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Global organization of innovation processes
Organisation globale des processus d'innovation
Organización global de los procesos de innovación

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Aller au sommaire du numéro

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Résumé de l'article

Dans cet article, nous commençons par présenter un bref aperçu de l'évolution historique de l'innovation à l'échelle internationale dans les multinationales. Nous présentons ensuite les défis auxquels sont confrontées ces multinationales lorsqu'elles développent des innovations. Ensuite, nous nous concentrons sur les phases de début et de fin du processus d'innovation : la création et la diffusion. Nous montrons que les enjeux liés à la création ont tendance à renforcer l'internationalisation, mais induisent des situations de plus en plus complexe lorsqu'il s'agit de diffusion. En conclusion, nous présentons les enjeux et les questions qui mériteraient d'être approfondis par les chercheurs travaillant à l'intersection du management de l'innovation et du management international.

CONCLUSION AU DOSSIER THÉMATIQUE

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Résumé

Dans cet article, nous commençons par présenter un bref aperçu de l'évolution historique de l'innovation à l'échelle internationale dans les multinationales. Nous présentons ensuite les défis auxquels sont confrontées ces multinationales lorsqu'elles développent des innovations. Ensuite, nous nous concentrons sur les phases de début et de fin du processus d'innovation : la création et la diffusion. Nous montrons que les enjeux liés à la création ont tendance à renforcer l'internationalisation, mais induisent des situations de plus en plus complexe lorsqu'il s'agit de diffusion. En conclusion, nous présentons les enjeux et les questions qui mériteraient d'être approfondis par les chercheurs travaillant à l'intersection du management de l'innovation et du management international.

Abstract

In this article, we first present a brief overview of the historical evolution of global innovation in multinational firms. We then outline four components and challenges facing firms that are evolving towards global innovation. Next, we focus on the beginning and end phases of the innovation process: their inception and their diffusion. We show that the stakes related to inception tend to sustain internationalization but induce ever more complex innovation diffusion. In the conclusion, we present open issues and questions that merit further attention and research by the academic community working at the intersection of innovation management and international management.

Resumen

En este artículo, empezamos por presentar un breve resumen de la evolución histórica de la innovación a nivel internacional en las multinacionales. A continuación, presentamos los desafíos enfrentados por estas multinacionales en el desarrollo de innovaciones. Luego nos centramos en las fases iniciales y finales del proceso de innovación: la creación y la difusión. Se demuestra que las problemáticas relacionadas con la creación tienden a sostener la internacionalización, pero inducen situaciones cada vez más complejas cuando se trata de la difusión. En conclusión, se presentan las problemas y cuestiones que deben ser profundizadas por los investigadores que trabajan en la intersección de la gestión de la innovación y de la gestión internacional.

The globalization of firms has been a growing phenomenon for many years, attracting a large body of research and leading to several models for multinational corporations (MNC) (Vernon, 1966; Bartlett and Goshal, 1989; Doz, Santos and Williamson, 2001; see Forsgren, 2013 for a review). This special issue focuses on globalization of innovation processes in MNCs that is motivated either by knowledge and talent searches or by market access and growth. Academic work has primarily emphasized the technical and scientific knowledge dimension of the phenomenon. In the nineties, studies of innovation strategies of MNCs focused on the localization of R&D centers and the transfer of knowledge between them and with the company's subsidiaries. Currently, the innovation challenges for MNCs relate to the *global* organization of the innovation process. Reshaping, relocating, and resizing functional roles within the MNC are considered key factors for its performance (Doz and Wilson, 2012). Indeed, the process of innovation is a process of both knowledge creation and knowledge integration (Nonaka et al., 1994).

In this article, we first present a brief overview of the historical evolution of global innovation in multinational firms. We then outline four components and challenges facing firms that are evolving towards global innovation. Next, we focus on the beginning and end phases of the innovation process: their inception and their diffusion. We show that the stakes related to inception tend to sustain internationalization but induce ever more complex innovation diffusion. In the conclusion, we present open issues and questions that merit further attention and research by the academic community working at the intersection of innovation management and international management.

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An overview of global innovation and the evolution of firms

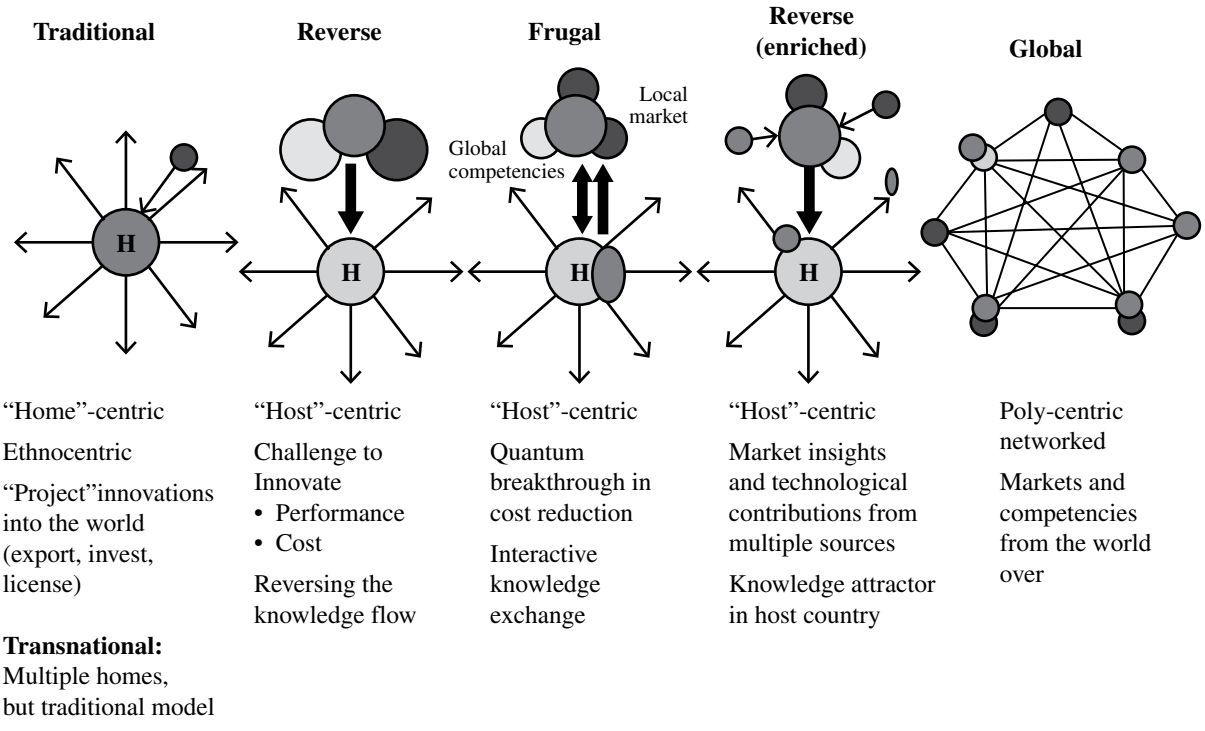
Global innovation is a relatively new phenomenon and a rapidly evolving one. Innovation did not used to be global; in fact it was intensely local. Some locations where major innovation occurred were serendipitous: the innovators just happened to be there. The Philips brothers, for example, were in Eindhoven, a small city in the southeastern region of the Netherlands, hardly predestined to be a hotbed of innovation. However, in most cases location did matter. It was often driven by propitious local or national circumstances. The textile industry in the Rhine valley drove the need for dyes, prompting early innovations in the German and Swiss chemical and pharmaceutical industries, still world leaders today. Similarly, mechanized farm equipment and the famous Model T Ford came out of the vast arable expanses of the US Midwest. More recently, but for similar reasons of space, consumer electronics, fax machines and compact office equipment developed in Japan. One could cite multiple other examples of leading locations in terms of needs, competencies, competitive stimulus to innovate, and available materials that became a crucible of innovation (Porter, 2000).

As other markets developed, firms exported and invested abroad on the strength of their innovations, a process conceptualized by Stephen Hymer (1960) and summarized by Raymond Vernon (1966) as the international product cycle. In short, innovations first developed for the home market would be "projected" internationally by innovating firms wanting to keep control (in terms of intellectual property and economic rent) of the fruits of their innovations (as represented schematically in the "traditional" column on the left of Figure 1, below.) Most innovative activities conform to that model.

The transnational innovation model developed by Bartlett and Ghoshal (1989) is essentially an extension of this traditional model and is best characterized as a "multiple home base" model: rather than do everything in the MNCs' country of origin, different international subsidiaries become responsible for the innovation of different products and for different markets. Again, this may be serendipitous in origin. For instance, when AT&T was forced to divest its international industrial operations to conform to a decree by US antitrust regulators, ITT was created to run them as a US company without a home base in the US. Progressively, it built multiple centers of innovation, each following the traditional model for its various businesses. ITT's global cable business was run from Norway because that country's geography called for advanced undersea cables and hence provided a lead market and competence center. For similar reasons, shipboard communication systems were run from the Netherlands, switching systems from Belgium, and so on. ITT was a multinational company with multiple "homes", one for each business (a "lead subsidiary" in Bartlett's and Ghoshal's terminology),

FIGURE 1

The Global Innovation Process: Western Stages in Transformation



projecting their innovations worldwide. When Alcatel bought the telecom equipment business of ITT, it inherited this multi-home base organization to its advantage, complementing its French roots. Other companies adopted the formula strategically by allocating "world mandates" for specific products and businesses among their subsidiaries worldwide.

While a multi-business company like ITT or Alcatel could easily adopt this multiple home base approach, more focused and integrated companies found it more difficult. For them the inception of global innovation was often serendipitous. When the founders of Intel allowed one of their most gifted early scientists, Dov Frohman, to emigrate to Israel in 1973 and keep working for them from Haifa, little did they imagine that the town would become Intel's major innovation center and save the company twice, by developing outstanding new products where its US-led efforts had failed. Since 1973, a massive influx of Russian Jewish scientists and engineers, together with Israel's emphasis on advanced electronics driven by defense needs, have made it a hotbed of electronics innovations, including advanced microprocessors, the core business of Intel.

For different reasons, Japan, with Fuji-Xerox, has come to play a leading role in the Xerox group (Doz and Wilson, forthcoming, 2016). Characterized by small businesses with cramped offices and a need for compact copying, faxing and scanning handwritten documents in Japanese, it became a lead market for reprography and later for distributed printing networks. Performance and cost-reduction imperatives drove what has since been dubbed "reverse innovation" (Govindarajan and Trimble, 2012). For traditional companies, such as Intel, Xerox and others, knowledge and innovation no longer flow from the center to the periphery but in the other direction.

A logical extension of the reversal of the knowledge flow is a phenomenon known as "frugal" global innovation. The emergence of new markets with limited resources, huge needs and low-cost local innovators has pushed global companies to innovate for these new markets. The notion of the "fortune at the bottom of the pyramid" (Pralahad, 2005) has reinforced the drive for frugal innovation, making the process more complex and demanding (as in the middle diagram of Figure 1).

But simply delegating innovation to local operations in emerging markets did not work well; despite being sensitive to product requirements and price points, they lacked the skills to truly innovate low-cost solutions. Simplified, "dumbed down" products did not meet local needs nor did they achieve cost breakthroughs. Renault, for instance, discovered that the development of a low-cost, high-quality car delegated to its Romanian acquisition, Dacia, exceeded local competencies. The Romanian project was discontinued, and ultimately the Logan model was engineered by Renault's major innovation center in France (Jullien et al., 2012).

Frugal innovation calls for interactive and iterative knowledge exchange and its integration between home bases (in developed countries) and local units in emerging markets. General Electric's (GE) famed cost-reduction breakthroughs in medical monitoring devices in India drew upon competencies and technologies in Norway, Germany, the US and Japan, not only GE's R&D efforts in India. As the fourth diagram in Figure 1 illustrates ("reverse [enriched] innovation"), the innovation process is host-centric: it may be driven by local needs for lower costs and rugged functionality, yet involve technological contributions from the most advanced R&D centers around the world. The integration and management of the innovation process may be centered on an emerging market, but the process itself is intrinsically distributed and truly global.

Indeed, it could well be that the innovation process more easily follows a fully "reverse" model for process innovation because it requires a level of simplification that is difficult to conceive in a developed country setting. In countering the rise of Nirma as a homegrown competitor in the market for detergents in India, for example, Unilever discovered that its local manufacturing processes could be simplified, plants made more frugal (doing away with air-conditioning and using cooling fans for specific steps in the manufacturing process), and costs massively reduced. This approach was subsequently transferred to Brazil for the introduction of the Ala branded detergent, and then to other emerging markets (Doz, Santos and Williamson, 2001).

When shown Figure 1, and asked about the fifth diagram (on the right), a senior R&D executive of Nestle, one of the most sophisticated innovators worldwide, exclaimed "Beware of chaos!" This remark may prefigure a more networked, centerless and emergent process as the next challenge, and indeed the gateway to global innovation.

Global innovation: components and challenges

The global innovation process encompasses four components managed concurrently which we aim to dig into in the following. Although 'born global' firms have become more common (especially in the sectors most exposed to virtualization) (Cantwell, 2015), the management of global innovation remains a major concern for firms (Valax and Beddi, 2014) and is increasingly at the heart of their competitive advantage.

Innovation draws upon various types of knowledge—technical, market, legal, business relations—of which many are tacit (see, e.g., von Hippel, 2005). Knowledge combination and integration lie at the core of innovation processes and are enhanced when teams are co-localized, especially in the case of tacit knowledge. However, existing literature often restricts its focus to technological knowledge (this is essentially the case in research work on patents; see Curci, 2016). Thus, the first component of global innovation processes that we stress is the internationalization of

R&D, which has been extensively analyzed and is now well documented. The second component comprises knowledge integration issues that limit this internationalization. The third component comprises the management practices that support internal and external collaboration, and the fourth component comprises the networks of professionals serving as a response to knowledge management requirements.

R&D internationalization

Where and how large firms locate their innovation efforts have evolved over the past twenty years, perhaps even more so than the speed or intensity of innovation. Historically, innovation was a very sensitive, in-house centralized function of the firm. Decreasing communication costs, improvements in the quality of information systems, and network effects are among the factors that lead to more and more geographically distributed innovation teams. Some companies have clearly organized their R&D activities globally, while others are beginning to follow this path. The case of leading pharmaceutical companies, which have all opened R&D facilities in China during the past ten years, is an example that underscores that the internationalization of R&D is still an ongoing process (Hadengue, Marcellis-Warin and Warin 2015). There are numerous reasons why MNCs initially locate their R&D activities (as well as their investment expenses) in different geographic areas: adaptation of the product or the process, access to specific local knowledge and resources, diversification of resources, exploitation of standard supply and demand imbalances, and so forth. Whatever the reason, Boutellier et al. note that "International R&D activity is an increasingly important phenomenon in the economic activity of firms" (2008, p. 10).

This multi-localization leads teams to collaborate and to compete as well. More importantly, it requires knowledge management and integration skills, so that the valuable resources anchored in various parts of the firm and the firm's networks can be leveraged despite the structural and cultural boundaries.

Challenges related to integration of knowledge: a limit to internationalization

Doz and Wilson (2012) showed that the geographic dispersion of innovation activities raises organizational integration difficulties that limit the extent of dispersion. According to their survey of 170 MNCs, the average number of geographically distinct units involved in a global innovation project was only 3.6. In their contribution to this issue, Laurens, Le Bas, Schoen, and Larédo (2015) analyze the dynamic of R&D internationalization through a study of large European firms and their evolution from the 1990s to the 2000s. In line with Gammeltoft's (2006) hypothesis, the authors show that the growth of R&D internationalization has reached a plateau and that now top management tries to better organize and exploit the knowledge that the firm already has. They thus stress that today's global management of innovation is less about discovering and harnessing new knowledge than optimizing the exploitation of existing knowledge inside the firm's international network.

The identification of this limit to the internationalization of R&D contrasts with research emphasizing that the development of knowledge management techniques and the codification of knowledge facilitate transfer between various locations. These researchers consider that technical knowledge is largely codified and that technologies that mainly rely on explicit and codified knowledge enable closing the gap between scientific knowledge and its practical application in a product or service (Cowan et al., 2000; Oguz and Sengun, 2011). They also stress the massive development of knowledge management systems as having contributed to knowledge codification.

Such findings raise questions about the extent to which the innovation function should be geographically distributed, and how to manage distributed resources.

Knowledge management supporting internal and external collaboration

Gassmann and von Zedtwitz (2009) highlighted the role of team management in different configurations of R&D internationalization: ethnocentric centralized R&D, geocentric centralized R&D, polycentric decentralized R&D, an R&D hub model, or an integrated R&D network. New human resource management techniques are needed so that the different teams are not playing against each other within the same firm (Katz, 1997; Charue-Duboc and Gastaldi, 2016). With the adoption of open innovation practices, team management is even more critical and difficult (as an example, GE, among others, uses open innovation, reverse innovation, and crowdsourcing; Pénin et al., 2013). Many studies investigate the question of what should be done within the companies, what should be done in collaboration, and what should be outsourced, and they emphasize the consequences for reshaping the core competences of the firms (Zook and Allen, 2010) and adapting to competencies globally (Teece, 2011).

Furthermore, Eschenbaecher and Graser (2011) point to the role of in-between innovation management when innovations come from the interrelation of internal and external knowledge. Practices that mix internal and external knowledge become a standard and raise managerial issues in addition to those related to the multi-localization of resources.

Networks of professionals

Networks of practice are outlined in the literature as an efficient knowledge management practice and integration mechanism. Such networks support knowledge diffusion

and sharing and thus provide a fertile ground upon which firms can build and nurture geographically dispersed teams. Furthermore, international R&D networks increase the emergence of global standards and the acceptance of dominant designs, and they also help to avoid technological lock-in (Cowan and Hulten, 1996). All of these effects have a positive impact on MNC revenues and, more specifically, those related to innovation. Considering not only technological knowledge, Tallman and Chacar (2011) suggest that local and internal networks of practice within MNCs play a critical role in knowledge accumulation and dissemination. Ben Mahmoud-Jouini and Charue-Duboc (2014) extend this research to knowledge related to innovation. Without adopting Tallman and Chacar's (2011) framework, Dalmasso and Maniak (2015) focus on the interaction between the local network of practice that involves collaboration with external as well as local players and the MNC's internal network of practice. They introduce the notion of "organizational distance" between different units in the same company, adapting the concept introduced by Torre (2014). They suggest principles and mechanisms to reduce this organizational distance and support and enhance collaborative design processes between the historic R&D center and newly created units. In such situations, cultural distance is inevitably important and deserves attention (Chevrier and Segal, 2011) when considering the vital role of networks of professionals in global innovation.

Inception and diffusion in the global innovation process

Little research has specifically studied the inception of the innovation process as well as the diffusion dynamics between subsidiaries. The vogue of frugal/reverse innovation has drawn stronger attention to the process of subsidiary-initiated innovation as well as their diffusion. In the following, we will focus on these two phases, inception and diffusion, which several contributions in this issue illuminate.

Internationalization of inception of innovations

Several articles in this issue help us understand why some innovation has emerged in subsidiaries that are not in the company's home country. In the case of radical innovations that are of strategic importance for the firm, this geographically distributed inception raises several issues.

Radically new opportunities result from coupling processes between markets and technological knowledge that are very complex and often rely on tacit knowledge. The importance of physical proximity for coupling markets and technical knowledge, and at the inception stage, is also highlighted in Guerineau, Ben Mahmoud-Jouini and Charue-Duboc (2015). They delineate the contribution of specific subsidiaries called "accelerators" and the characteristics of the innovations they tend to develop, precisely because of the specificity of customers they interact with.

Technological breakthrough is Blomkvist, Kappen and Zander's (2015) focus. They show that the R&D center located in the MNC's home country contributes fewer than half of the firm's radically novel patents. Thus they highlight that relying on a variety of R&D centers is a way to increase the probability that the company will significantly contribute to a breakthrough, as one cannot predict where it will pop up. The mimetic behavior of pharmaceutical companies in opening R&D centers in China (Hadengue, Marcellis-Warin and Warin, 2015) can also be analyzed as a search for variety and a managerial response to uncertainty. Not having R&D located in China would expose a company to a strategic risk, as new opportunities and scientific advances could be articulated in this specific environment in coming years.

The concept of reverse innovation draws attention to innovations that can be sources of strategic rupture. However, the breakthroughs are not technological and cannot be captured by a methodological approach based on patents. Radojević (2015) suggests that reverse innovation is a disruptive innovation with a geographical dimension: it targets a new market that differs from the company's usual primary market and is characterized by rapid growth. Identification of market segments that may lead to radically new offerings and open new strategic positioning is of crucial importance but it can come from actors located in very diverse locations. This is another source of variety, related to market diversity, that the company should enhance.

Global innovation diffusion

Studying innovation diffusion requires specifying the object of diffusion. It can be expertise about a technological domain developed in an R&D center that will be transferred to another R&D center and used in the development or adaptation of innovations dedicated to local markets (Dalmasso and Maniak, 2015). It can be an innovation designed in a subsidiary that may be of interest for other subsidiaries and adapted and commercialized in their markets (Ben Mahmoud-Jouini and Charue-Duboc, 2014). It can also refer to access to specific knowledge through a collaborative project in which several subsidiaries and partners take part (Doz and Wilson, 2012).

The research appearing in this special issue studies different types of international diffusion of innovation. Some of the research focuses on networks supporting the multidirectional flows of knowledge and innovation that we have previously presented, while other research tends to specify the processes and the organizational arrangement that support this knowledge exchange.

Blomkvist et al. (2015) consider exploratory research rather than incremental improvement of technologies and

products already mastered by a company. The type of exploratory research activity they analyze is often strategic and precedes the existence of a network. The authors' methodological approach involves the following question: after an entity of a MNC has filed for a patent in a technology class that is new for the firm, do other subsidiaries file for a patent in this same new technology class, and how long does this take? The authors analyze the constitution of teams specializing in a new class of technology and the strategy of localization of these teams, i.e., whether they are concentrated in a subsidiary or duplicated or dispersed in several subsidiaries. The authors show that the home-based R&D center retains a specific role; the absorptive capacity of this unit enables it to rapidly identify competences underlying radically new developments and acquire them.

Radojević (2015) emphasizes the organizational barriers to the development of reverse innovation and the endogenous distance between entities of the MNC, a notion that captures the organizational distance characterizing the ability of entities of the MNC to cooperate in a project and to mobilize skills mastered by only one entity. Furthermore, an understanding of reverse innovation may fuel the discussion of entrepreneurship and innovation among less favored players, such as small and medium enterprises (SMEs) vis-à-vis large MNEs (Burger-Helmchen et al., 2013).

Focusing on more typical and less radical innovations, Ben Mahmoud-Jouini and Charue-Duboc (2014) proposed the concept of innovation deployment, defined as the process leading to the successive commercialization of an innovation in various subsidiaries once it has been developed and marketed by the first one. They emphasize the necessary adaptation of an innovative product to the local context in which it is commercialized and the conditions that allow the subsidiary deploying the innovation to access the necessary knowledge, which is most often located in the subsidiary that originated the innovation. Guerineau et al. (2015) differentiate the types of innovation and the types of subsidiaries that are more prone to develop them, and they specify the role that each type of subsidiary may hold in the deployment processes.

Finally, the diffusion of an innovation, a technology, or a competence is often analyzed in sequence from the first subsidiary to the second. However, the initial sequence of subsidiaries that commercialize an innovation may present various patterns, as suggested by Guerineau et al. (2015) and Blomkvist et al. (2015). Understanding these patterns appears to be an important avenue for future research.

Looking forward: Further research and open questions

While addressing current challenges encountered by MNCs in the globalization of innovation processes, the articles of this special issue leave some important questions unexplored. In this section, we identify and summarize five avenues for future research.

Measuring subsidiaries' contributions to innovation

The role of subsidiaries in MNCs' global innovation processes has been acknowledged (Cantwell and Mudambi, 2005; Mudambi, 2011; Guerineau et al. 2015; Blomkvist et al. 2015). However, further research is needed to address some academic and empirical challenges. As highlighted by Schmeisser et al. (2010), coherent and adapted measures are needed for each step of an innovation process. This is particularly true when the process is global. Therefore, it is crucial to measure the contribution of subsidiaries to innovations, especially those commercial subsidiaries that do not have R&D capabilities and do not file for patents. As academics, we lack indicators other than patents to apprehend these innovation capabilities.

This is also an empirical challenge, because monitoring the innovation activities of subsidiaries is a prerequisite for designing incentives that will encourage rather than ignore them. Many incentives currently adopted by the headquarters (HQ) that are implemented for top management's subsidiaries can be counterproductive and lead to diminishing this capability.

Characterizing the roles of specific entities in the diffusion of global innovation

The role assigned to the HQ regarding innovation is dependent on the different models of MNCs; it is paramount in the traditional (Figure 1) and dominating (Forsgren, 2013) models but undifferentiated in the global (Figure 1) and networking (Forsgren, 2013) models. In the latter model, the HQ does not play a specific role different from any other subsidiary regarding the firm's innovation strategy. However, as pointed out above, the enriched reverse innovation model (Figure 1), for example, implicitly gives the HQ a specific role in the deployment of innovation. Ben Mahmoud-Jouini and Charue-Duboc (2014) showed that deployment of innovation among subsidiaries beyond the first commercialization relies on factors that can be set up by the HQ. Guerineau et al. (2015) identified several trajectories of innovation among subsidiaries that require monitoring by a player such as the HQ, for example.

How then can we best characterize the role of intermediary that HQ can play in these knowledge and innovation flows in the MNC? Indeed, the HQ can influence or support these dynamics and play a specific role with respect to some subsidiaries. Doz et al. (2001) compare this role to that of a magnet. Yet we lack a precise description of how the role is fulfilled: What are the management tools that are necessary for this role? What are the interactions with the other entities of the MNC? Can the HQ role be distributed

among multiple locations and subsidiaries, and how effectively? What roles do regional HQs play?

Such a fine-grained characterization can also be applied to entities other than the HQ—for example, specific subsidiaries that can leverage differentiated capabilities or unique environments. A characterization of innovation-strategic roles for specific entities of the MNC can help provide an answer to the following question, which deserves further investigation: Can we really have a centerless global network of innovation, where innovation can arise anywhere in the network and mobilize resources from anywhere in the network? Clearly, this warrants further investigation.

Global vs. local innovations: exclusive or dual strategies

The literature highlights a tension or duality between the development of a local product targeting a specific market that could be eventually adopted by similar markets (such as in the reverse innovation stream) and the design of a global product targeting generic needs and a global market, which will eventually be marginally adapted to a better fit in some countries. Should firms choose between these options—or can they coexist within some MNCs, despite the tensions resulting from the duality? Is one of these options a source for performance in some sectors but not in others? Is the option involving local innovation more suitable for services and sectors that rely on tacit and complex knowledge? What about offerings that mix a product and services, for example, an e-health solution (see the case of Sanofi in Ben Mahmoud-Jouini, Charue-Duboc and Midler, 2015)?

How about process innovation? Apart from a few exceptions, the reverse innovation stream focuses mainly on the diffusion of innovation products that diffuse from a periphery to another one, whether or not this is through the center.

Is globalization of innovation a transient phenomenon?

Gammeltoft (2006) argues that the growth of R&D internationalization may have reached a plateau. Are we at the end of the growing internationalization of innovation in its current form? Was this just a transient phenomenon triggered by an interdependent but heterogeneous world?

Indeed, some rationales for R&D internationalization, such as the low costs offered by some emerging countries, begin to lose their relevance with converging labor costs. Furthermore, in many MNCs, the hidden costs of this internationalization have become more visible with practice, reducing the attraction of such dispersion and eliciting disappointment in a global innovation process that proved too complicated to manage.

Markets may also converge, and MNCs seek opportunities to make them converge. Although markets are still highly geographically heterogeneous, their differentiation is decreasing in some traditionally highly differentiated sectors, such as cosmetics and food. Some companies, such as L'Oreal and Nestlé, are looking for local products that can become global.

The implicit equation of global innovation capability and R&D internationalization has also been challenged. Some companies target distant markets without having local R&D entities, for example, Haier, which mainly develops products for the Western market from a Chinese localization, such as wine coolers (although when China does not provide a competence base and the technology is demanding, Haier locates new product category R&D overseas in local innovation clusters, such as dishwashers in Germany, in a typically transnational move).

Therefore, the progress of communication tools along with changes of mindset leading to the increasing propensity of firms and customers to accept innovations emerging from around the world will perhaps lead to a reduction in the dispersion of R&D in MNCs.

From a corporate to an individual level

Literature on global innovation generally focuses on the corporate level, with the creation of entities in foreign markets. In doing so, it ignores an increasingly important vector of innovation internationalization that individuals provide. The growing role of individuals rather than organizational structure is exemplified by the migration of talent from one country to another, such as Indian engineers and entrepreneurs in Silicon Valley and Canada or Japanese engineers "moonlighting" in China and Korea, who have the ability to overcome political or economic reticence toward innovation internationalization. Such migration can be either permanent (e.g., to Silicon Valley or British Columbia) or temporary and even part-time (e.g., weekend engineering and team leader "moonlighters" from Japan in Korea and China). This phenomenon is accelerated by the internationalization of university curricula and students who create international networks from their university.

The growth in open innovation and the increasing interactions between start-ups and large companies favor this alternative mode of internationalization, for which scouting units have been established (Monteiro, 2015) and incubators and accelerators around the world have been created (Esquirol, 2015).

Strategic alliances and joint projects, often complemented with temporary secondments between partners and the assignment of engineers to shared labs, provide another opportunity for individuals to contribute to the growth of innovation networks. Hence internationalization through the installation of R&D centers or acquisition of

innovative local firms may be supplemented by individual internationalization.

After the management of global innovation, the next challenge for MNCs will be the international fostering of creative ideas. Creativity is widely acclaimed as being the next growth engine for both countries and firms (Burger-Helmchen, 2015). Many companies for which creativity is at the center of the value chain are already looking at integrating ideas coming from all around the world (see the case of Ubisoft in Ben Mahmoud-Jouini et al., 2015). Ideas are very specific and cannot be managed as technologies, knowledge, or innovation. Therefore, a new stream of research should grow around the notion of global management of creativity and creative players.

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