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# Open Innovation in Multinational Corporations

## New Insights from the Global R&D Research Stream*

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### 8.1 INTRODUCTION

Rapid technological innovation in today's business world has made it nearly impossible for any firm to sustain its technological supremacy without utilizing external knowledge and technologies. Examples abound. Procter & Gamble (P&G) has adopted a policy of "Connect & Develop" to emphasize the importance of sourcing external knowledge and ideas to achieve innovation (Dodgson, Gann, & Salter, 2006). The "Osaka Connection" is a famous example of P&G's successful open innovation strategy. P&G's Japanese technology broker (open network) discovered a sponge with the property of removing any dirt only with water, Basotect, in Osaka and connected it to P&G. In two years, P&G succeeded in the co-development and introduction of "Mr. Clean Magic Eraser" with BASF (German chemical firm).

As another example of a notable success of open innovation in an international context, Samsung Electronics of Korea developed its blockbuster Galaxy Note, a smartphone/tablet computer hybrid, in collaboration with Wacom, Japan. The device was innovative enough to be called "phablet" by Forbes and has been sold more than 10 million times in less than a year. One of the most distinctive features of the Galaxy Note was its stylus, which Samsung calls "S Pen." The stylus can be used in a variety of applications, including functions such as writing sticky notes with drawing/handwriting, text input, and pictures. Wacom had a world-class stylus pen technology and digitizer system that results in accurate, pressure-sensitive input. Samsung and Wacom collaborated to modify Wacom's existing technology to be more appropriate for smartphones/tablet computers.

IBM adopted its open innovation approach by managing its overseas R&D centers as "collaboratories," i.e., laboratories run in the form of collaboration through which the firm can efficiently source key external knowledge from external research organizations, such as universities, research institutions, and venture firms (Hamm, 2009).

Air Products and Chemicals (APD), a U.S. gas and speciality chemical firm, emphasizes "Identify & Accelerate" and has actively made alliances with R&D ventures, universities, and laboratories in emerging economies such as Russia, China, and India since the early 1990s to enjoy the low labor costs of R&D human resources in those emerging countries.

These are just a few examples of open collaborations around the globe. An overall trend is that firms put more emphasis on the external sourcing of technologies (Rigby & Zook, 2002). Open innovation enables firms to access new external knowledge efficiently (Chesbrough, 2003a), thus allowing them to maintain operational efficiency and flexibility (Pisano, 1990).

Despite the abundant examples of open innovation by multinationals (MNCs) on a global scale, open innovation literature only pays scant attention to the international dimension, revealing a remarkable research gap. In contrast, the recent development of global R&D research manifests a growing interest in and attention to external knowledge sourcing and leveraging (Kuemmerle, 1997; Doz, Santos & Williamson, 2001; Frost, 2001; Asakawa, 2001; Asakawa & Lehrer, 2003; Schlegelmilch, Ambos & Chini, 2003; Song & Shin, 2008; Frost & Zhou, 2005; Song, Asakawa & Chu, 2011).

Obviously it is important to note that the geographic dimension of open innovation is not totally neglected in the open innovation research (Simard & West, 2006). Chesbrough (2003) specified the "erosion factors" that undermined the logic of closed innovation in the late twentieth century. The factors that account for the emergence of open innovation include the mobility of human resources, the quality of university research, the presence or absence of venture capital, and the strength of IP protection. Apparently, they substantially vary by geography. Dealing with the geographic dimension of the erosion factors, we could deepen our understanding of open innovation which is now globally emerging.

For example, a geographic factor such as the presence of industry or technology clusters can influence the mobility of qualified and talented human resources. There is frequent inter-organizational mobility of workforces within industry or technology clusters (Casper, 2007). When the mobility rate is high, knowledge within a company can be easily spilled out to other companies (Song, Almeida, & Wu, 2003). A higher mobility rate of labor market promotes open innovation.

In the case of labor mobility across borders, there is high mobility between countries that have developed similar or related industries. Talented human resources also flow into countries where companies offer competitive salaries,

excellent benefits, and better work environments. Although labor mobility causes knowledge transfer or spill-over, the personal networks of the workers in a former organization can serve as collaboration linkages for open innovation. By observing the direction of labor mobility, we can explain locational choice of global open innovation or open innovation of certain emerging countries.

Open innovation research will be rich with international geographic dimensions to which the global R&D research stream has paid attention. Meanwhile, global R&D research stream would also benefit by dealing with geographically varying erosion factors. The focus of global R&D shifted from in-house to open. It is clear that erosion factors played roles in the shift. Delving into erosion factors and their geographic differences will help to study the new pattern of global R&D.

The purpose of this chapter is therefore to elucidate how global R&D literature and open innovation literature can complement each other. The chapter is organized as follows. After reviewing the characteristics of open innovation research and global R&D research, potential contributions by global R&D research to open innovation research are discussed, followed by the potential contribution by open innovation research to global R&D research. We suggest some promising areas for future research that may facilitate the cross-fertilization of these two research areas.

## 8.2 COMMON CHARACTERISTICS OF OPEN INNOVATION RESEARCH

Open innovation has some distinctive characteristics that differentiate it from the overall innovation activities featured in the innovation literature (Chesbrough, Vanhaverbeke, & West, 2006). Several characteristics of open innovation are summarized in Table 8.1 and discussed below.

First, open innovation theory captures multi-directional flows of knowledge: outside-in, inside-out (Gassmann & Enkel, 2004), and coupled process (Enkel et al., 2009) albeit with insufficient attention to the geographic dimension of knowledge flows. Firms with superior scientific discoveries can benefit from monetizing their scientific knowledge for commercial purposes, i.e., inside-out process to host countries in which the scientific knowledge is appreciated. In contrast, firms with limited advanced technologies can benefit from sourcing key technological knowledge from the outside, i.e., outside-in process.

Second, the open innovation literature widely covers partnering with various external parties. These partners include university and research institutes (Fabrizio, 2006; Enkel & Gassmann, 2008; Asakawa, Nakamura, & Sawada, 2010), venture firms, suppliers (Un, Cuervo-Cazzura & Asakawa,

2010; Takeishi, 2001; Dyer & Nobeoka, 2000), customers or clients (Enkel & Gassmann, 2008), lead users (von Hippel, 1988; Prahalad & Ramaswamy, 2004b), and competitors (Hamel et al., 1989; Brandenburger & Nalebuff, 1996), which constitute a common set of partners of open innovation.

Third, various forms of open connectedness are examined in the open innovation literature. These forms range from equity-based alliances, M&A, and contract research to more informal joint research. Other forms of open collaboration include cross-licensing, corporate venture capital investments, and collaboration with lead users (Vanhaverbeke, Du, and von Zedtwitz, 2013).

Fourth, open innovation literature puts an emphasis on the importance of absorptive capacity within a firm for engaging in open innovation. The importance of absorptive capacity for engaging in open innovation can be validated by abundant examples of successful firms engaging in open innovation that have already accumulated sufficient firm-specific capabilities necessary for searching, acquiring, integrating, and leveraging such new knowledge (Lichtenthaler & Lichtenthaler, 2009; Laursen & Salter, 2004), as represented by IBM and P&G.

Fifth, open innovation literature clearly underlines business model innovation which is significant for sustaining open innovation (Chesbrough & Schwartz, 2007). Business model enables a firm to create value from its internal and external knowledge and to capture a portion of the value by definition (Chesbrough, 2007a). There is no economic value in a technology unless it is commercialized and makes profits via a business model. Moreover, different business models will yield different returns with the same technology. Business model innovation is a process for a firm to find more appropriate business models which enable it to make more profits or create new value from a technology. To improve or renew the existing business model, a firm needs to go through extensive business model experimentations (Chesbrough, 2010; West & Gallagher, 2006). Furthermore, successful business model innovation calls for organizational leadership necessary for overcoming organizational barriers to changes which a firm faces during the process of business model experimentation (Amit & Zott, 2001; Chesbrough, 2007a; Chesbrough, 2010).

In spite of such diverse issues that have been covered in the open innovation literature as surveyed above, little attention has been paid to the international geographic dimension of open innovation. Open innovation research should benefit from considering the geographic aspects of global innovation, that affect the effective accessing, integrating, and leveraging of external knowledge. For example, partnering with nearby suppliers differs from that with distant suppliers in terms of the challenges and opportunities related to open innovation. Sourcing local knowledge requires absorptive capacity both at the headquarters and the subsidiaries, depending on where the knowledge sourcing takes place. We argue that the global R&D literature can complement open innovation theory by filling such gaps in the literature.

**Table 8.1** Common characteristics of open innovation research

| Wider Scope of Innovation | Success Factors of Open Innovation |
|---|---|
| • Multi-directional flows of knowledge<br>• Various external partners for open innovation<br>• Various forms of open connectedness | • Absorptive capacity<br>• Business model innovation |
| ***Lack of attention to international geographic dimension*** | |

## 8.3 WHAT GLOBAL R&D RESEARCH CAN CONTRIBUTE TO THE OPEN INNOVATION RESEARCH

Global R&D literature has evolved in the past several decades to accommodate changes in the directions of open innovation and emerging country innovation. Global R&D theory is particularly useful for the open innovation literature in that the former can provide a much more fine-grained approach to the geographic aspects of open innovation. Here we propose multiple areas in which global R&D research could advance our knowledge on open innovation.

### 8.3.1 Locational Decisions Matter for Open Innovation

Global R&D theory can offer detailed explanations regarding where open innovation takes place. Global R&D activities are located in countries with a strong research base in relevant technology fields, reflecting technology-sourcing motives (Kuemmerle, 1999; Belderbos et al., 2006). Particular attention has been paid to the merit of agglomeration, which influences locational decisions regarding R&D sites. Agglomeration economies attract firms in similar industries to form an R&D cluster to enjoy the benefits of externalities (Krugman, 1991; Belderbos & Carree, 2002).

Thus, locational decisions regarding R&D investments have been a central issue for MNCs intending to relocate their R&D abroad. The motivation behind internationalizing R&D can be classified into a market-seeking vs. a technology-seeking logic, which corresponds to the two types of overseas R&D laboratories: home-base-exploiting (HBE) and home-base-augmenting (HBA) as proposed by Kuemmerle (1997) or competence-leveraging and competence-creating as proposed by Cantwell and Mudambi (2005).

Doz et al. (2001) argue that knowledge is increasingly dispersed across the globe in a somewhat unexpected way: potentially valuable knowledge lies in peripheral locations that were often ignored by decision-makers within a firm.

Thus, global R&D literature can bring the following two perspectives to the open innovation theory by articulating the importance of the geographical location: whether knowledge is sourced from inside the innovation cluster or not, and the geographical/cultural distance (Ghemawat, 2001) that determines the effectiveness of external knowledge sourcing.

Technological distance across locations plays an important role in determining the locus of innovation. Song and Shin (2008) find that regarding home-base-augmenting R&D, an MNC tends to source knowledge from a host country where technological capabilities measured by USPTO patent filings are higher relative to those of its home country. Such a finding suggests that an MNC is sourcing overseas R&D in a host country where the technological capability is high compared to the MNC's home country, which motivates a firm to learn from the host country environment. Iwasa and Odagiri (2004) also show the importance of the technological capability of a host country for enhancing the R&D performance, although they have not explicitly captured technological distance in their study.

At the same time, a persistent trend of non-globalization of R&D can be observed (Patel & Pavitt, 1991), especially regarding core knowledge and technologies that remain susceptible to the erosion of intellectual property rights, as examined in the context of wireless telecom (Di Minin & Bianchi, 2011). Thus, locational decisions need to be comprehensive, such that both globalization and non-globalization (thus centralization) of R&D remain valid options.

### 8.3.2 Extending the Levels of Analysis for Global Open Innovation

Global R&D literature can also be helpful for open innovation researchers to extend the level of analysis. In fact, global R&D research has been conducted at multiple levels of analysis, ranging from a national to an individual human level. At the national level, the sourcing pattern of overseas R&D knowledge depends on the relative competitiveness of the knowledge source and recipient countries (Song & Shin, 2008). Open innovation research can incorporate such a macro-level influence of national competitiveness into its research domain. At a sub-unit level (i.e., R&D subsidiary level), global R&D research has investigated the effect of subsidiary initiatives, subsidiary capabilities, the subsidiary's host country environment as well as the HQ influence on the role and mission of a subsidiary (Nobel & Birkinshaw, 1998; Cantwell & Mudambi, 2005). Global R&D literature explicitly investigates open innovation at the overseas subsidiary level where each subsidiary is assigned a different role by the headquarters and engages in locally-specific innovative activities (Kuemmerle, 1997; Nobel & Birkinshaw, 1998; Cantwell & Mudambi, 2005). Global R&D research is also conducted at the team level (Ambos & Schlegelmich, 2004).

Research at the individual level has shed light on communication patterns among researchers across geographic distance, most typically between the HQ and foreign R&D subsidiaries, or among foreign subsidiaries (De Meyer, 1991). The research also captured the human resource dimension of global R&D (De Meyer & Mizushima, 1989; Cheng & Bolon, 1993) and includes issues such as recruiting and retaining talented foreign researchers abroad, training, transfers to the HQ, and incentives such as compensation.

While shedding light on the role of overseas R&D subsidiaries for open innovation, global R&D literature tends to be sensitive to other levels of analysis. For example, extant literature examined the associations between subsidiary-level R&D, national competitiveness and public policy (Lehrer, Asakawa, & Behnam, 2011). Some studies (Asakawa, 2004; Lehrer, Asakawa, & Behnam, 2011) featured home-base-compensating R&D as a situation in which MNCs compensate for comparative weaknesses in their home-country R&D by locating core R&D activities in foreign countries with a stronger R&D base.

### 8.3.3 Attention to Capability for Overseas Knowledge Sourcing

Global R&D scholars indicate positive effects of technological capabilities on the performance of overseas R&D and the knowledge sourcing from foreign locations. Iwasa and Odagiri (2004) indicate the importance of R&D investments for the performance of overseas R&D by showing the contribution of overseas locations' technological capabilities to the performance of R&D laboratories. Penner-Hahn and Shaver (2005) indicate the importance of the technological capability of MNCs in increasing the performance of international R&D, even though the locus of technological capability within MNCs (i.e., whether at the local laboratory or at the firm level) was beyond the focus of their research. Song and Shin (2008) went a step further by showing the relative impact of the parent company's and the local/home country's technological capabilities on overseas knowledge sourcing, among other factors. The authors propose a capability-motivation paradox in that MNCs with strong home-base technological capabilities could source overseas knowledge; however, such MNCs often have limited motivation to do so (Song & Shin, 2008). Their study indicates the importance of absorptive capacity but also considers enhanced motivation on the part of the parent (i.e., knowledge-sourcing unit) to source local knowledge as a sufficient condition. To extend this work, Song, Asakawa and Chu (2011) investigated what factors determine knowledge sourcing from host locations to overseas R&D laboratories and identified the existence of an optimal level of absorptive capacity of local laboratories for facilitating local knowledge sourcing. Knowledge sourcing from the host

country environment increases as the capability of a local R&D laboratory improves up to a certain level, beyond which it starts to diminish, largely because the local laboratory starts to shift its role from a local to a global innovator. A global-innovator laboratory can be considered as sourcing knowledge from all over the world; thus, the relative importance of the local host country environment would plummet (Song, Asakawa & Chu, 2011).

### 8.3.4 Managing Internal and External Networks

Global R&D research includes extensive literature on the management of global R&D networks, both external and internal to the firm. Regarding the management of *internal* networks, MNCs comprise multiple subunits such as headquarters and foreign subsidiaries. Engaging in open innovation on a global scale requires managerial skills to coordinate these subunits, in addition to the various external partners for R&D collaborations (Lehrer & Asakawa, 2003). Global R&D literature captures management challenges pertinent to such complex network management. As Cantwell and Mudambi (2005) indicated, managing complex intra-firm networks provides MNCs with cross-border learning opportunities. It requires managerial efforts to overcome various managerial difficulties such as the tension between headquarters and R&D subsidiaries (Asakawa, 2001; Birkinshaw & Hood, 1998; Florida & Kenney, 1990). Global R&D literature has long examined the optimal level of autonomy and control (Behrman & Fisher, 1980) as well as external and internal connectivity. While such managerial tension is related to open innovation in general, overseas R&D management involves much more tension and uncertainty (Asakawa, 2001).

Regarding the management of *external* networks, the extent of sharing and disclosing the firm's core proprietary knowledge with external parties becomes an issue. This issue is delicate, because cross-border collaborations, especially with global competitors, entail a much higher level of uncertainty than with their domestic counterparts. IBM disclosed its core technology such as the program source code and a circuit diagram, its core technologies of a computer design. IBM ended up exiting the PC market due to the open strategy, surrendering the leadership to Microsoft and Intel. In contrast, Apple only opened peripheral technology and outsourced manufacturing tasks to Foxconn. Apple also opened the right to develop applications for Apple products; however, the distribution of the applications is restricted to Apple's App store. Global R&D management literature captures a persistent trend of non-globalization of R&D (Patel & Pavitt, 1991). DiMinin and Bianchi (2011) by studying the case of wireless telecom show how MNCs attempt to avoid the erosion of intellectual property rights in the area of their core knowledge and technology.

Sharing core knowledge with local external partners requires nurturing trust to minimize the risk of opportunistic behavior on both sides. The assumption is that embeddedness in a local environment should generate social capital, which should enhance the mutual trust necessary for partners to exchange proprietary knowledge (Inkpen & Tsang, 2005; Granovetter, 1985; Uzzi, 1996). Local embeddedness is found to foster subsidiary innovation (Andersson, Forsgren, & Holm, 2002) and to source valuable locally specific knowledge (Almeida & Phene, 2004; Lehrer & Asakawa, 2002; Hakanson & Nobel, 2001; Song, Asakawa & Chu, 2011).

Open innovation research can benefit from insights into the global R&D context, which stress the importance of high-quality network management, whether internal or external. Because growing numbers of open innovations cross national borders, global R&D literature provides valid suggestions.

### 8.3.5 Emerging Countries Innovation

Recent global R&D research indicates an explicit interest in emerging countries, especially China and India, as local sites (Asakawa & Som, 2008). Global R&D scholars focused their research on identifying the extent to which location matters as a source of innovation. To what extent do firms achieve innovation in emerging countries compared to their innovations in the developed countries? Until recently, global R&D literature treated emerging countries primarily as a market for existing products developed and launched in developed countries. Recent improvements in technological competencies in developing countries such as India and China have changed this picture, and the main sources of technologies and knowledge lie now within emerging countries.

While the fundamental principle of open innovation may remain the same, where open innovation takes place could change the whole picture. In terms of inbound open innovation, MNCs typically source external resources that are unique to the particular location. MNCs typically source state-of-the-art knowledge from the most-advanced innovation clusters in the developed countries while sourcing resources from developing countries at lower cost. Adding the geographical dimension is crucial for a better understanding of open innovation.

Global R&D literature has also begun to highlight MNCs' innovation patterns that originated in emerging countries, which imply an alternative model of global innovation to the existing model of firms in developed countries. Most of the MNCs from developing countries neither have a sufficient level of home-country advantages nor the ownership advantage of the headquarters. For example, Mathews (2002) presented his model of dragon multinationals to illustrate how they globalize without a home-country advantage. Firms in emerging countries manifest a "scaling out" pattern of global innovation (*The*

*Economist*, 2010) in that they resort to open sourcing of external resources due to a lack of internal resources, whereas MNCs in developed countries can tap into their home-country resources.

Recent attention to the reverse innovation phenomenon as represented by the case of GE's low-price ultrasound scanner (Immelt, Govindarajan, & Trimble, 2009) can be explained by the global R&D theory. From the standpoint of global R&D, reverse innovation can be considered as a case of transition from local-for-local innovation to local-for-global innovation (Bartlett & Ghoshal, 1990). Reverse innovation can also be considered as a derivative of a home-base-augmenting (HBA) type of laboratory (Kuemmerle, 1997) in that low-cost, disruptive products that initially had been anticipated to fit only the emerging country context turned out to be appreciated even in the home-country markets.

Open innovation patterns should vary depending on the nature of the home country. Many MNCs from developed countries can actively engage in "inbound" open innovation based on their already existing absorptive capacity within the firm. These MNCs are also ready to engage in "outbound" open innovation if they have high levels of technologies within their firm, if they are prepared for this engagement, and if they find opportunities to monetize their own technologies. In contrast, many MNCs from developing countries are not ready for either inbound or outbound open innovation concerning advanced technology due to a lack of absorptive capacity within their firm; thus, sourcing high-standard knowledge becomes more difficult. Instead, these MNCs are more likely to engage in open innovation to lower innovation costs by recruiting low-cost engineers locally or procuring low-cost raw materials. MNCs from developing countries in general have more difficulty to engage in outbound open innovation due to the insufficient level of competencies within their firm.

While open innovation literature does not sufficiently examine the geographic dimension of knowledge sourcing, global R&D literature brings in fine-grained aspects of locational effects on knowledge sourcing.

## 8.4 WHAT OPEN INNOVATION RESEARCH CAN CONTRIBUTE TO THE GLOBAL R&D RESEARCH

Obviously, global R&D research has limitations. Global R&D research covers open innovation in a global context but mostly related to inbound open innovation with little attention to the outbound type of innovation (Vanhaverbeke, Du, & von Zedtwitz, 2013). In that respect, open innovation literature can complement global R&D literature by providing theoretical frameworks related to outbound open innovation—see also Table 8.2. The reality shows an

increasing degree of outbound open innovation taking place across national borders; therefore, it makes sense for global R&D researchers to adopt an outbound open innovation framework.

Global R&D literature also captures the effect of R&D on product innovation, implying that the literature covers multiple stages of the value chain beyond the narrowly defined R&D function. However, other functions such as marketing and sales are obviously beyond its primary focus. In this respect, open innovation research can add value to the global R&D literature. Of course, focusing on the R&D function allows a much clearer understanding of open innovation at the more-upstream phase of innovation; however, such a focus obviously puts lower priority on downstream innovation such as user-driven innovation. The significant role of lead users for innovation (von Hippel, 1988) cannot be ignored. The knowledge input from competitors should also be useful for innovation, particularly for benchmarking, because competitors typically share very similar contextual knowledge with the focal firm (Asakawa & Un, 2012). At the same time, focusing on R&D reveals some of the most distinctive traits of open innovation, i.e., the challenge of overcoming the "NIH syndrome" (Katz & Allen, 1982) prevalent in open sourcing of external R&D knowledge. Because R&D is often considered as the core intellectual property of the firm, sourcing R&D knowledge from the outside creates psychological and socio-political tensions on the part of the scientists and engineers within the firm.

Another advantage of the open innovation literature lies in its wider coverage of interested parties as key actors in the innovation activities, including intellectual property department, corporate venture department, incubators, strategic alliance department, among others (Vanhaverbeke, Du, & von Zedtwitz, 2013). Global R&D literature does not consider collaboration with all these parties in depth, if occasionally touching upon them.

Moreover, open innovation literature considers external partners such as lead users, user communities, innovation intermediaries (Vanhaverbeke, Du, & von Zedtwitz, 2013), beyond the brick-and-mortar type of overseas R&D centers, which are taken into extensive consideration.

Furthermore, open innovation literature adds value to global R&D literature by elaborating on the development of R&D capabilities much more fully. For example, Chesbrough and Schwartz (2007) present core, critical, and contextual R&D capabilities which feature different aspects of capabilities. Global R&D manifests increasing degrees of external collaboration to aim at building capabilities. But much more fine-grained classification of capabilities is desired. Open innovation literature complements that by filling the gaps in the literature. Here we draw on insights from open innovation literature, in that different capabilities require collaboration with different types of external partners, with appropriate type of governance mode (Vanhaverbeke, Du, & von Zedtwitz, 2013).

**Table 8.2** Cross fertilization of open innovation research and global R&D research

| What Open Innovation Research Can Contribute to the Global R&D Research | What Global R&D Research Can Contribute to the Open Innovation Research |
|---|---|
| • Adopting outbound open innovation framework<br>• Covering multiple stages of innovation activities<br>• Covering wider scope of external parties involved in innovation activities<br>• Introducing fine-grained classification of R&D capabilities | • Considering locational decisions<br>• Extending the levels of analysis for global open innovation<br>• Drawing attention to capability for overseas knowledge sourcing<br>• Managing internal and external networks<br>• Considering emerging countries innovation |

## 8.5 CONCLUSION

Considering that open innovation is becoming increasingly global and that global R&D is becoming increasingly open, such cross-fertilization is the most natural direction. Nevertheless, the research heritages of these two fields are different. It is our aim to suggest primarily to the open innovation research community how global R&D research can add value to the further advancement of open innovation research, in the context of globalization. We argue that the global R&D literature can contribute to the open innovation literature by offering a much more fine-grained approach to the geographic aspects of open innovation. More specifically, we proposed various research areas in which global R&D research could advance our knowledge on open innovation, such as locational decisions, distance and geographic scope, role of overseas subsidiaries, extending the level of analysis to global open innovation, organizational capability of managing internal and external networks, and managing open innovation in emerging countries.

Global R&D research has limitations, some of which open innovation literature can complement. For example, primary attention to the inbound type of open innovation by the global R&D literature can be complemented by the open innovation literature which captures the outbound type of innovation sufficiently. Global R&D literature's exclusive focus on R&D function can be complemented by much wider scope of attention by the open innovation literature to various functional areas that include sales and marketing.

Although the open innovation phenomenon has expanded rapidly in business and increasing numbers of management scholars have paid attention to this phenomenon over the past decade, rather limited attention has been paid to the international dimension of open innovation. Future research can shed more light on both the benefit and limitations of global R&D literature for investigating the nature of international dimension of open innovation much more in depth.