Optimizing Metanational Innovation Processes

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Introduction: Why metanational innovations?

How to best configure and coordinate global innovation processes has become an issue of growing relevance for global competitors, in many industries. Several reasons underlie this evolution. First, global competitors are increasingly well matched on other dimensions of competitive advantage than innovation: quality, efficiency of manufacturing and other processes, access to distribution, brands, global logistics, etc… (Doz & Prahalad, 19xx). Second, innovation – in particular R&D-driven product and technology innovation and future use-driven market creation – remains one of the few functions or activities of major global companies that still extensively depends on the distinctive knowledge of people and on their unique skills. And differences in skill availability, quality and costs across regions and specific locations around the world remain significant. Skills also tend to be locally rooted in education systems, national innovation systems, local competence "'clusters", cultures, and social structures. Thus, although they may seem to evolve relatively quickly, for example with liberalization in China and India, their rootedness in national institutions, local agglomerations of knowledge creating activities, and interactions embedded in social and cultural systems often makes them both unique and immobile. Third, the more differentiated and heterogeneous the knowledge base required for gaining advantage, the more likely key elements of such knowledge base will be dispersed around the globe. The knowledge content of most products has grown increasingly heterogeneous. This is truest when products and innovations rely more and more on very distinct knowledge bases, such as chemistry, genomics, biology and electronics in health care, or electronics and mechanics in transportation. These knowledge bases have their historical roots in different locations around the world. Market convergence and segmentation play a similar role particularly for goods and services that are at the intersection of technological capabilities and culturally segmented markets, such as digital entertainment or publishing. The market knowledge they require is both dispersed and locally rooted.

Historically, global companies largely competed on the basis of inherited, and carefully and deliberately further honed, home-base strengths and leadership in particular knowledge domains, for instance Germany in chemistry and machinery, the UK in food products, Finland or Canada in forest products, the US in transportation equipment and farm machinery, and Japan in automobiles and consumer electronics.

No longer fully true. Skills and knowledge creation are increasingly differentiated and dispersed, so competing on the basis of the strength of the home country leaves companies exposed to competitive threats from a new breed of global innovators we called "metanational" innovators (Doz, Santos and Williamson, 2001). In short, these companies consider the world as a fabric dotted with dispersed pockets of specialized knowledge, of a potentially complementary nature, to be discovered, accessed, linked, brought together and melded into new innovations. By bringing dispersed pockets together to serve their innovations they are able to gain a unique advantage over competitors who rely only on the knowledge available in the home base, or even that available in a few of their existing subsidiaries (Bartlett & Ghoshal, 1989)[1]. Knowledge dispersion drives metanational innovation. As an example, Essilor,

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[1] Perhaps the most strategically and practically relevant difference between the transnational model and the metanational one is that the former is retrospective while the metanational approach is prospective. In most MNCs the strength of a subsidiary (its voice in the product or service creation process) is likely

the world leader in vision correction glasses has built its leadership on a global innovation system drawing on German Optics expertise, US polymer chemistry, and Japanese coating and thin film competence. Interestingly, given the process skills needed for making high quality glasses, this dispersion is reflected in the production system: glasses are designed in Germany from ophtalmologists' prescriptions, blanks made in the US in an alliance with PPG, coated in Japan in an alliance with Nikon, and finished where they are sold.

Innovation in the 21st century is indeed increasingly knowledge recombination and melding across knowledge domains, guided by a better understanding of usage needs of customers, who themselves may be associated to the innovation process (Prahalad, 2004, xxxx). In extreme case, the users themselves, the customers take over the whole innovation process, in an open community process, for instance like in the massively networked video games Linden Labs' customers develop (xxxxx). Without going to such extremes, a metanational innovation process maximizes the diversity of sources a company can use to foster and stimulate its innovativeness.

Changes in underlying knowledge bases – and innovation regimes- have often led to the wholesale relocation of an industry, a well-researched example being provided by Ann Saxenian (XX), with the migration of the US IT industry to the West Coast when decentralized client-server architectures and PCs replaced traditional mainframes. Not only was the underlying nature of the technology shifting to standardized components and interfaces, but both the nature of the products (from "hierarchical" mainframes to "networked" client servers) and of the customers (from government agencies and large corporate IT departments to individual and small business enterprises) also drove the emergence of new corporate structures and governance forms, and of new competitors more in-tune with their triple shift, and sounded the death knoll for a number of traditional mainframe and mini computer companies.

Neither the opportunity, nor the difficulty, to draw on dispersed and differentiated sources of knowledge and to achieve metanational innovations, have been well-recognized initially by most companies.

 That the opportunity offered by metanational innovation processes was not recognized is hardly surprising. In most companies - in Japan and elsewhere - the historical leadership of the home base was so solidly established as not only to be reflected in the structure of the organization – which could be changed – but also deeply imprinted in the mind of its members – which is harder and slower to change. Reversing knowledge flows to learn from new locations at the periphery of the organization is difficult, all the more so once a company becomes successful on the basis of projecting home-grown knowledge, and in particular as it further deepens its home-base competencies. So, for instance, despite the particularistic nature of its home culture, Samsung may be much better poised for metanational innovation, today, than Sony – although Sony did learn very actively from the world thirty odd years ago! Sony came to be too inward looking, and after being one of the first Japanese companies to globalize, it then remained dependent on Japan. In our research, we

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to be rooted in market success measures such as size, local market share and profitability, not in tomorrow's relevance as a likely source of knowledge. The metanational models breaks that dependency by making no assumption that knowledge sensing, globally draws on existing subsidiaries, a key difference from th transnational model.

observed that "born in the wrong place" newcomers and challengers made significantly better and faster metanational innovators than established multinationals –or transnationals - trying to reform themselve. Metanational processes of innovation are beyond the success of many unexpected new global competitors (Doz, Santos & Williamson, 2001).

The Challenges of Metanational Innovation

Understanding the challenge of metanational innovation has proven equally hard. Some traditional multinationals simply suffer from ignorance: not having the experience of dispersed – multi-site - innovation projects, their management does not realize how different running a metanational innovation project will be from their experience of co-located projects. Many informal face-to-face interactions solve most problems under co-location, but these do not take place under dispersion. Unaware of likely difficulties, managers with no experience of multi-site innovation apply what their experience of co-location taught them, then fail and learn not to try again.

Other companies have put a misplaced faith in the virtue of virtual (or, more exactly, dispersed) teams and of an array of knowledge management tools to integrate their members across dispersed locations. While this works well for certain activities, such as the fabled "7x24 follow-the-sun" software development projects, the success of such projects is actually deceiving: No strong lesson can be drawn from them. Most knowledge – and in particular knowledge about emergent or latent market needs, or about infant technologies – cannot be so easily defined, structured, and expressed in binary code as software can. Quite to the contrary, most knowledge is ill defined, ambiguous (liable to selective and multiple interpretations depending on who considers it, from where) and does not have clear boundaries. It is often enmeshed in invisible ways in social fabrics and cultural values and traditions. The tacitness and context-dependency of much knowledge makes metanational innovation difficult, and the simple lessons from sharing highly explicit and codified knowledge, such as software code, hard to apply or altogether misleading. Complex knowledge still essentially requires in-situ apprenticeship, as the medieval craft guilds were providing in Europe. Not all contexts are open, not all to foreigners, and establishing oneself and being accepted as an insider may take a long time. Suntory, for instance, first sent one of its young executives to study oenology in Bordeaux, and befriend key experts among his professors, years before attempting to buy and run a winery there. The young executive then became the winemaster of newly acquired Chateau Lagrange (Asakawa & Doz, forthcoming 2006).

The growing potential value of metanational innovations, given the risks of competitive stalemates along other dimensions of advantage as companies converge in competence and configuration, worldwide, increases. Yet, growing market convergence and knowledge heterogeneity, combined with the internal (reversing the knowledge flows) and external (accessing complex knowledge from relatively closed contexts) difficulties of shifting to a metanational innovation raise a series of challenges for global companies. For metanational innovations not to remain an empty promise, these need to be addressed successfully by companies that aspire to innovate by tapping knowledge from the world.

Essentially our research suggests the existence of four distinct but related challenges:

First, when one considers how widely to deploy sensing and mobilizing capabilities, in the continuum from an unfocused worldwide creative sensing breeding diversity to focused and selective search in but a few innovation hotspots, some choice needs to be made: the innovation footprint needs to be optimised. More locations bring the advantage of more variety, albeit perhaps with decreasing marginal gains to further locations, but also an exponentially growing challenge of knowledge integration between locations.

Second, simplifying complex knowledge via codification and explicitation, and breaking it into modules, enhance mobility, but at the risk of a loss of substance and perhaps at that of making the knowledge a mere, and useless, informational representation of the real knowledge. How far to simplify and modularise, and how to make the appropriate trade-offs between various types of risks is another critical challenge.

Third, matching the knowledge sharing conduits to the nature of the knowledge to be shared and the experience of the participants involved in the process, over the duration of an innovation process with different requirements at various times is not an obvious set of choices: one can err toward mindless efficiency and over rely on knowledge tools, to see projects falter, but one can also err on the side of effectiveness but engage in exceedingly onerous forms of communication and knowledge sharing that will discourage all but a few particularly valuable (and probably not very innovative if their value can be assessed ex-ante!) attempts at metanational innovation. Combining efficiency and effectiveness is a major challenge.

Fourth, knowledge sharing often fails for lack of absorptive capacity (Cohen &Levinthal, 1989). Maximizing absorptive capacity without undermining the unity cultural strength of an organization is another critical challenge, in particular for companies coming from countries with particularistic national cultures.

We now address these challenges, in turn.

1. Optimization of location choices and dispersion

In a most obvious way, dispersion brings positive returns only insofar as it allows to access uniquely differentiated and complementary sources of knowledge. Except perhaps in industries where host governments insist on a foreign company developing a full set of technical competencies locally (e.g., defence electronics, perhaps the last sector where true "national responsiveness" and "multi-domestic" strategies still need to prevail) replicating competencies in multiple locations brings little benefit. Of course, cost savings may still accrue – as in software development – but these are often overshadowed by differentiation advantage. Even in the current wave of R&D investments in China and India other factors, such as skill uniqueness and market learning, play a role (Wilson, Doz & Veldhoen, forthcoming 2006).

Yet, locally differentiated contributions are not easy to make and sustain in a global innovation network. They require several conditions to be met:

- First, distinctive local skills need to be present, the result of a particularly strong education system in some relevant area (e.g., leading universities in the U.S.), or immigration to the country (e.g., Russian mathematicians to Israel), or of a pattern of national or regional specialization, sometimes brought about or helped by far-sighted government policies, that led to strength over time in specific areas and agglomeration of competent and creative people (Florida, xx).

- Second, the local operations of the foreign company need to partake in knowledge-creating activities in the local environment, in collaboration with local partners and gain leverage from such interactions. In other words, a stand-alone R&D center, not drawing on skills, competencies and knowledge from its local environment, would be of limited value. Local initiatives are often stifled by global control systems (Birkinshaw, 19xx; Frost, 200x).

- Third, a sequence of "matches" over time between the learning and innovative knowledge contributions the local environment has to offer and the needs of the global company need to take place, resulting in the development of a feasible skill trajectory on the part of the local unit (Doz, Santos, Williamson, forthcoming;). Fuji Xerox, for instance developed a succession of competencies, from the learning needs and opportunities serving the Japanese market offered, and contributed them to the Xerox group (Doz & Hunter, 2005). Some of these competencies turned out to be absolutely critical to Xerox's survival.

- Fourth, the receptivity and flexibility on the part of the global company to learn from its periphery and to let new locations play a growing strategic role, rather than to stifle local knowledge development initiatives has to be high, a not too frequently met condition.

In other words, dispersion is valuable only insofar as it allows to exploit globally and dynamically the value of locally created knowledge, not just within the confines of the multinational company's own operations, but also, and more importantly, in close collaboration with local sources of knowledge, individuals, partners, customers, suppliers, research centers, etc… This also requires that the multinational company's competencies be of sufficient interest to local knowledge sources for them to want to collaborate with it toward knowledge creation. In some cases local companies may be strong enough to "crowd-out" access to local knowledge creation processes and exclude multinationals. Foreign automobile companies in Germany, for instance, may discover that they hardly qualify against local German competitors for partnerships with equipment suppliers. This is not the result of misplaced nationalism, but simply reflects the reality that the local industry is generally more technically advanced than foreign MNCs, and thus makes a better partner for co-developments with local component makers.

Local operations thus have to deserve both their access to the local knowledge resources and the opportunity to contribute to metanational innovation processes in the MNC. Growing dispersion, and the costs and risks of running a globally dispersed innovation network limit the marginal value of each additional location, as the number of locations involved in a particular innovative project increases (Santos, Doz &

Williamson, 2004). The number of locations involved in a particular project will thus likely be limited. Our empirical research suggests that rarely are more than a few locations involved (Wilson et al., forthcoming 2006). Implicitly therefore, each location within the multinational network participates in two knowledge races: (1). A race against other companies, local and global, to tap into local knowledge creation capabilities and local sources of knowledge, and (2), a race against other locations within the MNC network form which the MNC might draw similar or superior knowledge of equal importance for particular projects[2]. Local subsidiary roles and local competence clusters therefore co-evolve.

2. Knowledge complexity and mobility:

The configuration of global innovative activities, as well as their coordination (as we will see below) also critically hinge on knowledge complexity and on the feasibility of various knowledge simplification approaches. To an extent all knowledge is contextual, because new knowledge can only be created through a context-dependent process (Nonaka & Takeuchi, 1995). The resulting knowledge may be articulated, and fully explicit, but it is not independent of the context within which it was created, nor can the creation process and its context be described in the resulting knowledge (for a summary argument, see Nielssen & Nielssen, 2005). Rules of de-contextualization cannot be fully articulated, and re-contextualization (when the knowledge moves to other locations) cannot be fully anticipated, even when the receiving location's context is well known (Brannen, 2004, Brannen, Doz & Santos, forthcoming 2006).

Trying to make complex knowledge independent from its originating context is thus self-defeating. Knowledge can be simplified in various ways, though. One approach is to use a relatively neutral language, which is neither the natural language of the source of knowledge, nor that of any recipient or knowledge melding crucible or location, to encourage expression of knowledge in context-neutral terms and tease-out the limits between such knowledge and that which irreducibly remains context-dependent. Practically desing environments such as DFSS (design for six sigma) or common engineering environments (such as CATIA for aerospace) are such context-neutral languages. Efforts at making tacit collectively held knowledge more explicit are also useful, provided they do not so oversimplify complex knowledge as to make it useless for the recipients, or potentially difficult to put into a new context. Practically, this may for instance entail the transfer of procedural minutia, but without the code that would provide meaning to these procedures. Out of context they may not work effectively, or they may have unintended consequences. It may also well be that in the receiving context a better, more effective and resonant with the local culture, set of procedures could have been invented, had the underlying purpose and principles been shared, rather than the procedural mechanics only (Brannen, 2004).

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[2] Of course, to an extent, competition among locations within the MNC system hinges partly on cost differentials, with China, for instance taking the lead today. To make costs the driving force, however is very short sighted on the part of management, not just because costs converge, but also because a cost focus blurs the attention to skill originality and uniqueness so essential to innovation. So costs may justifiably be a driving force for no so sophisticated but very well controlled software development or clinical tests, but would be a complete mistake for really creative activities such as software architecture definition or drug discovery.

Short of being made context neutral, knowledge can also be broken down into components. The challenge though is three-fold. First, the boundaries and structure of complex knowledge in context are very hard to discern and ascertain, hence if large "chunks" of complex knowledge are to be shared, uplifting them from their original context is prone to accidents. In particular, members of the originating context are likely to underestimate the "chunkiness" of their knowledge, because they implicitly know how it operates and have an almost tacit understanding of its structure. Second, even without the issue of chunkiness, the range of knowledge inputs into an innovation is a priori unknown. Innovation, as contrasted to programmatic phases of product development for instance, results from the serendipitous encounter of disparate sources of knowledge, an occurrence that cannot be pre-programmed. Hence breaking knowledge into modules cannot take place at early creative stages, before the knowledge architecture of the innovation is defined and stabilized. Third, knowledge modules have the nasty habit of interacting in unplanned way once put together. Hence, at the prototyping and testing stage, in particular when knowledge elements from various technical knowledge bases and usage patterns (or models) interact live modularity breaks down and the whole knowledge has to be integrated.

So a second critical trade off in managing global innovation, beyond the knowledge source "footprint" discussed in the previous section, is finding an appropriate balance between complexity and simplicity in attempting, or not, to package the knowledge. In addition to how codified and explicit one tries to make the knowledge, another packaging trade off is how and when in the innovation journey to attempt to make the knowledge modular and specify interfaces between knowledge modules.

3. Knowledge-sharing conduits:

A third key challenge for a firm to develop a metanational innovation capability is to learn to match the knowledge sharing conduits it chooses to the type of knowledge to be shared, typically different over time, and occasionally recursive and iterative in the course of an innovation project, and to the number of sites involved. The critical trade-off here is between the efficiency of mediated communication with simple inexpensive channels such as e-mail and net meetings, and the effectiveness of face-to-face communication with the associated travel costs and needs for personal stamina on the part of those involved. Beyond the nature of the knowledge, the experience of the parties in working together, and the extent to which such experience has removed ambiguity (Daft & Langel, 1986) also play a role in the choice of conduits. Removing ambiguity calls for a dialogue across contexts best achieved face to face, removing uncertainty calls for more information exchange that can easily be mediated with simple technologies. In several situations we observed, the issues of uniqueness and pertinence of local contributions to the global innovation network having been only partly clarified, ambiguity on cooperation and rivalry among sites persisted. Corporate location choices, and hence the future of various sites were not clearly defined, and the looming threat of outsourcing engineering to China and India only compounded ambiguity of motives. The learning of specific communication tools and of their limits, as they diffuse into an organization may also allow a progressive shift over time to more mediated communication, being applied to wider spectrum of knowledge sharing tasks, from support functions to the core of the innovation process. The

integrative features of IT tools can give them a stronger and stronger role provided they are designed to enable rather than constrain.

Our purpose here is not to engage into an extended discussion of knowledge sharing across contexts in the course of metanational innovation processes (see Doz & Santos, [1997] and Brannen, Doz & Santos [2006] for such a discussion), but simply to highlight that the choice of knowledge sharing conduits, and the learning on the part of innovative firms to match the choice of conduits for both efficiency and effectiveness to the characteristics of a particular project is a critical enabler of metanational innovation. Here too, a key trade-off is between opting for rich high bandwidth conduits, just in case, at the cost of some efficiency, vs. erring the other way by economizing on conduit costs but running a risk of stifling innovations.

4. Absorptive capacity:

A fourth challenge to metanational innovation is to foster the receptivity (or absorptive capacity) of the various units, both sensing units acquiring knowledge from the outside, and participants in knowledge melding or integrating within the MNC itself. Empirical studies (e.g., Szulanski, 1996) have shown that the receptivity of the receiving unit is the strongest determinant of success or failure in knowledge sharing. In the specific context of metanational innovations several aspects are important. First, as we mentioned earlier, the home-centric nature of a company is often more in the mind of the employees than in the formal structure or in the will to control of the head office. In other words it's enduring normative more than administrative control. Such normative control is perpetuated by the transfer of beliefs, interpretative structures and rules the corporate culture conveys. Hence a critical first step toward becoming a metanational innovator is to dissociate the corporate culture from the culture of the home country. The point here is not necessarily to change it all, but to make it equally easy for a non-home country national to be part of the company and not face a "glass ceiling" issue. Making the corporate culture more universal calls for understanding the essence of its underlying values and principles and leaving room for local reinterpretation and contextualization.

A complementary step is to make managers more cosmopolitan, i.e., better able to grasp the multiplicity of contexts and cultures, and be sensitive to them, rather than deny their existence or their relevance. Companies originating from a particularistic culture, such as Finland, Japan, or Korea, may have an advantage here over companies originating from a universalist culture, such as France, the U.S., or the UK: they already know the world is not, and cannot be like they are.

Conclusion:

The issue around metanational innovation ought no longer to be "whether" but "how". The previous section points to a few approaches to deal successfully with the challenges it faces. The promise of metanational innovation is competitively important, and once a few simple pitfalls are avoided, the implementation of a metanational strategy is quite feasible.

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