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Knowledge Accumulation and Dissemination in MNEs: A Practice-Based Framework

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Abstract

Much has been written on the importance of knowledge accumulation and transfer within the network firm but two questions remain. First, what are the specifics of this process, particularly for high tacit content knowledge? Second, how can firms create a sustainable competitive advantage from knowledge acquired from outside the firm? We address the first question by proposing that the mechanisms of external knowledge capture and internal knowledge transfer can best be understood and studied not at the level of networked subsidiary firms, but at the micro-organizational level of Communities of Practice (CoPs). We then offer a model of the dynamics of organizational learning in network organizations, such as MNEs, which builds on this unit of analysis. This framework clarifies the link between CoPs and Networks of Practice (NoPs), by offering a novel conceptual model of how knowledge, particularly tacit, embedded knowledge, is absorbed. The framework also proposes a new link -that between CoPs and Internal Networks of Practice (INoPs), as another essential ingredient to knowledge accumulation and transfer within firms. We also propose that the firm-level architectural knowledge that is developed through INoPs is valuable and rare. In combination with the component knowledge that is developed through NoPs, architectural knowledge can create novel knowledge that may be a source of competitive advantage.

Keywords: Communities of Practice, Networks of Practice, Knowledge Accumulation, Knowledge Dissemination, Multinational Enterprise

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INTRODUCTION

Knowledge has taken center stage over the years both in managerial practice and in academic discourse (e.g. Boisot, 1997; Grant, 1996; Kogut and Zander, 1992; Nonaka and Takeuchi, 1995). Researchers have even proposed that effective and efficient transfer and exploitation of knowledge is the primary reason for the existence of firms in general and in particular of 'network firms' – firms such as multinational enterprises (MNEs) with highly autonomous units in different geographic locations (e.g., Doz, Santos, and Williamson, 2001; Ghoshal and Bartlett, 1990; Gupta and Govindarajan, 2000; Nonaka and Takeuchi, 1995). Innovation in the MNE is viewed more and more as accumulating in peripheral units that are immersed in local business communities and then being disseminated both to the center and directly to other subsidiaries (e.g., Cantwell, 1989; Hansen and Lovas, 2004; Kogut and Zander, 1992, 1993). In this new view of the MNE, subsidiaries must be able to access and internalize locally embedded and often tacit knowledge spillovers through their presence in host countries (Cantwell, 1989) or in local communities and clusters (e.g., Almeida and Phene, 2004; Feinberg and Gupta, 2004) and then to transmit their knowledge throughout the MNE's network of units, using both formal and informal internal ties (Bell and Zaheer, 2007; Meyer, Mudambi and Narula, 2010). MNEs are able to create competitive advantage using knowledge that is available to other firms by removing knowledge from its place of origin through internal transmission and combining it in unique ways with similarly sticky knowledge from other locations (Kogut and Zander, 1993).

We currently have a fairly solid understanding of the mechanisms for the movement of basic information or low-tacit content knowledge in MNEs (e.g., Martin and Salomon, 2003a; Szulanski, 1996). Two key questions however remain about the development and transfer of tacit knowledge within

MNEs.[1] First, how do local units access this 'epistemically complex knowledge' (Grandori, 2001) from a foreign external environment when simple local presence is no guarantee of access to local knowledge pools (e.g., Liebeskind, Oliver, Zucker, and Brewer, 1996; Sorenson, Rivkin, and Fleming, 2006)? Second, how can sticky, or geographically bound, tacit knowledge (Markusen, 1999) be transmitted efficiently to other units of the MNE network (Nelson, 1982; Szulanski, 1996) and 're-combined' (Kogut and Zander, 1993) to create and gain sustainable competitive advantage using knowledge that is not completely proprietary?

We appeal in this paper to the theory of experiential learning (Kolb, 1984; Kolb, Boyatzis and Mainemelis, 2000; Nooderhaven and Harzing, 2009) as it has emerged in the literature of communities of practice (Lave and Wenger, 1991; Brown and Duguid, 2001) to provide a single theoretically consistent and comprehensive framework that answers both of these questions. In line with calls to examine the micro-foundations of organization processes (e.g. Abell, Felin, and Foss, 2008), we propose that the mechanisms of both external capture and internal transfer of knowledge that has a high tacit content can best be understood and studied not at the level of networked subsidiary firms, but at the micro-organizational level of Communities of Practice (CoPs) and the Networks of Practice (NoPs) that they form (Brown and Duguid, 2001). CoPs are small, focused, localized groups of individuals within a firm who have a mutual engagement in the joint practice of some activity (Brown and Duguid, 2001), such as the members of a technological work group (Henderson and Clark, 1990), a product development team, groups of technicians working on common problems (Brown and Duguid, 2001) or a firm management team (Matusik and Hill, 1998)[2]. Through their shared enterprise, members of a CoP develop common operational, technological, or *component* knowledge. They also develop common repertoires of behavior,

[1] While we focus on the MNE for simplicity of exposition and because of the particular importance of the issue of distributed knowledge development in the international strategy arena, our model could apply equally to other network organizations.

[2] Brown and Duguid (1991) describe communities as noncanonical and often not recognized by the organization, fluid and unbounded, and often incorporating people from outside the organization. They may include individuals with different professions (Mudambi and Swift, 2009), but these individuals share a common focus.

perspectives on, or understandings about the system of knowledge development and application, or *architectural* knowledge (Henderson and Clark, 1990; Matusik and Hill, 1998; Tallman, Jenkins, Henry and Pinch, 2004; Frost and Zhou, 2005).

Natural social processes occurring among individuals and groups engaged in similar activities in a confined geographical area (Granovetter, 1985) lead closely affiliated CoPs to create local Networks of Practice (NoPs). These NoPs are composed of interacting CoPs from the various firms and organizations (universities, trade groups, etc.) in a local geographic region or cluster (Brown and Duguid, 2001; Storper, 1993; Tallman et al. 2004; Zucker, Darby, and Armstrong, 1998). These networks and the social ties that they represent promote the development of network-level architectural knowledge that eases the transmission of tacit component knowledge among embedded member CoPs (Barnes, 1999; Brown and Duguid, 1991, 2001; Grandori, 2001; Tallman et al. 2004). When the CoPs that are part of an MNE subsidiary firm are embedded in relevant local NoPs, they will share the local architectural knowledge and internalize component knowledge that is available within the cluster (Frost, Birkinshaw and Ensign, 2002; Cantwell and Piscitello, 2005; Mudambi, 2008).

We apply the same construct to the movement of tacit component knowledge throughout the widely dispersed international networks of the MNE. Bureaucratic procedures at the level of the firm can help other organizational units access the explicit part of the component knowledge held by a subsidiary or its CoPs. We recognize this role for bureaucratic processes, but focus this paper on the creation, absorption, and dissemination of tacit knowledge. In this way, we also identify mechanisms through which publicly acquired knowledge can lead to a sustainable competitive advantage. The common architectural knowledge developed across networks of practice assists widely spread units to combine acquired component knowledge. This requires the internal and often international transfer of highly tacit component knowledge, an action that demands a level of connectedness that has been described within dispersed intra-firm communities (Buckley and Carter, 2003) or social communities (Noorderhaven and Harzing, 2009), but which, for consistency, we define as Internal Networks of Practice (INoPs). By this term, we mean informal networks that bring together in joint practice the CoPs that are found at intra- and inter-subsidiary levels, and that help in developing common repertoires of knowledge and routines, encouraging the development of shared architectural knowledge and thereby enabling the flow of tacit component knowledge. INoPs are less likely to arise ‘naturally’ than are local NoPs because of the lack of spontaneous social and practical interaction across practice and across geographic, institutional, and cultural gulfs or departmental boundaries likely to separate relevant units. Their emergence necessitates a delicate intervention by the firm’s managers which we discuss at length below.

To recap, our framework assumes: first, that all knowledge has at least some tacit aspects; second, that architectural knowledge derived from common practice must be experienced to be internalized and provides the understanding to absorb related component knowledge effectively; and third, that in MNEs the key sources of high-tacit content component knowledge from subsidiaries are communities of practice that are embedded in local networks of practice. We propose that these conditions suggest internal networking at the community of practice level as an efficient mechanism for disseminating tacit component knowledge throughout the MNE without requiring the coding and decoding of unfamiliar tacit knowledge.

The next section addresses knowledge stocks and flows in industry clusters. We then address the concept of the CoP and the local NoP as a mechanism by which the MNE internalizes embedded knowledge. Next, we focus on the same processes when they take place within the firm but across units, highlighting the role of internal NoPs, and addressing the process of building a unique knowledge base. Thereafter, we highlight the limitations of CoPs and NoPs and discuss the implications for MNE management. We conclude by proposing that understanding mechanisms for learning at such a disaggregate level is essential both to studying and to managing network organizations.

LOCAL KNOWLEDGE AND CLUSTERS

While current research on distributed innovation in MNEs has stressed the importance of learning from locally embedded knowledge pools (Andersson, Forsgren, and Holm, 2002; Almeida and Phene, 2004), the literature does not offer consistent mechanisms for this knowledge creation and transfer (e.g., Doz, Santos, and Williamson, 2001; Dunning, 1998; Jensen and Pedersen, 2010). Recent research on industry knowledge clusters suggests that while co-location is necessary for local knowledge acquisition by MNE subsidiaries, it is by no means sufficient (Tallman et al., 2004). In this section, we use the concepts of shared architectural knowledge and tacit component knowledge to establish that spillovers of tacit know-how from firm to firm do not require a process of codification and subsequent decoding of such knowledge, but involve direct transfers of tacit knowledge among firms within clusters.

Colocation in Clusters: Necessary but Not Sufficient

To gain the knowledge that is essential to competitive advantage, firms need to concentrate their efforts on the acquisition of external knowledge as well as internal development (e.g. Nahapiet and Ghoshal, 1998). How can firms capture geographically dispersed external knowledge that is bound to certain locations? Micro-level management research shows that dense communication, deemed essential to knowledge exchanges, breaks down over even a short distance (Allen, 1970; Cardinal and Hatfield, 2000a; Cardinal and Hatfield, 2000b; Pelz and Andrews, 1966; Tushman, 1979). Similarly, economic geographers recognize that information flows are highly localized (see for a review McDermott and Taylor, 1982). Consequently, geographic co-location has emerged as an important part of the solution to this problem (e.g., Allen, 1977; Criscuolo and Narula, 2007). Co-location of operating units is clearly important to accessing external knowledge via information spillovers (Zucker, Darby and Armstrong, 1998) or untraded interdependencies of knowledge – that is, knowledge transfer without direct compensation (Storper, 1993; Rugman, Verbeke and Yuan, 2010). The pervasiveness of geographical clusters or regional industrial districts is in fact seen as a response by firms to the need to capture local knowledge (Piore and Sabel, 1984; Porter, 1998; Saxenian, 1985, 1990; Meyer, Mudambi and Narula, 2010). It is also argued and demonstrated that new firms in general will emerge in areas densely populated with competing firms or industrial clusters, to allow entrepreneurs to gather the knowledge necessary for success (Sorenson, 2003; Sorenson and Audia, 2000; Zucker, Darby, and Brewer, 1998).

However, while co-location may be necessary for local knowledge acquisition, it is by no means sufficient. Knowledge is not a simple commodity and a degree of participation and experiential learning is essential to learning (Kogut and Zander, 1992; Meyer, 2007). Studies of technology-intensive industries indicate that knowledge sharing or acceptance of mutual spillovers of knowledge that tends to benefit all firms in a region requires confidence based on joint knowledge development as well as social interaction (Liebeskind, Oliver, Zucker, and Brewer, 1996; Spencer, 1997; Hansen, 1999; Bouty, 2000). Indeed, complex knowledge may resist diffusion even within tight social networks (Sorenson, Rivkin and Fleming, 2006). Tallman et al. (2004) establish that true geographic cluster membership requires sharing in the knowledge processes of the cluster. Member firms share conceptual understandings of relevant systems and demonstrate lowered barriers to the absorption of knowledge that spills over within the cluster. The importance of real connection is magnified by the liabilities of foreignness typically adhering to subsidiaries of foreign MNEs attempting to enter a different geographical and cultural context (Zaheer, 1995; Raab and Ambos, 2008).

Tacit Knowledge and Industrial Clusters

Regional clusters often are characterized as having local business networks in which firms are embedded (Giulani, 2007). How does firm embeddedness in a cluster improve knowledge absorption? In considering the development of knowledge in clusters, Brown and Duguid (2001) propose that rather than seeing knowledge as being of two types, explicit and tacit, researchers should recognize that all knowledge is tacit to some degree. This perception develops from Polanyi's seminal contribution to the discussion of knowledge (Polanyi, 1966) where he concludes that all knowledge has a tacit dimension, and that, 'in use…explicit [knowledge] nonetheless always possesses this other, implicit dimension' (Brown and Duguid, 2001: 204). With this recognition, Brown and Duguid (2001) diverge from the standard model of immobile, or 'sticky', tacit knowledge and mobile, or 'leaky', explicit knowledge. They find that any knowledge may be more or less sticky or leaky depending on its tacit content and the specific context. They further maintain that it is through joint practice, through performing their functions together, that individuals and groups develop the insights necessary to understand the application of a technology which leads to unique innovation, so that 'knowledge, in short, runs on rails laid by practice' (Brown and Duguid, 2001: 204).

Tallman et al. (2004) propose a typology of knowledge in clusters that distinguishes component and architectural knowledge at the firm and inter-firm levels. Through their shared enterprise, members of a cluster develop common repertoires of behavior and common technological or *component* knowledge. They also develop common perspectives on or understandings about the system of knowledge development and application, or *architectural* knowledge (Henderson and Clark, 1990; Matusik and Hill, 1998; Tallman et. al., 2004). In addressing knowledge exchange in clusters, Tallman et al. (2004) define Brown and Duguid's (2001) 'rails of practice' as architectural knowledge and the mobile knowledge following the rails as more-or-less-tacit component knowledge.

Architectural knowledge is defined as highly path-dependent (experiential) in nature, deeply embedded, tacit, and inherently immobile (sticky). It exists as a stock or body of knowledge developed and held at different levels of organization by units at the next subordinate level that share experience or practice, and provides the 'epistemic differences' that separate CoPs engaged in different practices (Buckley and Carter, 2004; Grandori, 2001). Sharing common architectural knowledge or understanding defines a community, whether a community of practice among individuals (Brown and Duguid, 2001), members of a technological work group (Henderson and Clark, 1990), firm management (Matusik and Hill, 1998; Tallman and Fladmoe-Lindquist, 2002), or firms within a geographical cluster (Tallman et al., 2004), and increases mutual absorptive capacities for knowledge within communities.

Component knowledge consists of the specific knowledge that relates to identifiable parts of an organizational system rather than to the system as a whole (Henderson and Clark, 1990). Component knowledge is typically a combination of explicit technology, which can be easily absorbed, and tacit understandings related to context and application, which require some degree of insight for absorption. Component knowledge can move among organizations more or less easily depending on the relative size of the tacit component (the more tacit, the slower) and the mutual absorptive capacities of the organizations.

We offer a model that addresses tacit knowledge movement by making two clear assumptions. First, it is important to recognize that processes of knowledge codification are at best uncertain and subject to losing the most tacit content of the knowledge that they are supposed to preserve (Coff, Coff, and Eastvold, 2006). Second, distance, whether geographical, institutional, or cultural, will make disseminating knowledge even more uncertain (Kogut, 1991; Szulanski, Jensen and Lee, 2003), so that most tacit knowledge is locally tied (Zucker, Darby, and Armstrong, 1998).

Joint understanding, or shared architectural knowledge, based on common practice makes for easier flows of knowledge within communities, even of component knowledge that is largely tacit in nature. Our framework suggests that tacit knowledge does not need to be converted to explicit knowledge, or codified, in order to move; rather, its mobility requires common architectural understanding developed from common practice that provides high levels of mutual absorptive capacity for tacit component knowledge (Cohen and Levinthal, 1990). The similarities in component knowledge stocks and shared architectural knowledge that emerge among the individuals and organizations that are closely tied to each other both geographically and socially in an industry cluster make the spillover of tacit component knowledge relatively easy (Tallman et al., 2004). On the other hand, the different architectures of knowledge developed in distant communities and networks reduce absorptive capacity for component knowledge across both geographic and practice boundaries (Tallman et al., 2004). Empirically, Andersson et al. (2002) show that 'technical embeddedness', or the capacity to absorb new technology from a local external network receives a strong positive causal effect from systemic 'business embeddedness'. Thus, component knowledge should be relatively slippery or leaky (flow easily) within a geographical cluster, while it should be relatively sticky (minimal flow) across management levels or over geographic distance. This leads to the following propositions:

Proposition 1: Through social networking, competitive interaction, supplier relationships, and observation individuals engaged in the same types of practice in a geographical cluster develop a common body of architectural knowledge.

Proposition 2: When individuals share a common body of architectural knowledge, they can exchange high-tacit content component knowledge directly, that is, without codifying and then decoding such knowledge.

Based on these insights, we propose below a complete model of knowledge acquisition, dissemination and development that builds on the same elemental unit of analysis.

COMMUNITIES, NETWORKS AND LOCAL KNOWLEDGE SHARING

Research on learning at the individual level shows that learning takes place in the context of social relationships. Bandura (1977) stressed in his social learning theory the importance of learning from others, via observation, imitation, and modeling. Individuals working in proximity to one another tend to self-organize into local communities of insiders, each enculturated to a particular set of values and perspectives. Routine, repetitive task environments are not conducive to the development and nurturing of such communities, but any activity that involves a degree of 'art', complex routines, evolutionary learning, or any other source of non-codifiable knowledge would seem to have the potential for emergent practice-based communities (Zucker, Darby and Armstrong, 1998). These communities often emerge spontaneously and leaderless, but still allow members to share both formal expert knowledge on their practice and the stories, insights, and understandings that they develop in their common practice. Based on these insights, Lave (1988) and Lave and Wenger (1991) built a model of situated or practice-based learning through participation in Communities of Practice (CoPs).

The CoP construct proposes that creation and movement of valuable knowledge in and across firms in geographic proximity are tied closely to 'practice' or the actual performance of actions related to creating value in goods or services (Brown and Duguid, 2001), akin to Nonaka's (1994) knowledge of experience. Only individuals actually engaged in the practice of some activity can obtain a deep understanding of that activity. They develop knowledge not only of the overt, explicit actions that are required, but also of the architecture of the activity that constitutes the essence of 'knowing more than one can say' or tacit knowledge (Henderson and Clark, 1990; Polanyi, 1966). Table 1 summarizes the characteristics of CoPs and other structures discussed here and their impact on knowledge transfer.

<u>Place Table 1 about Here</u>

Grandori says (2001: 392) that, '… the only mechanism that does not cognitively fail in governing the flow of tacit knowledge among different subjects is the mutual observation of the subjects in action, *is* a 'community of practice'.' In such communities, knowledge, in the form of repertoires or routines (Brown, 2008) is developed through practice, member interactions, and their mutual involvement in activity-specific local networks of practice – the ability to acquire experiential and vicarious learning through formal and informal inter-firm networking (Grandori, 2001). As detailed above, practice-based bodies of essentially immobile architectural knowledge emerge in communities that share common experiences. The original literature of CoPs focuses on the importance of physical co-location[3], as common norms, culture, and language, and architectural understandings condition the interpretation of and ability to exchange stocks and flows of more or less tacit component knowledge with other nearby communities of practice (Tallman et al., 2004).

Proposition 3: Co-location within a firm of small, focused, localized groups of individuals who are engaged in joint practice and share language, culture, and values facilitates the development of CoPs.

In a local cluster, each of these CoPs is immersed in a local network comprised of a number of communities of practice across multiple firms. In discussing the role of geographical clusters in generating knowledge, Wenger (2000) suggests that CoPs might exist across firm boundaries, and Brown and Duguid (2001) describe local Networks of Practice composed of the interacting CoPs from the various firms in the cluster. They propose that the knowledge spillovers (Zucker et al., 1998) or untraded interdependencies (Storper, 1993) that are commonly described features of regional clusters do not take place in a firm-to-firm network as usually depicted (particularly for complex, highly tacit knowledge or practice-based routines), but rather through the exchange of component knowledge among networked CoPs. Further, Andersson et al. (2002) demonstrate that what they call 'business embeddedness', what

[3] It should be noted that this idea of experiential learning through individual interaction is similar to the ideas develop by Kolb (1984) and his followers. Kolb however emphasizes that experiential learning is 'at an individual level.. And follows a cycle of experience, reflection, concept formation, and testing of implications' (1984).

we could consider architectural knowledge, measured as the degree to which given functional areas in firms adapt the way they do business based on external ties, affects the flow of technical knowledge.

Because these communities work on similar issues, are composed of similar individuals, have similar training and objectives, share professional norms and so forth (that is, share a common architectural knowledge as described above) (e.g., Faulconbridge, 2008), they will have high absorptive capacities for component knowledge coming from each other – even knowledge with a high tacit component – and knowledge will flow easily across an NoP (Tallman et al., 2004). Physical proximity offers the added benefits of shared local norms, language and culture, as well as national norms and culture (Ouchi, 1980). Likewise, the movement of knowledgeable individuals from firm to firm, a largely local phenomenon (Almeida and Kogut, 1996), builds social networks and leads to knowledge spillovers (Rosenkopf and Almeida, 2003; Zucker, Darby, and Torero, 2000) that offer value within relevant communities. An engineer coming to a firm generally brings technical knowledge, not marketing ideas, human resource models, or strategic concepts. Von Hippel (1987, p. 292) offers a concise description of such activity among engineers from competing companies that summarizes this section neatly:

> *'…the informal proprietary know-how trading which I have observed to date appears to involve informal trading 'networks' which develop between engineers having professional common interests. Network formation begins when, at conferences and elsewhere, and engineer makes private judgments as to the areas of expertise and abilities of those he meets and builds his personal informal list of possibly useful expert contacts. Later, when 'Engineer A' encounters a product or process development problem he finds difficult, he activates his network by calling Engineer B, and appropriately knowledgeable contact who works for a directly competing (or non-competing) firm, for advice …'.*

These observations lead to the following proposition:

Proposition 4: Geographic co-location, common professional norms, common local norms and formal rules, movement of individuals, and social interaction facilitates the development of local Networks of Practice among clustered CoPs.

While the concepts of CoPs and NoPs are relatively recent, examples of common knowledge based on joint practice within geographically concentrated communities of individuals or small firms date back to the beginning of research on management. Marshall (1920) describes how individuals engaged in similar work combine and recombine their own and others' experiences into what he calls the 'knowledge in the air' of an industrial district. A variety of authors (e.g., Saxenian, 1985; Storper, 1993) describe how knowledge moves via informal means (spillovers, untraded interdependencies) within industrial districts or industry clusters (Tallman et al., 2004). The Brown and Duguid (1991) construct of Networks of Practice comprised of firm-specific CoPs that are in geographical proximity allows us to make critical distinctions while avoiding semantic confusion, and extends naturally to the internal corporate realm. Tacit knowledge development in clustered firms is largely embedded in the practice-based, sub-firm level, informally delineated communities described in the previous section (Brown and Duguid, 1991; Buckley and Carter, 2004; Thompson, 2005). Local NoPs offer the opportunity at the inter-firm level for the sort of knowledge exchanges described by von Hippel (1987) and Marshall (1920). Tallman et al. (2004) describe the development of cluster-level architectural knowledge that facilitates the movement of more tacit component knowledge throughout the cluster. This suggests the following:

Proposition 5: Ongoing close economic and technical interactions among CoPs within a network of practice encourage the development of cluster-level architectural knowledge.

Proposition 6: Shared cluster-level architectural knowledge permits the members of networked CoPs to exchange high-tacit content component knowledge directly, that is, without codifying and then decoding such knowledge.

A PRACTICE-BASED MECHANISM FOR KNOWLEDGE DEVELOPMENT AND ACQUISITION BY THE SUBSIDIARIES OF MNES

The MNE literature identifies geographically dispersed local subsidiaries as key sources of knowledge for the MNE network (e.g., Gupta and Govindarajan, 2000; Lyles, von Krogh, and Aadne, 2003; Mudambi and Navarra, 2004). Further, the evidence (Andersson et al., 2002) shows that subsidiary firms must be embedded in their local external networks if they are to aid competence development in their parent MNEs. As an example, Andersson et al. (2002: 991) state that 'how competence is created in the subsidiary in the first place' is an essential question for the network MNE, one which is answered by considering external local network embeddedness of the subsidiary firm. However, when scholars speak of subsidiary firms providing interfaces by which MNEs draw from the local industrial environment, they tend to consider the subsidiary as a monolithic entity (Birkinshaw, 2001; Andersson, et al., 2002).

From the learning perspective described above, these models are attributing to the subsidiary firm as a whole what is more appropriately recognized as characteristic of its component sub-units. We visualize each subsidiary unit of the MNE as consisting of a number of activities, each with the potential of hosting one or more locally embedded CoPs. Every subsidiary activity is not necessarily the province of a community (Rugman, Verbeke and Yuan), but the practice-based learning perspective suggests that teams or communities embedded within each value-adding activity are 'privileged sites' for developing, storing, applying, and adapting knowledge, and particularly insight into the tacit processes, or *know-how*, of their own practice. As Brown and Duguid put it (2001: 203), '...mediating as they do between individuals and large formal and informal social structures, and between organizations and their environment, [CoPs] are where a good deal of the work involved in knowledge creation and organizational learning gets done.' Andersson et al. (2002: 981) describe the importance to MNE development of the relational embeddedness of a subsidiary in external networks of 'customers, suppliers, competitors, etc.' The practice-based perspective suggests that insofar as complex, tacit knowledge can be gleaned from such networks, it will be done not by the subsidiary firm, but by the CoPs internal to the subsidiary that are actually embedded in these relational networks, as in Figure 1.

<u>Put Figure 1 About Here</u>

We specifically propose the following framework for knowledge acquisition, based on the model described in the previous sections. CoPs located in the various units of the subsidiary firm develop their own component knowledge through joint practice among their individual members (Thompson, 2005) and from their individual and group interactions with other CoPs that are part of their local networks of practice and the local social networking of their individual members (Tallman et al., 2004). The essence of these networking relationships in a local area is the common architectural knowledge that develops among closely interacting firms and that eases the flow of component knowledge within the cluster. Thus, CoP local embeddedness is defined by participation in local practice-based architectural knowledge. These sorts of activity-specific embeddedness, found to lead to superior competence development in the Andersson et al. (2002) study, specifically reflect the expectations of our model. Similar findings by Frost et al. (2002) tie local industry strengths to the development of 'centers of excellence' in subsidiary firms, and are attributed to 'active participation of the subsidiary in the [local] community of practice' (p. 1002), although this participation is not further developed in that study. Knowledge emerges or enters the network of the MNE through a CoP that is part of Fig. 1's Source Subsidiary, much as it would for any firm that has CoPs embedded in the local networks of practice. This translates into the following:

Proposition 7: MNE local embeddedness occurs at the sub-firm level, as the subsidiary firm's communities of practice engage in joint practice with other members of local activity-level networks.

Proposition 8: The more deeply an MNE's constituent internal CoPs are embedded in local networks of practice, the more likely an MNE subsidiary firm is to be embedded in local NoPs.

Proposition 9: The greater the embededdness of local units, the more likely the generation of innovative high- tacit content knowledge in the discipline of that community.

THE SUBSIDIARY COP AS A SUPPLIER OF KNOWLEDGE TO THE MNE NETWORK

Internal network ties have been linked to knowledge acquisition and superior performance at multiple levels of analysis (e.g., Ahuja, 2000; Baum, Calabrese, and Silverman, 2000; Brass, Galaskiewicz, Greve, and Tsai, 2004; Dhanaraj, Lyles, Steensma, and Tihanyi, 2004; Shan, Walker. and Kogut, 1994). Frost et al. (2002) find that the development of centers of excellence in MNEs requires strong ties to the rest of the network MNE as well as to the local external environment. What Noorderhaven and Harzing (2009) label the sender-receiver model suggests that knowledge is packaged in one unit and then flows 'hydraulically' (from higher level to lower) to units with less of this knowledge. Andersson et al. (2002) show that knowledge flows from high-competence subsidiaries to less skilled units through both formal and informal means, such that subsidiaries act as 'bridging ties' (p. 993) between the environment and the larger MNE. The standard model (e.g., Gupta and Govindarajan, 2000) assumes that such knowledge is codified within the subsidiary and sent to other subsidiaries or to the parent headquarters, where it is decoded and applied. This model appears adequate for mostly explicit know-what but raises concerns for communicating more tacit knowledge, which does not move so simply. Table 2 relates a more precise correspondence between the types of knowledge and the types of mechanisms that facilitate or hinder their movement, and summarizes the arguments in the following sections.

<u>Place Table 2 about Here</u>

Noorderhaven and Harzing (2009) demonstrate the importance of social learning to moving more tacit knowledge between subsidiary units. Complex, tacit knowledge is best transmitted through rich communication media, such as face-to-face communication (Bresman, Birkinshaw, and Nobel, 1999; Pedersen, Petersen, and Sharma, 2003), or the movement of individuals to new locations (Almeida and Kogut, 1996; Zucker, Darby, and Brewer, 1998). Movement and exchange of practice-derived knowledge within a firm, just as among firms in a cluster, must take place among the engaged individuals who are embedded in CoPs (e.g., Buckley and Carter, 2004). Consequently, the CoP/NoP model suggests that firm-level hierarchical connections among subsidiaries may offer a weak mechanism for the transfer of high-tacit content component knowledge coming from their own CoPs. Improving our understanding of the movement of component knowledge requires again shifting the unit of study from subsidiary firms to sub-units at activity levels (Foss and Pedersen, 2004).

Our model offers a mechanism through which high-tacit content component knowledge can retain its tacit dimension while being assimilated by other CoPs that are internal to other units of the MNE.

Similar to local knowledge transfer into the subsidiary, transfers of tacit knowledge across units of the network MNE will occur much more readily when disseminated among CoPs engaged in joint-practice than when forced to move through formal channels at higher organizational levels. Inside MNEs, such communities of practice can be found in both headquarters and subsidiaries, and potentially can be formed into networks extending across geographical boundaries. Therefore, we propose the concept of the *Internal Network of Practice*, within which associated, but geographically separated, CoPs communicate directly. The INoP encourages the development of common architectural knowledge among the MNE's geographically scattered CoPs, permitting direct dissemination of component knowledge with high levels of tacit-content.

The idea of the INoP as a mechanism for creating a common sense of the architecture of knowledge and to ease the assimilation of component knowledge suggests that subsidiary CoPs act as links between local NoPs and internal NoPs to enable knowledge to be readily accumulated and disseminated – that is, learned, by the entire MNE organization. Without this capacity, the concept of the MNE as an arbitrageur of private knowledge (e.g., Bartlett and Ghoshal, 1989; Bell and Zaheer, 2007; Dunning, 1998; Doz, Santos, and Williamson, 2001; Kuemmerle, 1997; Feinberg and Gupta, 2004) offered in many models of the MNE is not workable for 'epistemically complex' component knowledge (e.g., Doz and Hamel, 1998; Szulanski, 1996; Gupta and Govindarajan, 2000; Mudambi and Navarra, 2004). We use our practice-based model to address two fundamental challenges to the diffusion of knowledge throughout MNEs, after it is accumulated locally. We also offer an approach toward meeting these challenges – assimilation within the local subsidiary unit and dissemination to distant units.

Assimilating Tacit Knowledge within the Subsidiary

The first barrier to the international transfer of highly tacit component knowledge arises within the subsidiary firm. As described by Brown and Duguid (1991) and others (e.g., Buckley and Carter, 2004; Lave and Wenger, 1991; Thompson, 2005), CoPs turn a firm or other organization into a set of subcultures, each with members identifying closely with their own community, but also with a high level of mutual incomprehension among the various communities gathered into the firm. Knowledge that is slippery across the geographical cluster's local CoPs tends to be sticky within the subsidiary firm (as with any firm), because other parts of the firm, including top management, have their own 'rails of practice' that run in different directions, or as Mudambi and Swift (2009) put it, managers and technical personnel belong to different professional guilds with different senses of the world. The different understandings of the (relevant) world, or architectures, developed by different communities engaged in different practices tend to make even fairly explicit component knowledge sticky when proposed for transmission across community boundaries – even among units within a subsidiary firm. Barriers to knowledge flows across practices, units, or departments are documented (e.g., Bechky, 2003). We often see that management struggles to communicate with work groups, marketing cannot understand engineering, accounting is the enemy of production, and technicians see less benefit to multiple bidders than does purchasing.

Thompson (2005) shows that exploiting CoPs while not corrupting their internal balance is a difficult management challenge. This is likely to be magnified in MNE subsidiaries, where the ties of the overall organization, and particularly of its top management, to the international parent firm will make interaction with locally embedded, and typically locally staffed, communities of practice more difficult. The benefits of practice-based, CoP-focused knowledge may be available for productive activities within the subsidiary firm through the CoP's direct activities, while the knowledge itself remains stuck in the community. This knowledge could be accessed, but not really possessed, by the subsidiary firm. Highly codified component knowledge may be internally mobile within the subsidiary firm, but is typically not seen as the basis for sustained advantage or even as a driver of foreign direct investment. The more tacit knowledge that is the source of sustainable value and the driver of knowledge-seeking investment is likely to be internally sticky at the CoP level. This may be a matter of indifference to a subsidiary that is tasked with generating products locally, where the CoP's knowledge can be accessed directly, but should give pause to those relying on the MNE's formal network for knowledge acquisition, assimilation, adaptation, and application worldwide (Feinberg and Gupta, 2004). The above suggests the following:

Proposition 10: The more tacit versus explicit an element of component knowledge is, the less likely it will be understood or assimilated in the subsidiary beyond the originating CoP.

Tacit Knowledge Dissemination throughout the MNE

If tacit component knowledge cannot be moved efficiently through local codification, actually exporting this knowledge without losing its non-codified content remains a considerable challenge. Explicit or codified component knowledge, or *know-what*, flows relatively easily, but offers little differentiation, as it also flows easily beyond the firm (Martin and Salomon, 2003a; Fang, Delios, and Beamish 2007). More tacit component knowledge, or *know-how*, offers a better source of competitive advantage and is the real basis for knowledge-seeking investment, but is harder to transfer (Kogut and Zander, 1993). As Fang, Wade, Delios, and Beamish (2007, p. 1053) summarize the importance of this activity, 'If this resource transfer [does] not occur, then…the whole [of the MNE] would not be more than the sum of its parts.' Further, they describe the essential paradox of the capabilities view for the MNE – that the resources that are most potentially valuable are also the most difficult to transfer.

Indeed, Szulanski (1996) found that knowledge resources tended to be sticky within individual subsidiaries and were difficult to transfer to other parts of the larger firm, due in some part to organizational motivations, but primarily to '…lack of absorptive capacity, causal ambiguity, [and] the arduousness of the relationship…' (p. 37). Consequently the knowledge resources which might become part of the MNE's competitive advantage tend to resist movement beyond local (Birkinshaw, Hood, and Jonsson, 1998) or home country (Martin and Salomon, 2003b) application. This stickiness is variously attributed to national institutional differences in technology development (Kogut, 1991), reduced movement of individual technicians and engineers among locations (Almeida and Kogut, 1996), subsidiary isolation (Monteiro, Arvidsson, Birkinshaw, 2008) and organizational limitations such as embeddedness in the local subsidiary or lack of absorptive capacity in the receiving unit -particularly for tacit knowledge (Gupta and Govindrajan, 2000). Recent firm and economy-wide research from strategy and economics shows that knowledge spillovers tend to be geographically bound (e.g., Allen, 1977; Almeida, 1996; Jaffe, Trajtenberg, and Henderson 1993; Zucker, Darby, and Armstrong, 1998). Hansen and Lovas (2004) conclude that as the spatial distance among subsidiary organizations in an MNE increases, the probability of technology transfer decreases.

In our terms, distance and differences in architectural knowledge from unit to unit limit the potential for high-tacit content component knowledge to be exchanged. Practice-derived, highly tacit, knowledge is difficult to comprehend for units that have different architectural understandings than the originating unit – we suggest above that this is the case across specializations within a subsidiary, and distance effects make this even more likely between geographically separated subsidiaries, or the originating subsidiary and the HQ (see Fig. 1). Indeed, the more deeply embedded the originating CoP and subsidiary are in their local environments, the more likely it is that the various factors leading to increased stickiness will be strengthened. Efforts to use formal, hierarchical channels of communication require translation of tacit knowledge into codified knowledge – and subsequent retranslation or decoding – in order to use impoverished media. On the other hand, rich communication media such as face-to-face interactions become increasingly expensive with distance and dissimilarity (Pedersen et al., 2003). Due to the loss of critical information in any effort to codify, transmit, and decode tacit component knowledge, impediments to the long-distance dissemination of critical operating knowledge are likely to persist, even within firms, without mechanisms to stimulate intra-firm knowledge transfer and permit increased linkage economies (Mudambi, 2008). Frost and Zhou (2005) demonstrate that 'R&D co-practice', or joint technical activities between units, increases social networking and absorptive capacities and future knowledge exchanges between isolated participating units. In our model, these commonalities are summarized under the rubric of architectural knowledge. This leads us to propose the following:

Proposition 11: Direct dissemination, i.e., without coding and decoding, of high-tacit content component knowledge between sub-units of the MNE requires commonality of architectural knowledge among units at geographically dispersed locations.

Proposition 12: The development of firm-level architectural knowledge requires joint practice, social networking, and other forms of regular technical and interpersonal interaction among the MNE's communities of practice in geographically dispersed locations.

CoPs, INoPs and the Accumulation of Knowledge in MNEs

We have proposed that the answer to both issues – the difficulty of moving tacit knowledge out of the originating CoP to the local subsidiary, and the difficulty of moving tacit component knowledge over distance is a network in which 'common rails' of architectural knowledge tie together the various CoPs dispersed within the MNE. While dissemination of more tacit component knowledge across the scattered units of an MNE will be difficult, expensive, and subject to inefficiencies, such knowledge does move within MNEs, and practices have been identified that appear to increase the effectiveness of transmission efforts. In addition, evidence is emerging that at least a few MNEs are actively working to develop 'communities' for knowledge sharing. We propose here that extending the Network of Practice construct to the internal network structure of the MNE – the Internal Network of Practice - offers a conceptually consistent framework both to understand the mechanism behind current efforts and to make normative recommendations about possible future approaches. To appreciate the key differences among the three practice-related structures introduced in the model, we refer again to Table 1which summarizes the key characteristics of each component of our structural model.

While we have coined the term of the INoP as a structural innovation, extant empirical work shows that processes which support social networking and common practice among subsidiaries of MNEs do occur. The key consideration to tacit knowledge dissemination is recognition that a codification and decoding process will remain inefficient, as discussed in the previous section. Rather, as established earlier in the paper, we should look to mechanisms for direct transfer of tacit knowledge from one unit, or one individual within a unit, to another, as occurs in CoPs and local NoPs (Brown and Duguid, 2001; Nooderhaven and Harzing, 2009). Buckley and Carter (2004) suggest that MNE-wide tacit knowledge exchange may be expedited by common professions and education. Szulanski et. al. (2003) find that deep understandings of both practice and environment between two units are essential to the successful transmission of complex know-how across borders. Noorderhaven and Harzing (2009) show that knowledge exchange is stronger between subsidiary units that have more integrated work processes. Frost and Zhou (2005) show that integrated practice across subsidiaries aids in future knowledge flows through the development of social processes and improved absorptive capacity. Hansen and Lovas (2004) find that both formal and informal connections among subsidiaries mitigate the negative effects of spatial distance on technology transfer. Bell and Zaheer (2007) find that friendship enhances knowledge flows more at greater geographical distances, while formal organizational ties were of little value in transmitting knowledge. Hinds and Mortensen (2005) show that geographical dispersion of teams leads to personal and task conflict, but that this is alleviated by shared identity, context and communication, all characteristics of community and network relationships. In addition, movement of individuals is an activity that can be encouraged and enforced within the hierarchy of the MNE, and which offers considerable opportunity to transmit tacit know-how (Rosenkopf and Almeida, 2003; Zucker et al., 2000) via the richest face-to-face communication (Pedersen et al., 2003). Currently, only a small number of firms have been identified as having what may be termed internal networks of practice, and this is still clearly a cutting edge innovation (Birkinshaw, Hamel, and Mol,2008) that has not yet widely spread.

A limited literature also suggests that the general concept of inter-firm networks or communities is in place, if poorly defined. Allatta (2007) describes efforts within General Electric to build firm-wide communities through the intensive use of IT. Hall (2007) describes Nissan's efforts to emulate IBM by developing internet-based social networking sites to encourage idea exchange among geographically distant but virtually close individuals working on similar issues. Buckley and Carter (2003) describe the idea of 'the firm as a community of practice', while Mahnke and Venzin (2003) describe communities of practice that are dispersed and informal technical groups with high levels of autonomy (Mahnke and Venzin, 2003), and Noorderhaven and Harzing (2009) focus on workflow integration supposedly at the subsidiary level. Frost and Zhou (2005) specifically describe joint activities of multiple sub-units of an MNE. We propose the INoP concept for symmetry with our model of local cluster networks, with 'communities' defined as close-knit, co-located groups and 'networks' as larger, more dispersed groupings of communities and individuals, as we did in the case of local relationships. This reduces semantic confusion, coincides with the Brown and Duguid (2001) typology, and suggests essential differences in the character of such relationships.

While these and other studies of knowledge movement in MNEs tend to look to connections between subsidiary firms or their general managers to discern these effects and their strength, our model suggests that the actual mechanisms that support component knowledge sharing must function at the individual CoP level. Reflecting the differences in 'professional guilds' between scientists and managers (Mudambi and Swift, 2009), our model offers the logical conclusion that top managers can have only superficial understandings of the knowledge held in different parts of their own firms. While social networking among general managers may encourage a 'managerial network of practice' in the MNE, it is not going to provide the sort of face-to-face interaction or shared background for other areas of practice that Bell and Zaheer (2007) find stimulates knowledge flow in networks. This suggests the following:

Proposition 13: Systems and processes for encouraging social networking and common practice among dispersed CoPs can only function effectively at the level of the activity in question.

The architects of the MNE's organization must consider the need for common practice – actual working together in developing solutions to problems, creating new processes, or designing new products – among the scattered CoPs in a specific area of endeavor if an INoP is going to develop. Creating the absorptive capacities, trust in motives, and understanding of architecture that Brown and Duguid (2001) propose for local networks of practice and Hinds and Mortensen (2005) find minimize conflict in distributed teams is an activity essential to building geographically distributed networks for tacit knowledge transfer (Frost and Zhou, 2005).

The development of INoPs must go beyond the occasional task force or annual technical fair. Pedersen et al. (2003) demonstrate the importance of rich communication to transmit tacit knowledge internationally. Szulanski et al. (2003) show that direct contact is needed to provide understanding of both the environment and the practice of the originating unit if complex practice-based knowledge is to be successfully transmitted. Without intense local integration, the firm's CoPs will be unable to share in the architectural knowledge of their local NoPs or to access the component knowledge spillovers that they target. Without similarly intense integration as an internal knowledge network within the MNE, the constituent CoPs will struggle to diffuse their knowledge internally but across large geographical distances. The difficulty of having regular face-to-face interaction over geographically large distances presents one challenge as it is simply difficult and expensive to regularly assemble teams of individuals from many places in one location. The likelihood of different nationalities among the members of geographically dispersed CoPs suggests that the cultural and institutional ties that strengthen local networks (Bell and Zaheer, 2007) will provide another challenge to successful internal community networking by reducing innate understanding across units. A group of communities with outstanding cultural barriers will find natural networking to be difficult.

The evidence suggests that rotating assignments, expatriate assignments, particularly for groups of technical employees, and now joint development projects using information technology to 'hand off' work on a daily basis can all serve to build relationships, overcome boundaries of many sorts, and create common architectures of knowledge. Frost and Zhou (2005) describe co-practice, or joint development, among separated units. Hinds and Mortensen's study (2005) shows that shared identity, shared context, and spontaneous communication can be effectively encouraged by top management to reduce conflict in distributed teams. Mahnke and Venzin (2003) show that CoPs and expert groups can be managed actively within MNEs without disruption – at least through the use of knowledgeable and involved boards. To the extent that such practices are used to build internal networks of practice, tacit knowledge can be diffused across the MNE. To the extent that such practices require investments of time and money, and are thus seen as costly and perhaps somewhat uncertain, diffusion of tacit component knowledge within the MNE seems likely to remain difficult. However, as Szulanski (1996) says, devoting resources and managerial attention to improving learning capacities, building closer relationships, and communicating practices across units are essential to overcoming the stickiness of tacit knowledge. Our framework suggests why this is the case and why solutions must be offered at the same level as that where the knowledge is held. Moreover, inter-unit collaborations are likely to have a higher pay-off when innovation is concerned (Miller, Fen, Cardinal, 2007).

In this exercise, it is important for decision makers to realize that individuals are intrinsically self-motivated (e.g., Mudambi and Swift, 2009) as well as self-interested . To the extent that firms are able to design their participation in INoPs, they need to recognize and incorporate incentives that build on such individual motivations (Dyer and Nobeoka, 2000). If not adequately recognized and incorporated, individual self-interest can undermine the most creative organizational initiatives (e.g., Foss, 2003).

The above suggests the following:

Proposition 14: Joint enterprise and shared MNC-level or subsidiary-level cultures facilitate the development of internal networks of practice, but managerial intervention is required to develop such activities across geographically isolated units.

Proposition 15: MNEs that can develop INoPs to provide integrated work processes and social interaction among CoPs will demonstrate superior innovation in that area of activity.

Proposition 16: The greater the distance that INoPs bridge, be it geographic or technical, the more likely that radical innovation will result.

THE LIMITS TO CoPs AS A SOLUTION

The concept of the CoP offers considerable insight into the organizational genesis of knowledge, particularly the sort of path-dependent, deeply embedded tacit know-how that is said to be the basis for sustained competitive advantage in MNEs (Grant, 1996). However, CoPs are not always the perfect solution to knowledge management woes and our understanding of CoPs is still imperfect (Roberts, 2006). Four known issues concerning practice-based networks need to be addressed to facilitate knowledge accumulation and transfer within CoPs, NoPs, and INoPs: their inefficiencies, their unpredictable development, their potential negative side effects, and their tendency to ease knowledge diffusion from the firm to its competitors.

First, CoPs and NoPs are not efficient channels to transfer systematically and consistently easily codifiable knowledge, as was presented above in Table 2. As depicted in the table, and discussed in the previous sections, CoPs and NoPs are highly suitable to develop common architectural knowledge and to exchange tacit, embedded component knowledge. However, MNEs and their constituent units also generate large amounts of information and data – low context, factual knowledge or know-what – that can be easily and quickly transmitted through formal channels, electronic means, and often between units or individuals with little or no familiarity with each other. Such information may move between CoPs, but if so, should be codified, transmitted with precision rather than deeper understanding, and used a medium that will guarantee accuracy in detail. The sort of face-to-face, high-context communication that permits mutual understanding of tacit knowledge will be inefficient for transmitting factual data, and might indeed add ambiguity or interpretation when not appropriate. Good transmission of factual data might not offer sustainable competitive advantage, but poor transmission of such know-what, may lead to a competitive disadvantage, so that fit between knowledge content and type and means of transmission is essential.

Second, it is considerably easier to recommend the need for INoPs within multi-unit, geographically dispersed MNEs, than it is to accomplish such a task. While managerial intervention may be needed to build such networks, such interventions can be problematic to CoP survival. Attempts to formalize informal networks may lead to their disappearance, and methods to aid in their developments are still unproven and can be costly (Thompson, 2005), although as we have seen above, examples exist of firms that are attempting the task (e.g., Allatta, 2007; Hall, 2007). Even without a sense of building NoPs within their structures, MNEs from Proctor & Gamble to ABB to Toyota have worked to transmit tacit knowledge through the use of task forces, expatriates, on the job training with successful units, and other mechanisms clearly recognize the importance of transmitting such knowledge, but also imply the difficulty of doing so by the costly and apparently inefficient means and methods applied. Moving people, whether for a short workshop or an extended assignment, is expensive compared to electronic or written means and creates high opportunity costs for the individuals involved in relocation.

Third, while CoPs do have the institutional artifacts to provide a certain internal strength and identity as emergent organizational forms, they can suffer from counter-productive (whether intended or not) policies that cut off innovation in the name of organizing around best practices or that constrain learning in the interest of security (Brown and Duguid, 1991; Roberts, 2006; Thompson, 2005). They can also develop self-referential cultures or sub-cultures that inhibit learning and radical innovations, a problem found as well in interdisciplinary teams (Henderson and Clark, 1990). Moreover, clusters and the CoPs in them can come over time to focus more on incremental innovation rather than looking for new break-through innovations (Pouder and St. John, 1996). These issues are likely to be magnified in MNE subsidiaries, where the ties of the overall parent organization and particularly of its top management to a foreign culture make interaction with locally embedded, and typically locally staffed, CoPs rather difficult. Differences in national and cluster cultures and institutions make the possibility of competing architectural knowledge much more likely, and competition among units makes transmitting epistemically complex knowledge difficult (Grandori, 2001).

Finally, just as they facilitate knowledge acquisition, NoPs also accelerate knowledge diffusion from the firm to the community, although employees are found to be careful at sharing tacit knowledge with employees from competing firms (Kachra and White, 2008). Firms are quite aware of this issue and have dealt with it in different ways. Shaver and Flyer (2000) found that larger and more competent MNEs tend to avoid industry clusters in their foreign direct investments, while less innovative firms seek cluster locations. Spencer (1997) found that firms in a technology intensive industry that held their own knowledge tightly gained little from their industry associations – access to spillovers requires a degree of mutuality. Von Hippel (1987), in a study of steel mini-mills in the US, found that almost all firms reported routinely trading proprietary process know-how, even with direct competitors. These forms of know-how exchanges and development are likely to be less costly than formal agreements for knowledge exchanges among firms, and in fact may be essential to building a competitive advantage (Appleyard, Lyebecker, and Yand, 2008). Most importantly, firms will be able to gain or maintain their lead by combining judiciously any firm specific advantage, especially firm or subsidiary level architectural knowledge, with the knowledge that is garnered from a particular location (e.g., Rugman, 1981).

These limitations suggest that CoPs are not the most efficient generators, nor are NoPs the most efficient means of transferring systematically, the easily codifiable and routine knowledge that is generated in large quantities by all organizations (Pedersen et al., 2003). Highly explicit knowledge, or 'know-what', is better and more inexpensively managed by traditional hierarchical means of information diffusion. Our model focuses on the unique, largely tacit, deeply embedded know-how that is derived from actual engagement in practice, and which seems by all accounts to be both highly valuable and highly uncertain in development and transfer by these traditional means. It should be also noted that firms may need to build knowledge on a the likes of country culture and local regulation before even locating in a particular region and that relevant CoPs may not even exist in that case to facilitate knowledge acquisition.

Despite their limitations, CoPs seem to offer the best chance to develop such highly tacit component knowledge, and networks of communities appear to provide the best way to transfer such knowledge from one place to another. In Rugman's terms, our model provides a mechanism for turning location-specific knowledge into firm-specific knowledge through local embeddedness, and then turns location-bound knowledge into non-location bound firm-specific knowledge that can be available to the entire MNE through organizational embeddedness. Neither of these functions is easy or simple, but our model of communities and networks of practice provides a symmetrical and consistent set of mechanisms that could make highly tacit knowledge become a valuable source of advantage for the entire MNE.

DISCUSSION AND CONCLUSION

This paper focuses on the accumulation and dissemination of the sort of path-dependent, deeply embedded, tacit know-how that is said to be the basis for sustained competitive advantage in MNEs (Grant, 1996). Such knowledge is not effectively transmitted through the formal bureaucratic pathways that MNEs rely on to transmit more explicit, codified information, and which are more typically studied by researchers looking at knowledge flows in MNEs. We propose a framework for decentralized knowledge development, acquisition and assimilation (organizational learning) in MNEs based on the concepts of communities and networks of practice. These ideas have been applied recently to understand knowledge in industry clusters, and thus appear to have value for a better comprehension of how local subsidiaries function as originators of innovative knowledge for the MNE network, or any firm with such a dispersed network structure. Absorptive capacity is commonly used at that level to talk about a firm's ability to capture external knowledge (Cohen and Levinthal, 1990), but as in the case of the literature on the MNE, the underlying mechanisms of 'absorption' or knowledge transfer are not explicated. Our model explicates such a mechanism by exploring the micro-foundations of organizational processes (Abell et. al., 2008).

The paper goes on to apply the same structural and knowledge mechanisms to knowledge dissemination across the larger multinational enterprise. This model projects a natural tension for CoPs that are embedded in their local networks through the naturally close interaction of individuals and groups engaged in the same practice in a small geographical area, but that must become equally embedded in internal, and often international, networks where practice is likely to be somewhat limited and interaction less natural. From the MNE's perspective, lack of local embeddedness will restrict the ability to acquire locally-based innovation, but lack of internal embeddedness will restrict the ability to assimilate and leverage such innovation throughout the corporation. MNEs, of course, must also deal with cultural differences between widely dispersed subsidiaries. The rise of INoPs is likely to be less spontaneous than CoPs and will require managerial intervention.

The concept of communities with common interests, particularly those focused on practice-based experiential learning, is not new but is rapidly evolving. For instance, the rapid increase in the use of offshore outsourcing for essential knowledge-related activities provides the added challenge of incorporating communities and teams from affiliated, but not controlled, firms into the intellectual property development of the MNE. There is no reason why our model cannot be applied equally to CoPs within non-hierarchical networks, indeed the importance of forming network ties to encourage common architectural knowledge is emphasized by these new organizational forms. Our model also helps to explain how combinations and re-combinations of location specific, but not privately held, knowledge can lead to sustained competitive advantage within an MNE (Kogut and Zander, 1993).

Future research should explore potential contingencies to the model developed. For example, Watson and colleagues suggest that different types of MNE strategies may require different types of CoPs (Watson et al., 2005). Knowledge flow among the members of a practice network, in terms of both speed and accuracy, is likely to be subject to contextual variations, whether industry or location based. It may also be the case that, as suggested by evolutionary theory (Nelson and Winter, 1982), smaller firms are best suited to working with such fluid structures, while larger MNEs may be well advised to profit from them ex post, by acquiring smaller firms that have crystallized some defensible knowledge assets. Should scholars be able to understand the role of conditions more accurately, true understanding of the role of the different knowledge types will be enhanced and the real importance of 'community' can be clarified. In the case of empirical research into organizational learning in MNEs, this work highlights the general need for multilevel analysis in undertaking empirical research.

Finally, this paper argues that examining knowledge origination and transmission at the CoP level is an essential step in truly understanding the process of innovation and learning in the multinational or any other organization with geographically dispersed units. Even if the actual creation of communities and networks of practice is a challenge that proves beyond the capabilities of all but a handful of MNEs, understanding the concepts of knowledge generation and transmission that underlie our model will offer managers new ideas for the strategic management of knowledge. For scholars, the idea that knowledge acquisition/generation and transmission is accomplished by semi-autonomous teams or communities within the formal components of the MNE both changes the level of analysis of organizational learning and suggests a path toward more productive studies of this essential phenomenon. We see this contribution as essential to further understanding the role of organizational learning in providing competitive advantage to the multinational enterprise. First, we offer a detailed mechanism to explain how and when knowledge with a strong tacit component can be internalized by local subsidiaries. Without a micro-level mechanism, learning is associated simply with co-location and its success or failure appears as a stochastic process. We argue that a proper understanding makes assimilation of knowledge a management process. Secondly, focusing on subsidiary firm to subsidiary firm relationships to understand the internal dissemination, recombination, and application of newly acquired knowledge likewise suffers from level of analysis errors. Understanding the real importance of communities, work groups, centers of excellence, or other informal, multi-disciplinary, sub-firm level units to any real understanding of tacit knowledge explains the mixed findings of empirical studies of internal knowledge transmission and also suggests how to consistently improve organizational learning outcomes. Incentivizing general managers will never be an adequate substitute for inspiring and enabling the individuals and small groups that are actually engaged in the practice of a particular set of skills. Our model offers a consistent, coherent, empirically supported and theoretically defensible solution to the problems seen by MNEs in acquiring and internalizing tacit knowledge and by scholars in understanding this phenomenon.

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Table 1: Distinguishing Features of Communities of Practice

	Communities of Practice	Local Networks of Practice	Internal Networks of Practice
Scope	Mostly local	Mostly local	Mostly multi-location
Nature	Mostly spontaneous	Relatively spontaneous	Mostly require management intervention
Binding Mechanisms	Common interests and activities, direct contact	Socially supported, common language and practice, close contact	Social and professional standards, mobility, distant contact, incentives
Knowledge Developed and Transferred	Within a practice; more likely incremental but dense/great amount	Within a practice and across nearby locations; co-specialization can lead to moderate innovation	Within practice and across locations; or across practices; recombination can lead to possibly radical innovation
Key Knowledge Exchange and Development Facilitators	Shared language, shared subsidiary culture or norms, proximity (possibly virtual)	Professional norms, local or national norms, culture, and language. Social interaction	Shared MNC/subsidiary or network culture, opportunities for shared enterprise

Table 2: Knowledge Types and Channel Choice and Suitability

	Bureaucratic Hierarchy	Community of Practice	Network of Practice	Internal Network of Practice
Highly Explicit Component Knowledge Development and Transfer Efficiency	High	Low	Low	Low
Highly Tacit, Embedded Component Knowledge Development and Transfer Efficiency	Low	High	High	Moderate
Common Architectural Knowledge	Low	Very High	Moderate to High	Moderate

Figure 1: Communities, Networks, and Learning in MNEs