model, the introduction of interaction terms to this model increased the overall R-squared from 47% t0 53%). Global orientation is positively related to RKAM (β =0.32, p<0.001). That is, MNEs valuing globalization are more motivated to absorb reverse knowledge from their subsidiaries.

With regard to its moderating effect, global orientation does not condition the effect of trust towards subsidiary (β =0.09, p>0.1) or subsidiary power (β =-0.04, p>0.1) on RKAM. It strengthens the link between host country competitiveness and RKAM (β =0.32, p<0.001). Taken together, H_{10a} and H_{10c} are not supported. H_{10b} is supported.

Table 19: The moderating effect of Global Orientation

	Model 10: DV=**RKAM**					
	Main Effect Only			Full Model		
Variable	B	S.E.	β	B	S.E.	β
Intercept	0.06	0.39		-0.08	0.38	
Trust towards subsidiary	0.32	0.07	0.32***	0.21	0.07	0.21***
Host Country Competitiveness	0.30	0.07	0.30***	0.29	0.07	0.29***
Subsidiary Power	0.18	0.07	0.18***	0.12	0.06	0.12*
Global Orientation				0.32	0.08	0.32**
Trust* Global Orientation				0.06	0.06	0.09
HCC* Global Orientation				0.14	0.05	0.21***
Subsidiary power* Global Orientation				-0.05	0.04	-0.08
MNE age	0.20	0.12	0.10	0.15	0.12	0.07
MNE size	-0.09	0.13	-0.04	-0.08	0.13	-0.04
Industry	-0.15	0.11	-0.07	-0.12	0.11	-0.06
Subsidiary age	-0.23	0.13	-0.11*	-0.17	0.12	-0.09
Subsidiary size	-0.30	0.13	0.15**	0.28	0.13	0.14
Tenure	-0.02	0.03	-0.05	-0.03	0.03	-0.06
Expatriates	0.01	0.04	0.01	0.01	0.04	0.02
Subsidiary function	0.27	0.11	0.13**	0.28	0.11	0.13
Greenfield Subsidiary	-0.26	0.14	-0.10*	-0.22	0.13	-0.08
Wholly owned subsidiary	0.09	0.11	0.04	0.03	0.11	0.02
Adjusted R-squared	47%			53%		
Model significance	F=14.95 d.f.=13 p<0.001			F=14.33, d.f.=17, p<0.001		

*** significant at p<0.01; ** significant at p<0.05; *significant at p<0.1

6.4 Moderating Effect on RKAA

6.4.1 The Moderating Effect of Centralization

Model 11 tested the moderating effect of an organization's centralization on the effect of (1) relevance of subsidiary knowledge, (2) HQ-subsidiary interaction, and (3) cultural distance on RKAM, after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary. Table 20 summarizes the results of the moderated regression.

The introduction of innovation culture to the model does not change the R-squared (from 34% to 34%). The moderating effects of centralization on the effect of (1) relevance of subsidiary knowledge (β =-0.09, p>0.1); (2) HQ-subsidiary interaction (β =0.04, p>0.1); and (3) cultural distance (β =-0.03, p>0.1) are all not significant. Therefore, H_{11a}, H_{11b}, and H_{11c} are not supported.

Table 20: The Moderating Effect of Centralization

	Model 11: DV=**RKAA**					
	Main Effect Only			Full Model		
Variable	B	S.E.	β	B	S.E.	β
Intercept	0.22	0.44		0.24	0.46	
Relevance of Subsidiary knowledge	0.36	0.07	0.36***	0.30	0.08	0.30***
HQ-subsidiary interaction	0.33	0.07	0.33***	0.30	0.09	0.60***
Cultural distance	-0.01	0.03	-0.02	-0.01	0.04	-0.03
Centralization				0.11	0.12	0.11
Relevance*Centralization				-0.07	0.06	-0.09
Interaction*Centralization				0.04	0.7	0.04
Cultural distance* Centralization				-0.10	0.04	-0.03
MNE age	0.05	0.13	0.03	0.04	0.14	0.02
MNE size	-0.23	0.15	-0.12	-0.21	0.15	-0.11
Industry	-0.17	0.13	-0.08	-0.16	0.13	-0.08
Subsidiary age	-0.01	0.14	-0.00	-0.01	0.15	-0.05
Subsidiary size	0.17	0.15	0.08	0.16	0.16	0.08
Tenure	0.02	0.03	0.04	0.03	0.03	0.06
Expatriates	-0.02	0.04	-0.03	-0.03	0.04	-0.05
Subsidiary function	0.16	0.13	0.07	0.16	0.13	0.08
Greenfield Subsidiary	-0.15	0.16	-0.06	-0.17	0.16	-0.07
Wholly owned subsidiary	0.13	0.13	0.62	0.14	0.13	0.07
Adjusted R-squared	34%			34%		
Model significance	F=9.23 d.f.=13 p<0.001			F=7.14, d.f.=17, P<0.001		

*** significant at p<0.01; ** significant at p<0.05; *significant at p<0.1

6.4.2 The Moderating Effect of Cross-Cultural Competence

Model 12 tested the moderating effect of an organization's cross-cultural competence on the effect of (1) relevance of subsidiary knowledge, (2) HQ-subsidiary interaction, and (3) cultural distance on RKAM, after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary. Table 21 summarized the results of the moderated regression.

Compared with the main effects only model, the introduction of interaction terms to this model significantly increases the overall R-squared (from 34% t0 39%). Cross-cultural competence is positively related to RKAA (β =0.31, p<0.001). That is, MNEs valuing globalization are more motivated to absorb reverse knowledge from their subsidiaries.

With regard to its moderating effect, cross-cultural competence does not condition the effect of relevance of subsidiary knowledge (β =0.13, p>0.1) or cultural distance (β =-0.01, p>0.1) on RKAA. Surprisingly, organizational level cross-cultural competence significantly weakens the link between HQ-subsidiary interaction and RKAA (β =-0.15, p<0.05). That is, frequent interactions between HQ and its subsidiary are less likely to contribute to MNE-HQ's ability to absorb reverse knowledge in MNEs that are cross-culturally competent. Taken together, H_{12a}, H_{12b}, and H_{13c} are not supported.

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Table 21: The Moderating Effect of Cross-Cultural Competence

	Model 12: DV=**RKAA**					
	Main Effect Only			**Full Model**		
Variable	B	S.E.	β	B	S.E.	β
Intercept	0.22	0.44		0.58	0.45	
Relevance of Subsidiary knowledge	0.36	0.07	0.36***	0.18	0.08	0.18**
HQ-subsidiary interaction	0.33	0.07	0.33***	0.29	0.07	0.29***
Cultural distance	-0.01	0.03	-0.02	0.00	0.03	0.00
Cross-Cultural Competence (CC)				0.31	0.13	0.31**
Relevance*CC				0.09	0.06	0.13
Interaction*CC				-0.13	0.06	-0.15**
Cultural distance* CC				-0.00	0.04	-0.01
MNE age	0.05	0.13	0.03	0.18	0.13	0.09
MNE size	-0.23	0.15	-0.12	-0.20	0.15	-0.10
Industry	-0.17	0.13	-0.08	-0.24	0.12	-0.12**
Subsidiary age	-0.01	0.14	-0.00	-0.21	0.14	-0.10
Subsidiary size	0.17	0.15	0.08	0.25	0.15	0.13*
Tenure	0.02	0.03	0.04	-0.02	0.03	-0.04
Expatriates	-0.02	0.04	-0.03	-0.03	0.04	-0.04
Subsidiary function	0.16	0.13	0.07	0.30	0.12	0.14**
Greenfield Subsidiary	-0.15	0.16	-0.06	-0.25	0.16	-0.10
Wholly owned subsidiary	0.13	0.13	0.62	0.07	0.12	0.31
Adjusted R-squared	34%			39%		
Model significance	F=9.23 d.f.=13 p<0.001			F=8.64, d.f.=17, P<0.001		

*** significant at p<0.01; ** significant at p<0.05; *significant at p<0.1
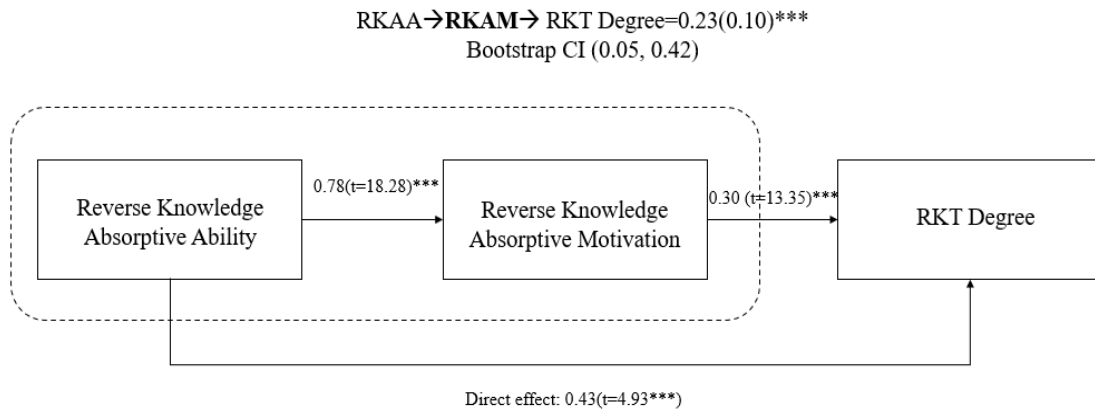
6.5 Additional Analysis

6.5.1 RKAA and RKAM: what is the intercorrelation?

One interesting direction for future research is to examine the intercorrelation between RKAA and RKAM. Scholars have argued that willingness or motivation would be affected by one's cognitive ability (Minbaeva, Park, Vertinsky, & Cho, 2018). Following this logic, headquarters' motivation to absorb knowledge from a certain subsidiary can be affected by their perceived ability to absorb such knowledge, how much effort to invest, and how long to persevere in the process of knowledge absorption (Bandura, 2001). In this sense, when headquarters' ability to absorb reverse knowledge is high, headquarters are more likely to exert efforts to do that. In contrast, when RKAA is low, headquarters foresees more obstacles and challenges, which further leads to a low RKAM. Combining these arguments, I test a mediation model where RKAM positively mediates the relationship between RKAA and RKT degree.

To test the indirect effect of RKAA on RKT degree through the mediating role of RKAM, I used the PROCESS mediation model (Hayes, 2012). This analysis model allows researchers to test direct and indirect effects simultaneously and generate bias-corrected bootstrap confidence intervals for indirect effects (Hayes, 2012). As shown in Figure 6, RKAA has both a direct effect on RKAM (β=0.78, p<0.001) and RKT degree (β=0.43, p<0.001). In addition, RKAA has an indirect effect on RKT degree through the mediator of RKAM (β=0.23, p<0.001). According to the mediation classification (Zhao, Lynch Jr, & Chen, 2010), because the indirect effect and direct effect of RKAA

both exist in the same direction, RKAM is a complementary mediator of the relationship between RKAA and RKT degree.

Figure 6: Intercorrelation between RKAM and RKAA

RKAA→**RKAM**→ RKT Degree=0.23(0.10)***
Bootstrap CI (0.05, 0.42)

| Reverse Knowledge Absorptive Ability | 0.78(t=18.28)*** | Reverse Knowledge Absorptive Motivation | 0.30 (t=13.35)*** | RKT Degree |

Direct effect: 0.43(t=4.93***)

6.5.1 Antecedents of RKAA and RKAM: alternative models

In this section, I tested if antecedents of RKAA can also be antecedents of RKAM, and vice versa.

Model 13 tested the effect of (1) trust in subsidiary, (2) host country competitiveness, and (3) subsidiary power, on RKAA after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary. Table 22 summarized the results.

Notably, this set of antecedents explained more variance in RKAA (adjusted R-squared=53%) than Model 8 in Table 16(adjusted R-squared=34%). Trust towards subsidiary (β=0.42, p<0.001), host country competitiveness

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(β=0.27, p<0.001), and subsidiary power (β=0.18, p<0.001), are all positively related to RKAA.

Model 14 tested the effect of (1) relevance of subsidiary knowledge, (2) HQ-subsidiary interaction, and (3) cultural distance on RKAM, after controlling for the following variables: MNE age, MNE size, industry, subsidiary age, subsidiary size, tenure, number of expatriates, subsidiary function, greenfield subsidiary, and wholly-owned subsidiary. Table 23 summarized the results.

Compared with Model 7 in Table 16 (adjusted R-squared=47%), this set of antecedents has a lower explanation power (adjusted R-squared=32%). Relevance of subsidiary knowledge (β=0.25, p<0.001) and HQ-subsidiary interaction (β=0.35, p<0.001) are both positively related to RKAM. Cultural distance is not related to RKAM.

Model 15 and 16 tested the effect of (1) trust towards subsidiary, (2) host country competitiveness, (3) subsidiary power, (4) relevance of subsidiary knowledge, (5) HQ-subsidiary interaction, and (6) cultural distance on RKAM and RKAA, respectively. Table 24 summarized the results.

Consistent with our proposed conceptual framework, trust towards subsidiary (β=0.29, p<0.001) and host country competitiveness (β=0.25, p<0.001) are important antecedents of RKAM. Subsidiary power is not related to RKAM in Model 15 (β=0.08, p>0.1). Instead, HQ-subsidiary interaction becomes a third antecedent (β=0.17, p<0.001).

Contrary to our proposed conceptual framework, for RKAA, only relevance of subsidiary knowledge ($\beta=0.17$, $p<0.001$) remain as a significant antecedent of RKAA. The other two are trust towards subsidiary ($\beta=0.38$, $p<0.001$) and host country competitiveness ($\beta=0.22$, $p<0.001$). Taken together, trust towards subsidiary and host country competitiveness are significant antecedents for both RKAM and RKAA.

Table 22: Alternative Model of RKAA

	Model 13 DV= **RKAA**		
	Main Effect		
Variable	B	S.E.	β
Intercept	-0.06	0.37	
Trust towards subsidiary	0.42	0.07	0.42***
Host Country Competitiveness	0.27	0.07	0.27***
Subsidiary Power	0.18	0.06	0.18***
MNE age	0.10	0.11	0.05
MNE size	-0.12	0.12	-0.06
Industry	-0.09	0.11	-0.05
Subsidiary age	-0.14	0.12	-0.07
Subsidiary size	0.21	0.13	0.11
Tenure	-0.00	0.03	-0.00
Expatriates	0.03	0.03	0.04
Subsidiary function	0.20	0.11	0.09
Greenfield Subsidiary	-0.19	0.13	-0.07
Wholly owned subsidiary	0.07	0.11	0.03
Adjusted R-squared	0.53		
Model significance	F=18.78 d.f.=13 p<0.001		

Table 23: Alternative Model of RKAM

Variable	Main Effect		
	B	S.E.	β
Intercept	0.35	0.44	
Relevance of subsidiary knowledge	0.25	0.07	0.25***
HQ-subsidiary interaction	0.38	0.07	0.38***
Cultural distance	-0.02	0.04	-0.04
MNE age	0.15	0.14	0.07
MNE size	-0.20	0.15	-0.10
Industry	-0.21	0.13	-0.10
Subsidiary age	-0.10	0.15	-0.05
Subsidiary size	0.29	0.16	0.14
Tenure	-0.01	0.03	-0.02
Expatriates	-0.04	0.04	-0.05
Subsidiary function	0.25	0.13	0.12
Greenfield Subsidiary	-0.23	0.16	-0.09
Wholly owned subsidiary	0.11	0.13	0.05
Adjusted R-squared	0.32		
Model significance	F=8.52, d.f.=13 p<0.001		

The header row shows "Model 14   DV= **RKAM**" above the "Main Effect" span.

Table 24: Alternative Model for RKAM and RKAA

Variable	Model 15 DV= **RKAM** Main Effect β	Model 16 DV= **RKAA** Main Effect β
Trust towards subsidiary	0.29***	0.38***
Host country competitiveness	0.25***	0.22***
Subsidiary power	0.08	0.08
Relevance of subsidiary knowledge	0.08	0.17***
HQ-subsidiary interaction	0.17***	0.09
Cultural distance	-0.03	-0.00
MNE age	0.09	0.05
MNE size	-0.08	-0.09
Industry	-0.08	-0.06
Subsidiary age	-0.10	-0.06
Subsidiary size	0.14***	0.08
Tenure	-0.03	0.01
Expatriates	-0.01	0.02
Subsidiary function	0.12***	0.08*
Greenfield Subsidiary	-0.10*	-0.07
Wholly owned subsidiary	0.03	0.03
Adjusted R-squared	53%	55%
Model significance	F=13.10, d.f.=16 p<0.001	F=16.77, d.f.=16 p<0.001

CHAPTER 7 DISCUSSION

Exploiting knowledge generated in or by subsidiaries is clearly an important concern for MNEs. However, our understanding of MNE-HQ's reverse knowledge absorptive capacity is very limited. To enrich our understanding, in this dissertation, I address three fundamental questions that are very important for knowledge management and the international business literature: (1) how do we define MNE-HQ's absorptive capacity of reverse knowledge? (2) does this capacity matter for MNEs' knowledge management and innovation performance? and (3) how do we promote such capacity in the organization? Specifically, I develop a new conceptualization of MNE-HQ's RKAC and a systematic framework that accounts for its antecedents and outcomes. The model is further tested by a survey study of 206 MNEs' subsidiaries in China, one of the world's largest emerging markets. The results supported most of the hypotheses. Overall, this study provides a richer understanding of the reverse knowledge transfer process with a comprehensive conceptualization, systematic theorization, and empirical verification. The following sections will first summarize and discuss the key findings. Following that, the theoretical and managerial implications will be discussed. The last two sections of the dissertation are dedicated to a discussion of the research limitations and future research avenues.

7.1 Summary and Discussion of findings

Table 25 summarizes the results of the hypotheses testing. As predicted, MNE-HQ's RKAC were positively related to MNE's RKT outcomes, including

RKT degree, quality, and speed. Notably, since the unit of analysis in this study is the HQ-subsidiary dyad, the dependent variables of RKT degree, quality, and speed were also specified to refer to reverse knowledge from a certain subsidiary. In addition, this study investigates the RKT outcomes from three dimensions, allowing scholars to have a comprehensive view of the phenomenon. Taken together, H1 is well-supported by the data, and addresses one of fundamental questions: *does MNE-HQ's RKAC matter for RKT?*

The positive effect of RKAC on MNE's innovation performance is also well supported by the data (H2a, H2b, and H2c). Interestingly, I found that MNE-HQ's RKAC not only contributed to product innovativeness but also to headquarters' transnational new product development capability. This implies that MNEs may leverage knowledge from one specific subsidiary to benefit the product innovation and market development in other subsidiaries. This also reinforces the importance of RKT for MNE's global innovation and long-term competitiveness. I also found that MNE-HQ's RKAC was positively related to the extent a certain subsidiary can contribute to headquarters' innovation. This means that, the higher RKAC, the more value the headquarters can derive from its subsidiaries. Given the nature of an MNE as a global network for innovation, these findings provide valuable insights into how to leverage knowledge from the dispersed subsidiary network to benefit long-term innovation performance.

In terms of the antecedents of RKAM and RKAC, the most of my hypotheses are supported (H3-H7). Results show that trust towards subsidiary, hos country competitiveness, and subsidiary power were all positively related to RKAM. MNE-HQs would be more motivated to source knowledge from

subsidiaries that are trusted by its headquarters, located in a competitive host country, and with more power. In addition, results show that relevance of subsidiary knowledge and HQ-subsidiary interaction are positively related with RKAA.

Surprisingly, the negative effect of cultural distance on RKAM was not supported. One possible reason is that the measure of cultural distance is not the most ideal for this research setting. In this study, cross-cultural distance was measured with a cluster approach (Clark & Pugh, 2001). Scholars have documented other ways to measure cultural distance, including both objective measures and subjective measures (Shenkar, 2001). Future studies may use different measures to reinvestigate the relationship between cultural distance and RKAM.

When it comes to the moderating effect, most of the hypotheses were not supported. This is not surprising, given interaction effects are usually more difficult to detect than main effects in field studies (McClelland & Judd, 1993). Another possible reason could be a lack of variation in these variables. A basic descriptive analysis shows that the standard deviation of the moderating variables is all below 1 (innovation culture: 0.73; global orientation: 0.76; centralization: 1.0; cross-cultural competence: 0.85). This lack of variation can make it difficult to detect significant interaction in the dataset.

As predicted, global orientation strengthens the link between host country competitiveness and RKAM (H10b). This is reasonable because global-orientated MNEs tend to pay more attention to subsidiaries outside of the home

country. When host country competitiveness is high, MNEs with a high global orientation would be more sensitive to knowledge from these countries and thus become more motivated to absorb this knowledge.

Taken together, the model testing results lend support to the majority of the main effects proposed in this model. It also generated some unexpected moderating effects that may serve as interesting avenues for future research.

Table 25: Summary of Hypotheses Testing Results

Hypotheses		
H_{1a}	RKAC positively influences RKT degree.	Supported
H_{1b}	RKAC positively influences RKT quality.	Supported
H_{11c}	RKAC positively influences RKT speed.	Supported
H_{2a}	RKAC positively influences MNE's innovativeness.	Supported
H_{2b}	RKAC positively influences MNE's transnational new product development capability.	Supported
H_{2c}	RKAC positively influences the subsidiary's contribution to MNE's innovation.	Supported
$H3$	Trust towards subsidiary positively influences RKAM.	Supported
$H4$	Host country competitiveness positively influences RKAM.	Supported
$H5$	Subsidiary power positively influences RKAM.	Supported
$H6$	Relevance of subsidiary knowledge positive influences RKAA.	Supported
$H7$	HQ-subsidiary interaction positively influences RKAA.	Supported
$H8$	Cultural distance negatively influences RKAA.	n.s.
H_{9a}	Innovation culture strengthens the link between trust towards subsidiary and RKAM	n.s.
H_{9b}	Innovation culture strengthens the link between host country competitiveness and RKAM.	n.s.
H_{9c}	Innovation culture strengthens the link between subsidiary power and RKAM.	n.s.
H_{10a}	Global orientation strengthens the link between trust towards subsidiary and RKAM	n.s.
H_{10b}	Global orientation strengthens the link between host country competitiveness and RKAM.	Supported
H_{10c}	Global orientation strengthens the link between subsidiary power and RKAM.	n.s.
H_{11a}	Centralization weakens the link between relevance of subsidiary knowledge on RKAA.	n.s.
H_{11b}	Centralization weakens the link between HQ-subsidiary interaction and RKAA.	n.s.
H_{11c}	Centralization weakens the link between cultural distance and RKAA.	n.s.
H_{12a}	Cross-cultural competence strengthens the link between relevance of subsidiary knowledge on RKAA.	n.s.
H_{12b}	Cross-cultural competence strengthens the link between HQ-subsidiary interaction and RKAA.	n.s.
H_{12c}	Cross-cultural competence strengthens the link between cultural distance and RKAA.	n.s.

7.2 Theoretical Implications

7.2.1 Contribution to the Literature on Absorptive Capacity

This study is one of the few studies that focus on the MNE-HQ's absorptive capacity in the reverse knowledge transfer process. A significant departure of this study from the previous literature is that it takes the HQ-subsidiary dyad as the unit of analysis to understand the concept and effect of absorptive capacity. Existing research tends to conceptualize MNE-HQ's absorptive capacity as a generic and firm-level characteristic that does not vary according to knowledge senders (Nair et al., 2015; Nair et al., 2016). An underlying assumption is that MNE-HQ is equally motivated and capable of absorbing *any* reverse knowledge from *any* subsidiary. However, considerable variation often exists across different subsidiaries. Given the structural (e.g., bottom-up and many-to-one) and political features (e.g., power asymmetry) of reverse knowledge transfer, it is unrealistic to expect that MNE-HQs will pay equal attention to knowledge from different subsidiaries of different levels of strategic importance. In other words, it is unrealistic to treat MNE-HQ's absorptive capacity as a single firm-level value. If the MNE-HQ's absorptive capacity of reverse knowledge is investigated at the overall firm level, the findings are likely to be confounded. It will also confuse scholars in terms of the building mechanism of absorptive capacity, and fail to provide implications to practitioners.

A major contribution of this study is that it develops a new conceptualization of MNE-HQ's RKAC that is specifically for the unit level of analysis, *i.e.*, HQ-subsidiary dyad. It proposes variation of the MNE-HQ's

absorptive capacity of reverse knowledge across MNEs' subsidiaries. I believe that this approach better captures the complexity of the reverse knowledge transfer phenomenon and has the potential to make the construct more realistic and relevant for MNE's knowledge management efforts. Notably, since this construct is developed for the HQ-subsidiary dyad as opposed to the typical firm level of analysis, a re-specification of the main elements of absorptive capacity was carefully carried out. Starting from the behavioral foundation of absorptive capacity, I conceptualized MNE-HQ's absorptive capacity of reverse knowledge from a certain subsidiary—RKAC—as a two-dimensional construct of reverse knowledge absorptive motivation (RKAM) and reverse knowledge absorptive ability (RKAA). Both RKAM and RKAA are allowed to vary across subsidiaries. This is important for explaining why and how MNE-HQs exhibit different levels of interest and ability in absorbing knowledge from different subsidiaries, which further causes different outcomes of RKT across HQ-subsidiary dyads.

This re-specification of construct elements also takes into consideration the process of absorptive capacity, namely identification, assimilation, and application. Specifically, the constructs of RKAM and RKAA are further expanded to become three-dimensional constructs, respectively. Existing literature generally tends to ignore the processes of absorptive capacity. Absorptive capacity is treated as an all-purpose unidimensional construct. In reality, especially in the context of reverse knowledge transfer, an MNE-HQ may encounter different obstacles in each step of knowledge absorption. As a result, they may exhibit different behavioral patterns to deal with these

obstacles. Therefore, a distinction of three different actions is needed to fully capture the concept of absorptive capacity. For this reason, this study further conceptualized RKAC as MNE-HQ's motivation and ability to identify, assimilate, and apply the reverse knowledge from a certain subsidiary. All six subdimensions have to be present in order for an MNE-HQ to get reverse knowledge transfer.

The second major contribution of this dissertation is that it integrated two previously disconnected perspectives of absorptive capacity, *i.e.*, (1) the motivation-ability perspective and (2) the process perspective. Existing literature tends to focus on one perspective when conceptualizing absorptive capacity (Minbaeva et al., 2003; Schleimer & Pedersen, 2013). This not only leaves our understanding of absorptive capacity incomplete, but also makes the comparison between studies adopting different perspectives difficult. A lack of a generally accepted conceptualization further limits the generalizability of research findings and hinders knowledge development. In this study, as opposed to taking sides in this debate by choosing to focus on either a motivation-ability view or a process view of absorptive capacity, I combined these two views to capture the full breadth of the construct. I argue that there is no reason to position these two perspectives as mutually exclusive and antagonistic, as both dimensions focus on a different aspect of absorptive capacity in MNC-HQs. By combining these two views, the new construct of RKAC offers a more realistic and comprehensive understanding of absorptive capacity in this specific context and could increase the generalizability of results.

Third, by leveraging the overall knowledge management framework in MNEs, this study offers an explanation of both knowledge sender-specific and HQ-subsidiary relationship-specific factors that determine the formation of RKAC in MNEs. The results indicate that the context in which the subsidiary is externally embedded has a significant effect on RKAC, as exemplified by the effect of host country competitiveness in this study. Internally, the HQ-subsidiary relations, such as trust towards subsidiary and HQ-subsidiary interaction, also present as critical predictors. In this sense, this framework highlights the value of leveraging the contextual embeddedness of the HQ-subsidiary knowledge transfer in explaining the MNE-HQ's absorptive capacity. By contextualizing, this study provides a more fine-grained explanation of what determines MNE-HQ's RKAC. It also provides more specific and detailed guidance to MNEs in terms of fostering such capacity within the headquarters.

7.2.2 Contribution to the Literature of Reverse Knowledge Transfer

Absorptive capacity is a critical predictor of knowledge transfer effectiveness (Junni & Sarala, 2013; Minbaeva et al., 2003). Understanding MNE-HQ's absorptive capacity of reverse knowledge is especially important. MNEs rely on the knowledge from their dispersed subsidiary network to carry out innovation activities and stay competitive. Without a good understanding of RKAC, our understanding of how to make RKT effective is incomplete. In addition, MNEs would fail to capitalize on a very valuable source of advantage and even lose their long-term competitiveness.

Unfortunately, the current literature fails to provide a clear and unified definition of RKAC. Scholars assume that headquarters would automatically be

able to absorb reverse knowledge from its subsidiaries. Stated differently, existing studies believe that RKAC is a firm-level rather than subsidiary-specific variable. Therefore, the unit of analysis of RKAC is unclear in the existing literature. Second, existing studies ignore the motivation aspect of absorptive capacity. Scholars assume that MNE-HQs would be equally interested in reverse knowledge from different subsidiaries. However, given the limited attention of MNE-HQs, such an assumption barely holds in reality. This is a second weakness of the current literature. Third, knowledge absorption is a complicated process including knowledge identification, assimilation, and application. However, existing studies largely ignore the courses of action involved in knowledge absorption; they use firm-level knowledge base or training activities to measure absorptive capacity. Such an oversimplified measure of absorptive capacity fails to reflect the complexity in RKT.

As a result, our understanding of the role of the knowledge receiver's absorptive capacity in the RKT process is at best incomplete and at worst incorrect. Whether MNE-HQ's RKAC matters for the RKT effectiveness is unknown. This largely hinders knowledge development in the RKT literature. This study fills the gap by offering a broad conceptualization of RKAC, which provides a comprehensive view and unified theoretical framework to interpret MNE-HQ's RKAC.

This study also contributes to the literature on reverse knowledge transfer on the following ways. First, this study clearly points out that MNE-HQ's RKAC is subsidiary-specific. Therefore, future studies should focus on each HQ-subsidiary as the unit of analysis to study RKT effectiveness. In addition, this

study provides a six-dimensional construct of RKAC that delineates each step of knowledge absorption by integrating both the motivation-ability perspective and the process-based perspective. Each dimension is relevant and important for MNE-HQs to effectively absorb reverse knowledge. In this sense, this study improves the theoretical underpinning of absorptive capacity in the RKT literature.

Specifically, this broad conceptualization of RKAC suggest that MNE-HQs need to pay attention to RKT along a number of dimensions. For them to effectively receive reverse knowledge, MNEs cannot just have the will to transfer knowledge; they have to build a culture around it, and more importantly, to back it up with processes and skilled individuals who can integrate the reverse knowledge. In a similar vein, for MNEs that already have such an ability to transfer knowledge but are not doing it, they really need to reconsider idea of knowledge sourcing from overseas and promote a willingness towards reverse knowledge transfer. The core argument here is that MNE-HQs would not automatically absorb reverse knowledge. Correspondingly organizational culture, mindset, skilled employees, and processes must be in place to facilitate RKT. This also enriches our understanding of the RKT phenomena. Existing studies in the RKT literature primarily focus on the knowledge senders (i.e., subsidiaries) to investigate the effectiveness of RKT. Given the dominant role of MNE-HQs in ensuring RKT, this study suggests that more attention could be paid to knowledge receivers. It

Second, this new conceptualization of RKAC might help set an agenda for future research on reverse knowledge transfer. The conceptualization and

measurement model of RKAC would allow researchers to examine each dimension of RKAC in detail, which could expand our understanding of the knowledge absorption process. For example, existing studies do not offer many explanations about how different stages of knowledge absorption (i.e., identification, assimilation, and application) differently affect RKT outcomes. Because MNEs may value RKT outcomes such as extent, quality, and speed, to different degrees, it is worthwhile to examine the separate effect of RKAC dimensions on different RKT outcomes. It would also be worthwhile to separately investigate the antecedents of each dimension of RKAC. For example, factors that are conducive to building identification motivation are not necessarily beneficial for building identification ability. In this case, exploring antecedents of each dimension could offer a more specific guidance to MNEs.

Third, the broad conceptualization of RKAC might also lead to theorizing about why some organizations seem to do well with some aspects of RKT but not others. Specifically, future studies may discuss several scenarios reflecting various levels of RKAA and RKAM that lead to different manifestations of RKAC. For example, scholars may discuss four stylized scenarios depending on whether RKAA and RKAM are high or low. Doing so would allow us to have four basic types of MNEs based on their RKAC: (1) high RKAA and high RKAM—reverse knowledge expert; (2) high RKAA but low RKAM—reverse knowledge discarder; (3) low RKAA and low RKAM—reverse knowledge insulator; and (4) low RKAA but high RKAM—reverse knowledge admirer. This categorization might offer a find-grained explanation as to why some MNEs are better than others in absorbing reverse knowledge from subsidiaries.

MNEs could also use it as a reference to see to which category they belong and find the corresponding direction to improve.

Figure 7: Stylized Scenario in RKT

		RKAM	
		Low	High
RKAA	Low	reverse knowledge *insulator*	reverse knowledge *admirer*
	High	reverse knowledge *discarder*	reverse knowledge *expert*

Another contribution of this study is that it offers a holistic investigation of RKT outcomes. Existing literature tends to focus on only one aspect of RKT outcome, be it RKT degree or RKT benefit. However, the RKT process is complicated; correspondingly, the outcomes of RKT should be evaluated from multiple perspectives. This study offers a comprehensive investigation of RKT outcomes by incorporating three dimensions of *degree, quality,* and *speed* (Hansen, 2002; Sheremata, 2000; Van Wijk et al., 2008; Zander & Kogut, 1995). Such a comprehensive investigation confirms the role of RKAC in determining RKT outcomes. Apart from RKT-related outcomes, this study also links MNE-HQ's RKAC to MNE's innovation performance. As subsidiaries, especially those in emerging markets, become more strategically important, more and more MNEs start to source subsidiary knowledge to fuel innovation. Therefore, empirical tests to substantiate the relationship between absorptive capacity and innovation performance become imperative. This study contributes to this stream of literature by examining the effect of RKAC on three dimensions of

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innovation, including MNE-HQ's innovativeness, transnational new product development capacity, and subsidiary's contribution to MNE-HQ's innovation. Taken together, this study contributes to the RKT literature by introducing a new concept of RKAC to explain a wide range of RKT outcomes and innovation performance in MNE-HQs, enriching our understanding of the overall RKT process.

7.2.3 Contribution to Organization Learning Theory

This study contributes to the organizational learning literature in the following ways. First, this study focuses on the unique learning context of RKT. Absorptive capacity is a critical element of organizational learning. While previous studies primarily treat absorptive capacity as a firm-specific stable trait, this study argues that a firm's absorptive capacity may exist at multiple levels. A firm-level absorptive capacity is not the same as the absorptive capacity in a HQ-subsidiary dyad. Therefore, it is theoretically necessary to examine a firm's absorptive capacity in different learning situations. Indeed, scholars have long called for studies to develop a reconceptualization of absorptive capacity based on a careful evaluation of the research context (Lane et al., 2006). This study answers this call by proposing and testing a new construct of MNE-HQ's RKAC.

Second, this study serves as a significant attempt to integrate different studies on absorptive capacity into a new reconceptualization. As an important construct in the organizational learning literature, absorptive capacity has been examined from different perspectives. For example, scholars have investigated the processes involved in absorptive capacity (Jansen, Van Den Bosch, &

Volberda, 2005; Schleimer & Pedersen, 2013), and the behavioral foundations including motivation and ability of absorptive capacity (Dana Minbaeva et al., 2014; Oddou et al., 2009; Volberda et al., 2010). While so doing enriches our understanding of the construct, it also makes the comparison of different studies impossible because different studies use different theoretical lens. It also reduces the generalizability of the research findings. Integrating different perspectives makes the construct and theory more relevant and applicable to organizations.

Based on an in-depth analysis of the contextual features of RKT, this study argues that different views of absorptive capacity are not mutually exclusive but complementary to each other. Each perspective defines a key feature of MNE-HQ's reverse knowledge absorption. Based on these arguments, our conceptualization of MNE-HQ's RKAC integrates the motivation-ability and process view of absorptive capacity. To the best of our knowledge, this is the *first* attempt to integrate multiple perspectives to develop a new conceptualization of AC .We believe integrating different perspectives makes the construct of MNE-HQ's RKAC more relevant and applicable to the RKT context. Notably, while this construct is developed against the backdrop of the RKT, the overall framework and logic of the new conceptualization should also apply to other learning settings such as learning from MNE's joint ventures or learning from competitors. In this sense, this study also contributes to the general field of organizational learning.

Third, this study builds a linkage between organizational learning and MNE's knowledge creation and internationalization. Existing literature has

long been criticized for having strikingly little mutual engagement and interaction between fields of global strategy and organizational learning (Hotho et al., 2015). With regard to the context of RKT, although the value of reverse knowledge is gaining more recognition recently, our understanding of how learning works in MEN-HQS and how it influences global strategy remains very limited. Our study supports the contention that learning of reverse knowledge is a complicated, multi-stage process and that MNE-HQ's different levels of RKAC may significantly shape their innovation strategy and performance. Specifically, both motivation and ability are important for MNEs to leverage reverse knowledge. In this sense, this study provides a new theoretical lens from the organizational learning perspective to explain MNE's different global strategies.

Lastly, this dissertation deepens the understanding of the critical role of the contextual features in the learning process. Previous studies tend to regard absorptive ability as a stable trait of the firm and mainly use it as an independent variable. In this dissertation, I propose that MEN-HQ's RKAC is not endogenous to the firm. Instead, it can be shaped by the complicated contextual features surrounding the HQ-subsidiary dyad and the institutions of the subsidiary. Therefore, this study also moves one step further in synthesizing the literature of institutional theory and organizational learning. In addition, this study finds that organizational-level factors, such as global orientation, can moderate the relationship between institutional factors (e.g., host country competitiveness) and RKAC. This finding shows the promise of

leveraging a multilevel perspective (i.e., HQ-subsidiary dyad level and MEN organizational level) in investigating MNE's learning behavior.

7.3 Managerial Implications

This study provides several managerial implications for MNEs on how to best manage reverse knowledge transfer and improve global innovation performance. First, this study redirects MNE's attention to the role of headquarters—the receiver of reverse knowledge—in effectively managing reverse knowledge transfer. Existing studies primarily focus on subsidiaries (e.g., Nair et al. (2016) and Najafi-Tavani et al. (2012)) and downplay or even ignore how MNE-HQs may contribute to the RKT process. This study suggests that MNE-HQs can play an important role in the RKT process. Therefore, instead of solely focusing on the subsidiaries, MNEs should better balance their attention between HQs and their subsidiaries to optimize the process of RKT.

Specifically, the results suggest that MNE-HQ's RKAC is an important predictor of RKT outcomes (including degree, quality, and speed) and MEN's innovation performance. It is thus important for MNEs to build such a capacity to fully reap the benefit of reverse knowledge from its dispersed subsidiaries. Specifically, my broad conceptualization of RKAC suggests that MNE-HQs should pursue both motivation and ability to fully cultivate RKAC. An unbalanced focus on only one dimension of RKAC may not help MNEs learn and manage knowledge transfer. For example, an exclusive focus on improving MNE-HQ's motivation would not equip it with the actual ability to execute the knowledge absorption process. Similarly, MNE-HQ's ability without motivation

to absorb reverse knowledge may result in a waste of resources. Many MNEs, especially those from advanced markets, may easily miss the reverse knowledge from their subsidiaries, not for a lack of ability but a lack of motivation. However, since advance markets are no longer the *only* center of economic growth, MNEs must overcome their strategic myopia and re-evaluate the value of knowledge from areas outside of the home countries of the MNEs, such as emerging markets and less-developed countries. Given the dramatically different customer preferences and market dynamics, it is not realistic to assume that the practices from MNEs' home countries would be equally effective in another market. Therefore, being motivated to learn from other markets becomes necessary.

Second, this dissertation suggests a series of actions that MEN-HQs can take to improve their absorptive capacity. For example, the results show that MEN-HQ's trust in subsidiaries, as well as the power it delegates to its subsidiaries, would largely motivate the headquarters to absorb knowledge. Therefore, it seems advisable for MNEs to build trust in their subsidiaries and authorize more power to their subsidiaries. Specifically, trust towards subsidiaries could be strengthened by implementing international human resource management practices (Chung, 2014; Whitener, 2006). For example, MNE-HQs may involve in the recruitment and selection processes in subsidiaries; or they may directly assign employees to subsidiaries (e.g., expatriates). MNE-HQs may also provide training in relevant skills as a way to build trust in their subsidiaries. Understandably, some MNE-HQs are not willing to delegate power to subsidiaries due to their concerns about an agency

problem (i.e., subsidiaries with more trust or power may not act in the best interest of the headquarters). This study provides a new angle for MNEs to make a trade-off between the potential gains and costs of so doing. MNE-HQs can also design certain coordination mechanisms, such as formal and informal meetings, to make sure that subsidiaries with power would still act in the best interest of the parents. MNEs should also pay close attention to the host country of the subsidiaries to stay on the top of its technology advancement and customer needs. Specifically, MNEs may host meetings regularly to listen to subsidiaries; or gather industrial reports, newsletters, and customer surveys from competitive host countries. MNEs may also set up subsidiaries in competitive countries as an effort to gather information.

In addition, this study shows that the relevance of subsidiary knowledge and HQ-subsidiary interaction are important predictors of RKAA. Therefore, headquarters may pay close attention to the subsidiary's knowledge to be in a better position to understand the reverse knowledge. For example, subsidiary managers could be asked to keep records and file reports on their knowledge management activities. MNE-HQs may also invest in advanced knowledge storage systems so that headquarters can easily search for knowledge embedding in different subsidiaries. Frequent interactions between headquarters and subsidiaries should also be encouraged., in the sense that it helps headquarters better understand and apply the knowledge. These interactions may take place in the form of informal (e.g., emails, telephone calls, virtual meetings) or formal interactions (e.g., business trips, expat training, conferences, and employee exchange).

Lastly, this study suggests that MNEs as a whole should actively promote a global orientation to facilitate the formation of RKAC in the headquarters. Global orientation helps MNEs better overcome the potential domestic myopia and an ethnocentric mindset in that it reflects an open attitude towards reverse knowledge and promotes a learning culture within the MNEs. This overall organizational culture can help smooth the reverse knowledge transfer in HQ-subsidiary dyads. Therefore, it is beneficial for MNEs to nurture a global orientation in their internationalization process.

7.4 Limitations

This study has several limitations. First, given the unit of analysis in this study is an HQ-subsidiary dyad, it would be most ideal to collect dyad data from both the headquarters and the subsidiaries to test the model. In the current study, some key constructs, such as RKAC and RKT outcomes, are measured with the subsidiary's perception. Although I believe that subsidiary-level managers qualify as key informants in this research setting, direct measures from the headquarters' perspective would increase the accuracy of the measures.

Second, although I checked the common method variance in this study, the possibility of single-source bias could not be completely ruled out. That is, there could be overlapping variability among some variables due to the way data were collected (i.e., data was solely collected from subsidiary managers using survey) rather than from a real, substantive relationship (Campbell & Fiske, 1959). For example, it is likely that subsidiary informants are going to indicate that subsidiary-level knowledge is going to have an effect at the firm

level. This is because the survey asked subsidiary informants to reflect upon their perceptions, which by nature, are less accurate or objective. It is very difficult for subsidiary informants to distinguish between the perceived effect of subsidiary knowledge on the firm and its actual effect. In this case, the relationship in the proposed framework could be biased.

Third, this study could suffer from a lack of divergent validity. Divergent validity is used to determine if a test is too similar to another test. The additional analysis shows that all antecedents of RKAM are also strongly related to RKAA, and vice versa. Indeed, when antecedents of both RKAM and RKAA are simultaneously introduced to the model, the regression results are very similar. This implies that, although RKAM and RKAM are theorized to be different, they are not empirically distinguishable.

Fourth, the cross-sectional nature of the study constrains the ability to make causal inferences between independent and dependent variables. A longitudinal research design in which RKAC was measured before RKT outcomes were reported is necessary to establish any causal relationships.

Fifth, the sample used in this study only allows one subsidiary from one MNE. This makes it impossible to compare MNE's RKAC to different subsidiaries. Given that a key contention of my model is that RKAC is subsidiary-specific, it would be beneficial to test the model with a dataset in which multiple subsidiaries are mapped to one MNE. Doing so would allow researchers to have a better understanding of how RKAC differs across subsidiaries.

Researchers should be cautioned about generalizing the results to other countries as the current study is limited to one host country-China. Although China has become a popular destination for MNEs to establish subsidiaries, it would increase the generalizability of the findings if subsidiaries were located in different host countries.

Due to the constraints in the research scope, this study only focused on certain organizational factors that have an impact on the formation of RKAC. The results indicated that only global orientation was a significant organization-level factor. Therefore, there is room to explore other organizational context factors such as formalization to further test the model. The sample size of this study is relatively small. This may explain why the vast majority of the moderating effects were not supported. Future studies can enhance the statistical power with a greater sample size.

Lastly, RKT outcomes and innovation performances were examined with subjective measures in this study. This could bias the findings, since the subsidiary's subjective judgment of these variables may not perfectly correspond with the objective performance. Future studies can improve these measures with objective data. Such data could be in the form of secondary archival data or text data. In this way, scholars can better map MNE-HQ's RKAC to the innovations associated with the specific subsidiary.

7.5 Future Research Avenues

One direction is to further unpack six second-order dimensions of RKAC and explain the interdependencies and causal relationships among them. Inquiry into this issue would allow us to better design a governance mechanism and processes to manage RKAC and ultimately improve the effectiveness of RKT. Scholars may also want to study the aggregated level implications of RKAC on organizational outcomes such as strategic agility and internationalization.

In addition, the construct of RKAC can serve as a foundation to investigate AC in different learning contexts. Although RKAC is developed against the backdrop of the RKT context, the overall framework of this conceptualization applies to other learning contexts such as intraorganizational learning between an MNE and its joint ventures. An MNE usually have multiple joint ventures. Existing studies assume that absorptive capacity is the same when an MNE learns from different joint ventures. Advocating an integrative approach, I argue that AC should include both motivation and ability to be fully realized, and be regarded as a process that includes the identification, assimilation, and application of knowledge. Therefore, absorptive capacity is in this learning setting would also vary according to different joint ventures. In this sense, this study contributes to the general field of organizational learning and calls for future studies to adopt this conceptualization of AC to examine the learning effectiveness under different learning situations. Adopting this broad conceptualization of AC would clarify some confusing results in existing studies, and help scholars better align the appropriate organizational designs to facilitate learning in different scenarios.

Second, the construct I developed in this study, *i.e., reverse knowledge absorptive capacity*, may act as a new theoretical lens through which scholars can explain MNEs' various global strategies and internationalization approaches. For example, MNE's RKAC can shape firms' attitudes towards reverse innovation, as well as a firm's ability to apply reverse innovation. RKAC may also factor in MNE's global innovation strategy. It can also affect other global strategies such as MNE's R&D internationalization. For example, MNEs with a high level of RKAC are more likely to promote R&D internationalization to facilitate innovation. In most cases, MNEs (especially those from advanced markets) do not set up subsidiaries primarily for knowledge sourcing but more for purposes such as manufacturing or distribution. Even so, that does not mean that these non-R&D-focused subsidiaries would not have something worth exploitation. For example, market development-focused subsidiaries may provide information on customer preferences or new trend. If an MNE doesn't build its RKAC, potentially important reverse knowledge could not be exploited. This may explain why some MNEs are better than others in leveraging resources from their dispersed subsidiaries. In this sense, this study builds a link between the literature in MNE global strategy/internationalization and organizational learning .

In addition, RKAC may serve as a new lens through which international business scholars can explain the internationalization and outward foreign direct investment (OFDI) of MNEs from less developed countries such as China (*i.e.,* emerging markets MNEs). There is a growing volume of research on EMNEs that emphasizes the role of OFDI as a springboard to aggressively

acquire critical resources and capabilities needed to innovate and establish their competitive positions at home and globally (Deng, 2009; Kumar, Singh, Purkayastha, Popli, & Gaur, 2019; Luo & Bu, 2018; Luo & Tung, 2007; Rui & Yip, 2008). Knowledge as an important source of the competitive edge has been heavily sought by emerging markets MNEs. However, the issue of *what* has been learned and *how* learning has taken place along the path of OFDI remains under-explored. Scholars thus call for research to explore the mechanisms and processes of emerging markets MNEs' unusual learning approach and the effects on their innovation and international performance. RKAC may be an important underlying mechanism through which emerging markets MNEs leverage strategic resources and knowledge to compete with incumbent MNEs. Inquiry into this issue can contribute to international business literature by bridging organizational learning literature and knowledge management.

Lastly, future studies may distinguish market development-focused subsidiaries and R&D-focused subsidiaries to see whether MNE-HQ's RKAC work differently. Given the salience of subsidiary context in affecting the RKT process, it is also worthwhile to explore subsidiary-level political environmental factors that may promote or hinder the development of RKAC in MNEs' headquarters.

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VITA

Yiwen Chen was born and raised in Zhejiang province, China. Before attending the University of Missouri, she attended University of Warwick, United Kingdom, where she earned a Master of Science in Finance and Economics in 2014. From 2008 to 2012, she attended Sichuan University, China, where she received a Bachelor of Arts in Economics.

While at the University of Missouri, Yiwen was elected fellow of Marketing Strategy Consortium in 2020. She represented the marketing PhD program as a presenter in Robert Mittelstaedt Doctoral Symposium in 2019. Yiwen Chen also won the Outstanding Graduate Teaching Assistant in the Trulaske Business School in 2020. Yiwen Chen published papers in Management International Review, International Journal of Advertising, and International Journal of Electronic Commerce during her stay at University of Missouri.