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balancing bandwidth and dispersion in MNEs**

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Exploring the paradox of competence-creating subsidiaries: balancing bandwidth and dispersion in MNEs

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Abstract: This paper seeks to synthesise the various contributions to the special issue of *Long Range Planning* on competence-creating subsidiaries (CCS), and identifies avenues for future research. Effective competence-creation through a network of subsidiaries requires an appropriate balance between internal and external embeddedness. There are multiple types of firm-specific advantages (FSAs) essential to achieve this. In addition, wide-bandwidth pathways are needed with collaborators, suppliers, customers as well as internally within the MNE. Paradoxically, there is a natural tendency for bandwidth to shrink as dispersion increases. As distances (technological, organisational, and physical) become greater, there may be decreasing returns to MNE spread. Greater resources for knowledge integration and coordination are needed as intra- and inter-firm R&D cooperation becomes more intensive and extensive. MNEs need to invest in mechanisms to promote wide-bandwidth knowledge flows, without which widely dispersed and networked MNEs can suffer from internal market failures.

Keywords: R&D, globalization, dispersion, embeddedness, knowledge flows

JEL: F23, Z13, M21

1. Introduction

MNEs have become increasingly knowledge driven, and growing cross-border competition has led many to seek and develop knowledge assets through a wider variety of means. Competences are increasingly developed at the subsidiary level (Birkinshaw and Hood 2001, Andersson et al 2002, Rugman and Verbeke 2001, Cantwell and Mudambi 2005), although the extent to which this occurs is dependent upon a variety of factors, such as the degree of the subsidiary's embeddedness within the MNE's internal network as well as its external environment (Meyer et al 2011). The subsidiary's ability to play this dual role of tapping into local knowledge and engaging in knowledge exchange with other units is further influenced by the nature of its own mandate, the MNE's corporate strategy and the aspect of the value chain the subsidiary is engaged in (Rugman et al 2011).

But to what extent does the subsidiary's competence creation benefit the MNE at large, and how does this activity happen most effectively? The literature over the last two or three decades took two different views of the subsidiary-parent relationship (Foss et al 2012). The 'traditional' view was that the MNE was essentially a hierarchy with subsidiaries acting at the behest of the parent. Strategic activities such as R&D were largely concentrated at, by or close to other strategically significant activities such as HQ functions, and major markets (or customers). Major markets/customers tended to be located close to the MNE's home country or region, so too were R&D facilities, particularly those that were engaged in systematic creation of new competences for the MNE as a whole. Headquarters functioned as the primary hub in a hub-and-spoke structure, providing centralised strategic decision-making able to exercise fiat as needed. An alternative approach took the view that all MNE units share a common set of goals and objectives, but sees the MNE as a network of subsidiaries which ultimately act as a fraternity (a 'federal' structure).

Although later studies reconciled these two views (see Andersson et al 2007), earlier work underplayed the conflict and struggle for power within the MNE (Mudambi et al 2013). Indeed, the terms 'subsidiary' and 'headquarters' are themselves increasingly problematic, just as 'home country' and 'host country' are suggestive of an earlier era. As several of the papers in this special issue illustrate, subsidiaries and headquarters do not always share the same goals and objectives, and while subsidiaries may generate new competences, it is by no means assured that these are accessible to the parent, or other subsidiaries. That is, competence creating subsidiaries must be 'willing and able' to make their assets available to

other MNE units, and in other cases they may either not be ‘willing’ or not ‘able’ to do so. This is not as radical as one might believe. Establishments may not have a mandate, or may be *unwilling to accept* a change in mandate: they may have enjoyed complete operational and strategic opportunity autonomy in the past, which they are loathe to lose. Likewise, parents (or other subsidiaries) must ‘want’ what the subsidiary has, but internal markets suffer from imperfections as well, particularly as MNEs become geographically dispersed and individual operations become specialised in scope and competences (Mudambi 2011, Najafi-Tavani et al 2012).

It may appear that discussions on HQ-subsidiary interactions, and in particular, those involving a central corporate headquarters, are increasingly archaic and irrelevant. This is indeed so when we speak of large MNEs that are a complex combination of hierarchies and networks, interspersed by a (spatially dispersed) variety of functional and geographical headquarters (Benito et al 2011). Nonetheless, the corporate HQ – just as the concept of a home country – is not yet a vestige of the past. Beyond a certain cadre of large MNEs typical of the Fortune 500, the dispersion of the strategic activities of the majority of MNEs remains modest.

To what extent has this state of affairs got to do with globalization? There is plenty of evidence to indicate that MNEs have expanded their competence-creating activities both geographically and technologically, the first to take advantage of a plethora of innovation systems available to them, and the second to respond to the growing multi-technology nature of products and processes (Narula 2003). Additionally, political pressure by influential host country governments has also played an important role. Governments have sought to promote local R&D and manufacturing by MNEs as a condition for market access. However, there is no clear evidence that this growing geographical expansion has led to a commensurate growth in their competence portfolios (Singh 2008). Indeed, there are suggestions that firms may be better off restricting new knowledge creation to a limited number of units: there is a non-linear relationship between spread and benefits to innovation (Lahiri 2010).

Meyer et al (2011) argued that MNEs need to balance the internal embeddedness of the subsidiary within the MNE network against its external embeddedness in the host milieu. Achieving this balance between the subsidiary's strategic role within the MNE with its local identity and its domestic linkages represents a special challenge because of the nature of the trade-offs that it can create. Multiple embeddedness implies a greater degree of collaboration,

both with external actors, and within the MNE. Innovation-related knowledge flows require greater bandwidth, even in the absence of geographical expansion. We draw on arguments from sociology that highlights the dispersion-bandwidth paradox, which argue that firms tend to shrink bandwidth when they become more dispersed, because they are cognitive limits to their coordination and integration capacity. Bandwidth becomes more expensive (both financially, and crucially, in terms of human resources) as distances (technological, organisational, physical) become greater, implying that there are decreasing returns to MNE spread.

In the following section, I expand on the nature of firm specific advantages (FSAs) and location advantages, emphasising the different advantages that are essential for optimal external and internal embeddedness. Section 3 examines the complexities and challenges of external embeddedness for competence-creation, while section 4 takes a closer look at the MNE's internal embeddedness, and the difficulties in optimising the benefits from their growing portfolio of competence-creating subsidiaries. Generating competences through innovation activities is only part of the task, as these assets need to be successfully made available to (and integrated with) other MNE units. Section 5 examines the bandwidth-dispersion paradox. While MNEs have rapidly expanded over the last few decades, they have sometimes struggled to reconcile growing geographical and technological dispersion with the commensurate greater bandwidth required for effective intra-MNE knowledge exchange within these larger networks. A larger number of competence-creating subsidiaries require much more sophisticated means to acquire, coordinate and integrate these assets within the MNE.

2. Competence-creation and FSAs in the modern MNE

The focus of this paper (and the special issue) is the competence creating subsidiary (CCS), which may consist of one or many establishments in the same location. We are interested in subsidiaries that are in aggregate systematically and deliberately engaged in creating new competences. Few subsidiaries (whether an agglomeration of many establishments, or a single establishment) are clearly competence-creating or competence-exploiting. Both subsidiaries and establishments will tend to discover new competences through the utilisation of existing competences, since much (some say most) learning is of an incremental rather than a radical nature (Nelson and Winter 1982).

Competence-creation lies at the heart of the survival of the firm, and the sustainability of its competitive advantages, or FSAs. Firms (and their subsidiaries) are continuously engaged in competence-creation, even if it is 'on the margin', to improve them incrementally through learning-by-doing. Productivity improvements may also happen through the auspices of customer-supplier interactions, as well as by observing the activities of competitors. Firms also seek new classes of FSAs by deliberately engaging in systematic exploration, through a R&D department. But it is worth re-emphasising that a significant share of competence-creation is not formally organised through systematic and formal R&D.

Much of the literature has focused on a basic two-way classification of FSAs which we feel is limiting in its simplicity. The first class of FSAs is associated with knowledge assets ('asset-type FSAs'). However, much of the discussion of knowledge assets tends to focus on FSAs to do with technology/engineering, such as new products, services and processes, machinery and equipment and intellectual property. These asset-type FSAs have dominated much of the empirical literature because they are more tangible and easier to proxy (and therefore empirically test) through data on patents, royalties and licensing fees, R&D expenditures, and so on. Competence-creating establishments are generally taken to imply establishments that are net contributors to FSAs of this type. This is a conceptual simplification driven by methodological challenges, because the firm need other classes of knowledge assets, both to utilise technological assets, and in other instances, in the absence of technological FSAs.

The second broad group of FSAs determine the ability of the MNE to earn economic rents from the first class of assets, and are called transaction-type FSAs (see Dunning 1993, Cantwell and Narula 2001). These are traditionally associated with conducting transactions efficiently, and derive from being able to generate rent by virtue of superior use of intra-firm hierarchies, both within and across national borders. These sorts of assets are the distinguishing feature of the MNE, and are inextricably associated with their multinationality and can be termed 'advantages of common governance'. In other words, the generation of competences by subsidiaries needs to be complemented by an effective distribution of these assets to other constituent parts of the MNE, and their ability to internalise these assets. It is "the capacity of MNE hierarchies vis-à-vis external markets to capture the transactional benefits (or lessen the transactional costs) arising from the common governance of a network of these assets located in different countries" (Dunning 1988). These advantages are capabilities for the creation and coordination of efficient internal hierarchies and markets within MNEs that span a complex diversity of locations. These are to do with managerial

skills associated with efficiently running a complex organisation. These capabilities encompass leadership, human resource management, logistics, creating and implementing organisational structures. They are about creating and maintaining routines within an MNE, and establishing bureaucracies (in a Weberian sense). They are important for MNEs because they define the capacity for the firm to become an MNE in the first instance. The lack of such FSAs will also inhibit the growth of reverse knowledge transfers, a subject of growing importance in the literature (e.g., Rabbiosi 2011, Rabbiosi and Santangelo 2013, **Mudambi et al, in press – paper in this issue**).

It is a (sometimes implicit) assumption of the IB and strategy literature that the MNE is an especially efficient mechanism to transfer assets to and from its various geographically dispersed subsidiaries (e.g., Bartlett and Ghoshal 1989, Kogut and Zander 1993, **Anderssen et al, in press – paper in this issue**). MNE internal markets are generally considered to be more efficient than independent firms in engaging in expropriating the opportunities of cross-border markets for knowledge, but this does not mean that they do not suffer from endemic imperfections or failure. The truly *multinational* enterprise must, by definition, be able to exploit the benefits of multinationality (Dunning 1988). Otherwise it is simply a multi-locational collection of free-standing establishments held together by common ownership. It is worth noting that not all multinational firms function – or seek to function - as integrated MNEs, either because they do not have the FSA necessary, or they have economic or strategic reasons not to do so.

Much of the evidence in the IB literature indicates that this two-category typology of FSAs is still core to our conceptual understanding. However, given the complex dispersion of the MNE, the structure and variety of activities within the MNE and each individual subsidiary, it is also simplistic. It obfuscates the fact that there are a plethora of knowledge-sets which are not always available to all firms, but that shape the efficiency with which the MNE can develop, acquire and utilise competences within the various spatially distributed establishments within its realm. In short: a variety of FSAs are needed to utilise the output of competence-creating subsidiaries, over and beyond asset-type and transaction-type FSAs.

One of the problems with creating typologies is that they can endlessly become bucket-lists of important exceptions and caveats, with academic discussions that focus on the minutiae of definitions, categories and sub-categories (see Narula 2010). We therefore do not offer a typology, but indicate that –within the rubric of the broad definitions of asset- and transaction

type FSAs important to MNEs and their subsidiaries -a variety of important classes of FSAs reside. This special issue suggests a number of such classes of FSAs, summarised here in Figure 1. Some –such as knowledge of institutions - are more easily identifiable as transaction-type FSAs, while others, such as recombination FSAs straddle the two ‘classic’ categories.

*****Figure 1 about here*****

It is essential that establishments generate competences; and it is equally essential that these be exploited efficiently, but in order to do so, it must possess other complementary FSAs. To focus on a particularly relevant example for this special issue: we need to recognise *the modern MNE as a meta-integrator*. It seeks to combine the assets of a variety of subsidiaries together. Each subsidiary acts as an integrator as well, and this includes not just integrating internally generated competences (from other establishments within the subsidiary, and from other subsidiaries within the MNE), but also integrating externally-based location-specific assets. To paraphrase: the MNE is fundamentally an integrator of knowledge, and this requires the capabilities to recombine diverse knowledge sets. This is best understood by applying the multiple embeddedness concept, as in Figure 2.

There are obvious dangers of compressing a complex set of concepts into a 2X2 matrix. Embeddedness¹ is not a dichotomous state, nor is there an absolute scale to measure it by, given differing roles of individual establishments within the MNE, and the degree to which embeddedness is desirable, and indeed, possible. An automobile sales facility has limited potential for external embeddedness or internal embeddedness, and indeed little likelihood to contribute to competence creation. However, in the enterprise software sector, outputs rely on a high degree of interaction with the customer and the scale by which embeddedness can be evaluated for a sales office is fundamentally different. Indeed, engaging in joint adaptation is taken for granted and in this industry, it might even be considered weakly embedded. Such a degree of external embeddedness for automotive sales office would be impossible to achieve, and were it to be achieved, it might be considered to be deeply embedded.

It is therefore with the greatest of caution we suggest that the ‘ideal’ CCS sits in cell 4, being deeply internally embedded, as well as deeply embedded in its local milieu (Zanfei 2000). Our trepidation is caused by our use of ‘ideal’ or ‘optimal’. This presumes the perspective of

¹ Indeed, the word ‘embeddedness’, may be inappropriate, and at least in the case of intra-MNE activity, ‘integration’ may be more accurate. See Krippner et al (2004) for a discussion.

the MNE as a whole, on the principle that what is good for the goose is good for the gander. As we shall discuss later in this paper, this is not always so. Nor is it our intention to suggest that internal and external embeddedness must be 'balanced'. Rather, we wish only to imply that a competence-creating subsidiary negates the counter-factual: A subsidiary that is in Cell 1 is both insufficiently integrated into the MNE, and poorly embedded in its local milieu. It is unlikely to generate competences, nor be able to make them available to other MNE units². Thus, a CCS may occupy any cell except cell 1.

Our use of 'ideal' implies that the subsidiary meets two conditions: that it is capable of generating competences in its location, and that these competences are in practice available to the rest of the MNE, should they wish to avail themselves of these assets. This does not mean that internal embeddedness plays a role in its efficacy in competence-creation. A subsidiary of an MNE that maintains a multi-domestic strategy will have weak internal embeddedness but deeply embedded locally (Cell 3). An example of this would be Hindustan Lever, which continues to be strategically and operationally independent from Unilever's global operations. The subsidiary will function with a local-for-local strategy, as opposed to cell 4, where the assumption is that a 'local-for global' mandate applies. It may also be the case that the competence-creating subsidiary had hitherto been part of an acquired firm, and has not been successfully integrated within the MNE structure. However, a firm may have a few 'deep' linkages, as opposed to be more broadly connected locally. For instance, a CCS (cell 2) may also exist where the subsidiary is 'attached' to another MNE as a captive supplier (as part of its global production network) within an enclave, thereby being very deeply embedded with a single customer.

figure 2 about here

It seems obvious from our reading of the evidence, and the papers within this special issue, that cell 4 is sometimes aspirational (figure 2). Complex, networked MNEs may strive for simultaneous dual embeddedness of its subsidiaries, but this is not always the case (Achcaoucaou et al. 2013, Figueiredo 2011). Indeed, the subsidiary itself may be generating competences (and utilising them), whether the rest of the MNE benefits from these assets is another matter (Cell 3). Using the logic of figure 2, we will now proceed to discuss the

² It has been suggested that, in principle, an MNE may set up a research lab populated entirely by expatriates, engaged in basic (long-term) research in (say) theoretical mathematics (thereby requiring no internal or external embeddedness), and located in a remote spot in the Andes. I concede that such a competence-creating subsidiary is a possible but (excuse the pun) remote possibility.

challenges and difficulties of creating what must surely be the MNE's greatest wish – to establish competence creating subsidiaries that provide competences which can be efficiently be utilised by the whole MNE.

3. FSAs and external embeddedness

Let us first take the case of external embeddedness. The subsidiary's ability to create new competences depends on the ability to recombine (or 'bundle') the FSAs of collocated firms and/or the location-specific assets associated with the host location's innovation system with its existing FSAs (Verbeke 2009). Such bundling requires a rather specific set of knowledge assets, and ownership of these skills determines the ability of the subsidiary to act as a 'mechanism' to convert location-specific assets to FSAs, and it is by no means a set of assets that all firms possess.

Recombinant advantages (figure 1) are an important set of FSAs, which represent capabilities for the re-combining (Verbeke, 2009) or 'bundling' (Hennart, 2009) of complementary assets to improve their performance. Firms require a certain threshold of assets to successfully compete in any given milieu, and this threshold of FSAs consist of several different classes of complementary assets which must be 'bundled' together, some of which are location-bound and to which a firm may (or may not) have privileged access. Where a firm (or a subsidiary) is deficient in one type of FSA, it can nonetheless continue to be competitive, overcoming this weakness by leveraging other assets outside its own boundaries (whether associated with a specific location or a firm). This requires expertise that is not easily acquired, nor transmitted. Such expertise is a firm-specific asset in its own right (Verbeke 2009, Narula 2012), and is especially important as firms require multiple competences in disparate technological and scientific areas.

Recombinant advantages reflect the absorptive capabilities of the establishment. They require the establishment to be able to value its internal assets, as well as those of its potential partner, or sister subsidiary from whom it wishes to acquire the complementary resources. Recombinant advantages are extremely context-specific and technology-specific, and therefore very subsidiary-specific. This is because knowledge can have a substantial location-bound aspect. We know that there are a considerable proportion of the FSAs of a given subsidiary that are location-bound, and are therefore subsidiary-specific advantages (Rugman and Verbeke 2001). To value an asset requires objective information about tangible and intangible assets but such information is often un-codified, embedded in routines, equipment,

and brands, embodied in individuals, and variously protected (Narula, 2012). In short, it requires a high degree of embeddedness with its external partner to decode its assets and to determine its value and complementarity.

Converting externally available assets into FSAs that the subsidiary (and ultimately the MNE) can use requires disentangling them from their existing context. This ‘stickiness’ has to do with institutions, and this forms another aspect of FSAs (Figure 1). Deep external embeddedness in the local innovation system implies familiarity with institutions, and provides the benefit of access to specific knowledge sources not available to outsiders, but at the same time, it implies that the new competences have an important user-specificity (Santangelo 2000) or location-specificity (Rugman and Verbeke 2001).

Some institutions indirectly affect market transactions of firms (Andersson and Santangelo 2013). Firms must interact with markets for ‘support’ inputs, such as capital markets, labour markets, etc. For instance, selecting and training suitably qualified workers means that firms must develop relationships with universities. More embedded firms are able to shape the curriculum, select the best graduates, and establish joint research activities with universities. Formal and informal institutions bind firms to other actors, including governments (Narula 2002, Nachum and Keeble 2003). Institutions confer the basis for insiders to generate economic rent, and are a cost to new entrants or those less entrenched in the domestic milieu (Narula 2014). Knowledge to overcome or reduce the liability of outsidership, once acquired, can be used and updated at low marginal cost. High levels of institution-based FSAs, because they are context and location-specific, paradoxically means that new competences generated are more likely to be location-bound, and ultimately makes them difficult to ‘export’ to sister subsidiaries.

3.1 The challenges for external embeddedness

External embeddedness and competence creation is determined by both demand-driven and supply-driven factors. From a conceptual perspective, this relates to the all-important FSA-location advantage nexus, at the subsidiary level (Rugman and Verbeke 2001). Where the MNE is part of a supply chain, or a production network, it is continuously engaged in adaptations and modifications to meet specific needs, since its products and services must be made complementary to the goods and services of other firms. Even where it is not intricately

engaged within such networks, customers play a significant role in shaping the FSAs of the subsidiary.

For external embeddedness, subsidiaries engaged in competence creation need “flagship” relational contracts and access to specialised actors that make up the local innovation system, which are linked to the subsidiary either directly or indirectly. This includes universities, public and private research institutes, government research councils, as well as competitors, collaborators and suppliers, (Rugman 2000). The importance of collocation with the other actors in an innovation system when conducting R&D activities cannot be overstated. Important synergies can exist, and at its most optimal, such collocated knowledge infrastructure can act as a ‘club’ or community of practice providing access to specialised knowledge to those who are locally embedded, and excluding those who are not (Tallman et al 2004, Narula and Santangelo 2009, 2012).

Competence creation by subsidiaries located abroad presumes that the location itself provides distinct benefits deriving from that location, that are suitably different from those of other locations, including its parent. Such benefits are broadly classified as implying local external embeddedness, but naturally there is considerable variation in the degree to which they locally embedded. Being an ‘insider’ can have various meanings. An “insider” can mean being integrated more broadly with the innovation system of the host country; that is, being extensively linked to a variety of actors. Such local embeddedness may be organic, in that the subsidiary has grown roots over a long period of time, perhaps as a part of a multi-domestic strategy, either currently, or in the past, and is operationally and strategically autonomous. A deeply embedded subsidiary may also be an acquired subsidiary, giving it ‘instant’ external embeddedness. Either situation implies intensive external embeddedness with an extensive set of actors, such that it is considered as a local firm (Cantwell and Mudambi 2011).

On the other hand, a subsidiary can be an “outsider”, because local linkages are intensive, but not extensive. For instance, a subsidiary that forms part of a cluster around a flagship firm (e.g., a tier 1 supplier in a global production network) may have intensive linkages with the other firms (say tier 2 and tier 3 suppliers), possibly even only with the flagship firm (and primary customer), at whose behest it engages in creation of competences specific to this customer (Cell 2, in Figure 2). Local embeddedness, of course, remains a gradual process, and newly established greenfield subsidiaries are expected to be ‘outsiders’ at initial entry. It

is well-known that moving from an outsider to an insider status is a slow process, since it requires building up a certain degree of social capital to establish ties with the key local players in the innovation system (Figueiredo 2011, Narula and Santangelo 2012), and the level of difficulty to become an insider varies by the extent of industrial concentration (Cantwell and Mudambi 2011). In other words, in oligopolistic sectors, greenfield entrants have greater difficulty becoming externally embedded; because gaining membership is especially difficult (McCann and Mudambi 2005). The extent to which subsidiaries are able to leverage location-specific assets in the host country is driven by the competitive dynamism of the host, and the market conditions (**Anderssen et al (in press – paper in this issue)**, Perri et al. 2013, Santangelo 2102).

It is of course, a mistaken assumption that knowledge is only acquired through formal and informal channels of linkages from collocated firms. Indeed, firms are known to actively avoid collocation in certain circumstances (Cantwell and Santangelo, 2002, Alcácer 2006, Narula and Santangelo 2009, Santangelo 2012). Firms do not have to be collocated to cooperate. Where knowledge can be codified, firms can acquire knowledge assets through markets. Knowing how to *utilise external markets* forms an important set of FSAs of firms (figure 1). Firms must be able to identify opportunities for arbitrage if they are to generate rents- a type of entrepreneurship. Entrepreneurship involves one or more of three functions: the discovery of new opportunity for rent generation in foreign markets; the capacity to coordinate activities associated with such opportunities; and the ability to bear the associated risk. These are requirements for all firms regardless of size. The ability to monitor and sift through information and identify (and subsequently exploit) market imperfections and failures in a timely fashion underlies the capacity of firms to profit. Such activities presume considerable knowledge of markets, the ability to acquire such knowledge on an on-going basis (as markets fluctuate), and the ability to integrate information from various markets together (if the firm's activities are across borders). Such markets include markets for knowledge, which though imperfect, do exist. This class of FSAs thus implies a degree of local internal embeddedness.

A certain degree of local embeddedness is a *sine qua non* for most forms of knowledge creation. Some of the knowledge sets that make up a subsidiary's FSAs are normally associated with the FSAs of specific firms collocated in the host innovation system, or they are extracted from non-firm actors within the knowledge infrastructure, through formal and informal collaborative processes. Such complementary knowledge assets may not always be

location-bound, but they are certainly sticky, and are part of the host country location advantages. Geographical proximity is often essential for the exchange of tacit information (Criscuolo and Verspagen 2008), and the greater the local embeddedness of the subsidiary, the greater the likelihood of recombining these external assets with its FSAs. Indeed, the *raison d'être* of an MNE is its ability to combine and internalise location-specific assets associated with the host country in which it is engaged, with its existing FSAs.

4. Constraints on Internal Embeddedness

HQ-subsidiary relationships in a MNE are complex, and much of the research in this area presumes highly stylised sets of interactions (Rugman and Verbeke 2001). At the very least, there is a principal-agent problem, and even wholly-owned subsidiaries do not always act in the best interests of the parent. This relates to the classic centralization/autonomy paradox (Tavares and Young 2001). A competence-creating subsidiary does not necessarily imply that its competences are available to the rest of the MNE. For this to happen there must be a strong internal embeddedness to other establishments elsewhere. This can be with the parent company, the regional HQ, or with another subsidiary located in a third country.

It seems clear that the modern MNE acts more as a federation with 'an on-going power contest' between the various units (Ambos et al 2010, Najafi-Tavani et al 2013) with the subsidiaries struggling for greater influence (often measured through resource allocation), reflecting an uneasy balancing act between the quest for greater autonomy by the subsidiary against a centralising tendency by HQ (see Holm and Pedersen 2000, Birkinshaw and Hood 1998). It is one thing for the subsidiary to create competences; it is entirely another that they benefit the MNE at large. That is, there must be tangible and cogent mechanisms by which both the parent and the subsidiary (presuming for simplicity a stylised MNE composed of a dyadic single-subsidiary and single HQ) can effectively exchange knowledge.

It is certainly not the case that subsidiaries are always subservient to the will of the MNE. The subsidiary may not want to reveal the nature of its asset base to the HQ, for fear that the HQ will appropriate them, possibly also depriving it from exploiting the new competence itself. Although MNEs have transfer pricing mechanisms a price must be established for any asset to be exchanged. By their very nature, the *a priori* value of new competences is hard to determine. A subsidiary may be reluctant to 'sell' an FSA to the HQ (or to another subsidiary) whose value is likely to be underestimated by the parent or subsidiary, because it

has less complete information about the asset. It may also be, of course, that the FSAs of the subsidiary are highly context-specific, and the subsidiary overestimates its value to others.

The degree to which a subsidiary is autonomous within an MNE network is not to be underestimated. Subsidiaries may see their autonomy as a ‘badge of honour’, an acknowledgement of their superior knowledge assets in a specific area. The right to globally coordinate value-adding activities, having been deemed as a ‘centre of excellence’ (CoE) within the MNE network is a status that is hard-won (Mudambi et al 2013). Achieving a ‘hub’ or CoE status implies that the affiliate has been recognised by headquarters as having demonstrated best practice in a particular functional area or line of business and is given the mandate to lead these other affiliates towards this goal (Frost et al 2002). CoEs create an intra-MNE network to *actively cooperate* in a specific area, making its specialised capabilities available to others to emulate. The mandate to ‘lead’, particularly in R&D, allocates the subsidiary managers certain decision rights associated with autonomy, particularly where the subsidiary is engaged in basic research, rather than development (Ecker et al 2011).

It is important to acknowledge that the modern MNE sits uncomfortably between the classic hierarchy with a hub-and-spoke structure, and a free-wheeling network structure comprising a number of ‘equal’ partners engaged in an uneasy balance between intra-firm cooperation and competition. Increased intra-firm competition for scarce resources reduces the incentive to cooperate and share between subsidiaries. ‘Coopetition’ remains an imperfect mechanism to reward performance and allocate resources to establishments within a network, because it reduces the incentive to share knowledge (Luo 2005, Tsai 2002). The problem with networks is that intra-MNE rivalries still exist, and intra-firm distances are defined not only by physical distances, but by intra-MNE organisational distances, cultures and rivalries (**Athreye et al, in press – paper in this issue**).

Intra-firm distances are shaped by the mode of operation, and the extent to which the subsidiary has evolved organically, or been acquired. A recently acquired establishment in a given location may be an ‘outsider’ to the MNE. Rapid international expansion is often facilitated by supplementing organic, greenfield investments with acquisitions and joint ventures. Acquired subsidiaries are viewed with some suspicion by extant, greenfield subsidiaries (Criscuolo and Narula 2007). There is considerable organisational inertia,

especially in the area of R&D, and key individuals show a reluctance to engage in R&D cooperation with former rivals. (**Palmie et al, in press – paper in this issue**)

On the other hand, **Blomkvist et al (in press – paper in this issue)** argue, acquisitions permit a lateral shift in the strategy of the MNE. It allows rapid entry into new markets, as well as into unrelated technological field in which the acquiring firm has little or no current engagement. They have the further advantage of providing ‘instant local embeddedness’, and membership into the local innovation system, which ordinarily might take years. However, it has the downside that such subsidiaries have no internal embeddedness, and they are less likely to be a catalyst for long-term change once they serve their initial purpose (or fail to) for which their initial set-up was intended. **Blomkvist et al’s study (in press – paper in this issue)** takes a long-term view and finds that there are still tangible differences between acquired and greenfield subsidiaries even after 100 years. As **Mudambi et al (in press – paper in this issue)** note, a common culture is important in transferring tacit knowledge.

4.1 Knowledge flows and Internal Embeddedness

To be sure, the challenges of optimising knowledge flows between HQ and subsidiaries are especially complex in the case of innovation, because of the intangible nature of knowledge. Not all knowledge can be affordably codified (think of writing a book to explain how to competently play the violin; the cost required to codify all the relevant knowledge would be prohibitive). This tends to be more so when the knowledge being transferred is some distance away from the market, or is complex in that it requires a variety of complex complementary sets of knowledge to utilise. In addition, we know that knowledge is context-specific (and even establishment-specific) so that there is need for common contexts of experience amongst employees to convert their individual tacit knowledge to explicit knowledge (Nonaka, Toyama and Konno 2000).

Optimising knowledge flows within the boundaries of the economic actor is a subject of much research. The literature on social capital (e.g. Hansen 1999, Tsai and Ghoshal 1998) has highlighted the importance of the creation of social structures in the diffusion of knowledge within and across organizational units. If MNEs want to increase their technological performance by adopting a geographically dispersed and diversified network of R&D units, they must overcome a number of managerial challenges to ensure that the

knowledge produced in the differentiated network is not only diffused internally, but is also recombined and integrated (Almeida *et al.* 2002). Organizational structures are specific to the kinds of activities that need to be conducted. Where reliability, repetition and accountability are paramount, a much higher degree of institutionalised standardisation of routines is necessary. Thus where competence-exploitation is the predominant objective, different organisational structures are necessary than where creativity and complex activities associated with competence-creation is the primary goal (Criscuolo and Narula 2007).

4.2 Subsidiaries and inefficient internal market

Regardless of the strategy and structure of the MNE, subsidiaries need to find ways to utilise competences, either themselves, or by making these available to others, since they must be seen to generate rent (or at least recover costs) on their innovative activity. However, the markets available to subsidiaries are limited: subsidiaries are not always free agents. They do not normally have the freedom to make their assets available to other firms through external markets without the express permission of the parent³. As such, the default ‘customer’ remains the parent firm, or a sister subsidiary.

As such, as **Hoenen et al (in press – paper in this issue)** and **Dimitratos et al (in press – paper in this issue)** point out, subsidiaries need to make efforts to ‘sell their wares’ to the rest of the MNE, and in order to do so they need to have entrepreneurial capabilities. It helps to bring their competences to the attention of the parent if they are formally recognised as being competence-creating subsidiaries, either through a designation as a centre of excellence, or otherwise having been granted an appropriate mandate, for instance, because one of the establishments that form the subsidiary is a stand-alone R&D facility. In any case, as **Mudambi et al (in press – paper in this issue)** argue, there are costs to the subsidiary in trying to make their competences relevant to the rest of the MNE; such promotional activity requires resources, which creates a trade-off between resources to generate knowledge and resources need to transfer and promote their activities.

Nonetheless, there are considerable pressures for the boundary-scanning capabilities of the parent firm to be enhanced. Some MNEs are more capable of being able to monitor and select

³ Chesbrough and Rosenbloom (2002) illustrate how companies may offer to create spin-offs to keep as a means of keeping important talent in-house. By maintaining a lower governance structure, it can improve their ability to hire and retain the best engineers and scientists.

promising new competences and leverage them for use by HQ, or by other subsidiaries, but this requires considerable systematic effort. Monteiro et al (2008) point out the important role of specialised technology-scouting operations. Such specialised boundary scanners are one of several intermediary agents, such as regional headquarters and centres of excellence that are formally designated to act as honest brokers (**Hoenen et al, in press – paper in this issue**).

Parents must be persuaded that the knowledge of its subsidiaries is relevant (Ambos 2006), because the HQ is not omniscient, and in any case may have its own agenda. The paper by **Athreye et al (in press – paper in this issue)** illustrates this for the case of Fiat. The parent firm did not seem interested in internalising the new competences developed by the R&D facilities in its Indian and Turkish operations, despite a sophisticated set of tools to promote knowledge-sharing across the MNE. In this instance it may also reflect the fact that the Indian and Turkish subsidiaries were joint ventures. But it also echoes the home-country-biased techno-centric view commonly described as the ‘Not-Invented-Here’ syndrome, where competences generated in other, peripheral subsidiaries are judged to be inferior, simply because of their provenance. The **Athreye et al (in press – paper in this issue)** paper illustrates par excellence the fundamentally different view taken by the parent firm and the subsidiary.

Naturally, subsidiaries are likely to overvalue their own newly created assets, or indeed underestimate the extent to which they can be transferred with ease. It is for this reason that **Palmie et al (in press – paper in this issue)** make the valuable point that not all competences generated by subsidiaries are ‘useful’. In addition, even where HQ finds the subsidiary’s knowledge useful, it may not be ‘useable’, because they do not have the necessary recombinant FSAs to do so.

5. The perils of growing too fast: the MNE and the dispersion-bandwidth paradox

That internal embeddedness is crucial for the MNE, particularly in the area of innovation, has always been uncontroversial (Kogut and Zander 1994, Frost and Zhou 2005). We know that strong internal linkages are a mechanism to ensure that the various units of the MNE maintain similar priorities, and coordinate activities so that there is an internal interdependence. These challenges are further exacerbated – even where MNE units want to cooperate – in more tacit/less codifiable activities, where distance matters even more, and the

external environment is characterised by weak intellectual property protection (Alcacer and Zhao 2012). There is considerably less agreement on how embeddedness may be efficiently and practically achieved.

The growing multinationality - both in terms of numbers of subsidiaries, and the intensity of their activities in multiple locations – of both established MNEs, as well as new MNEs has created large hierarchies (or networks) of subsidiaries that are geographically dispersed, with differing degrees of local embeddedness, and a wide and varying scope and scale in each location. While new technologies make it easier to monitor activities across distances and to transfer information, the sheer volume of such information means that there are bound to be ‘internal market failures’. We posit that information-sharing systems and intra-MNE control mechanisms that act as arteries between the dispersed constituent establishments of the MNE, have not expanded at a pace to handle the ever-greater information flows between these dispersed activities.

Even in the absence of geographical expansion, there are three important sequential conditions that need to be satisfied for an optimal competence-creating subsidiary (cell 4, figure 2). First, it must be capable of generating new competences. Second, these competences need to make their way from the subsidiary to other constituencies within the same MNE. Third, these competences need to be effectively integrated with the existing FSAs of the unit in question.

It is only logical that as the number, variety and intensity of subsidiaries of the ‘typical’ MNE has increased, so too has the need for internal pathways for the movement of knowledge within the MNE, especially where such MNEs have a dispersed array of competence-creating subsidiaries. Indeed, it is not simply a matter of ‘pathways’ between establishments, it is also about their ‘bandwidth’. High bandwidth connections imply regular, efficient and intensive two-way knowledge flows, for instance through systematic face-to-face engagement between scientists, engineers and managers in different units. High bandwidth links are also resource-intensive, and therefore costly. They are hard to build, and take time to establish (Criscuolo and Narula 2007). Indeed, given the costs that ‘distance’ adds to coordination, successful MNEs tend to concentrate their activities close to the home location or region (Rugman and Verbeke 2004)

In a seminal contribution in sociology, Aral and Alstynne (2011) point to a fundamental dispersion-bandwidth paradox. Although their context is different, we believe it can be

suitably applied here. Firms are more likely to engage in wide bandwidth relationships with existing partners (for instance, existing subsidiaries short ‘distances’ from each other), than with ‘strangers’ (new subsidiaries in new locations, and/or engaged in new sectors). Subsidiaries show greater preference for those actors who share important values or knowledge sets, and will have a wide ‘bandwidth’ with such subsidiaries. The disadvantage of ‘homophily’ (i.e., preferring those with whom you share characteristics) is that it does not encourage novelty because of the strong overlap: the higher the overlap, the lower the probability of novelty. The learning potential remains greatest when partnering with relatively unknown actors, but establishments tend to assign smaller bandwidth in cooperating with new or unfamiliar partners. A greater overlap of technological specialization (as would be the case in homophily) between establishments eases communications, but reduces novelty, while a small overlap of technological specialization increases the potential of novelty, but makes communications difficult (Nooteboom 1999, Narula and Santangelo 2009).

Keep in mind that globalization is not only about geographical spread, but also about technological spread: firms need multiple technological competences, because products, processes and services increasingly require a greater breadth (and depth) of expertise in a greater variety of unrelated fields. This means that the dispersion-bandwidth paradox described above applies equally to dispersion in response to complementary technological needs, which may or may not imply entry into new locations abroad. Firms have often responded to this challenge by engaging in R&D collaboration, whether in new or existing locations. Such increases in technological diversity also require new pathways with new partners of high bandwidth, exacerbating the challenges posed by international expansion (Lahiri 2010).

In short, to optimise learning, MNEs require a greater dispersion of activities, both geographically and technologically. However, *ceteris paribus*, greater dispersion by the MNE requires a reduction in the bandwidth because it must spread its resources more widely, engaging in a larger number of sectors, location and partners. The focal CCS – where it is in engaging in a new technological sector, or in a new location – has to invest in a certain amount of bandwidth with a variety of new external partners as well. It too has limited bandwidth, and will also act to conserve bandwidth. All things being equal, MNE units will demonstrate an organisational inertia that maintains their existing high bandwidth relationships, even where alternative configurations are potentially superior in terms of

innovation and novelty (which are assigned low bandwidths). Greater competitive pressures mean that typically firms have concurrently reduced their organisational slack, which puts further restrictions on managerial resources needed to coordinate these activities.

What this means is that *while MNEs are keen on greater geographical dispersion because of the greater variety of external environments/location advantages/innovation systems potentially available to them, paradoxically, these knowledge flows will not easily materialise because the bandwidth necessary to internalise the increased knowledge flows are not easily available.*

Indeed, following Singh (2008) we propose that greater dispersion may *decrease* the quality of innovation. Greater dispersion may indeed be a good way to identify new complementary knowledge sets, the potential value may be less than the costs of coordination and the costs of integrating it with the existing portfolio of assets within the MNE. Bigger and more complex MNEs do not automatically result in high-bandwidth pathways, nor – even where such high bandwidth pathways exist- do they function as intended, with knowledge flowing unimpeded between the different units within the MNE. That is to say, knowledge within the boundaries of the ‘ideal’ MNE should have the characteristics of a public good – freely available to all members of the network/hierarchy at marginal cost. This is patently not so. There are two interrelated reasons why it is unreasonable to expect this to be so.

First, there is a larger, MNE-level phenomenon to do with the efficiency of internal markets. It is a basic principle that the MNE exists there are significant economies of common governance. It is indisputable that the typical MNE conducts thousands of transactions, and that it is able to conduct these transactions on average more efficiently than the market. However, it seems less certain that it can continue to do so equally efficiently as both the number of subsidiaries with which it must do so increases, and as the bandwidth needed with each individual subsidiary grows. It seems reasonable to expect that – given the increasing number of pathways as firms expand geographically-the internal markets will operate less efficiently for certain subsidiaries than for others, because the firm does not have the organizational capacity to meet the demand for the larger ‘bandwidth’ to efficiently manage each of these flows individually. It suggests therefore that there is a reasonable argument to be made for the existence of internal market *imperfections*, and in the limit, of internal market *failures*. We posit that there is such a thing as growing too fast, and there is also such a thing as decreasing returns to geographic dispersion after a certain point, at least as far as

innovation is concerned. Greater bandwidth does not happen by executive fiat, and this is especially so in the case of competence-creating activities. It is well-known that creating cooperative relationships in R&D require inordinate amounts of trust and social capital. The same applies for units of the same MNE, and take considerable time to become effective. As is the case with nurturing partnerships with external actors, bandwidth evolves naturally, but firms cannot simply allow it to evolve by chance. Mechanisms for greater bandwidth are not immensely complicated – they involve the promoting the exchange of ideas and tacit information, and to create trust between organizations and individuals. These include short-term assignments, cross-technology platforms, product-group conferences and so forth. Much is simply to do with face-to-face interaction between parties from different communities of practice which helps promote cross-unit knowledge integration greater cross-fertilisation, and knowledge re-uses.

Second, improving internal knowledge markets requires a greater coordination role to integrate knowledge from separate subsidiaries (Nell and Ambos 2013). This traditionally has underlined the continuing relevance of headquarters (of various types), even where the MNE itself moves towards a network structure. Ironically, MNEs seek to *reduce* headquarters oversight in network organisations, even as there is more need for coordination. Such pressures for cost-cutting are associated with a widespread perception that managerial and administrative costs are support activities that are detrimental to shorter-term profit objectives, since they do not directly contribute to value-creation. Beyond a certain size, however, coordination cost rise, rather than fall, and MNEs by virtue of being multinational rely on high-bandwidth connections.

In a more hierarchical setting, the HQ plays an important role as an ‘honest broker’ between subsidiaries competing for resources, so as to arbitrate, control, regulate and sanction activities, and to avoid wasteful duplication. In such a set-up, it can be argued that only a headquarters-type of organisation will have the ‘big picture’. What is the strategic long-term direction of the MNE as a whole: future product and market positioning, and the subsequent structural adjustment within the MNE (and therefore individual units) needed, in terms of overlap, specialisation and so forth? In other words, only a HQ-type unit has the overview to determine areas of priority that ‘deserve’ greater bandwidth. Left to individual units, self-interest will dictate the allocation of resources. Linkages are stronger between intra-MNE units as well as between MNE units and external partners that share some epistemological

provenance (Håkanson 2010). Persuading them to make linkages with unfamiliar partners is always challenging.

However, there is an inherent challenge to this, because the greater the breadth of technological and geographical dispersion, the less likely an HQ-type organisation can 'pick winners', particularly at the frontier. Having the vision to identify the constituent knowledge sets that will shape the competitiveness of a firm twenty years hence requires it to spend considerable resources to have a high level of expertise to understand multiple technological paradigms, possibly in unrelated fields, as well as in pre-paradigmatic technologies (i.e., basic research, which are likely to bear no fruit for many years). It also requires intimate knowledge of the local context of each subsidiary, and its external partners. This means that the HQ must also be externally embedded, and not just in its local context (**Hoenen et al, in press – paper in this issue**). In other words, such a unit *requires* bandwidth to *assign* bandwidth. This explains the tendency towards multiple headquarters along functional or divisional lines.

The ability to integrate knowledge dispersed across different locations in multiple technological fields is at the heart of what we earlier described as recombinant FSAs, and defines the ability of the MNE to act as a meta-integrator. However, as executive fiat does not work, somebody must persuade the individual subsidiaries to act for the greater good, and as much of this special issue argues, this is not always possible.

However, for many of the same reasons, it could be argued that HQ(s) is not always well-placed to act with enlightened self-interest. It suffers from inertia, which can lead to sub-optimal technological and institutional lock-in (Narula 2003). This is the reason firms that are unable to break their path-dependence seek external actors to lead their organisations. As MacAulay et al (2011) discuss, specialist external organisations can act as knowledge and innovation intermediaries provided they possess a network spanning capability, organisational memory, and credibility and skills as a mediator. Intermediation is about helping the customer determine what it wants, or what it most probably will want, were it able to evaluate its own strengths and weaknesses more objectively. Consultants can see patterns and opportunities as well as bottlenecks and inefficiencies which insiders cannot.

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Figure 1 the different classes of FSAs underlying the MNE

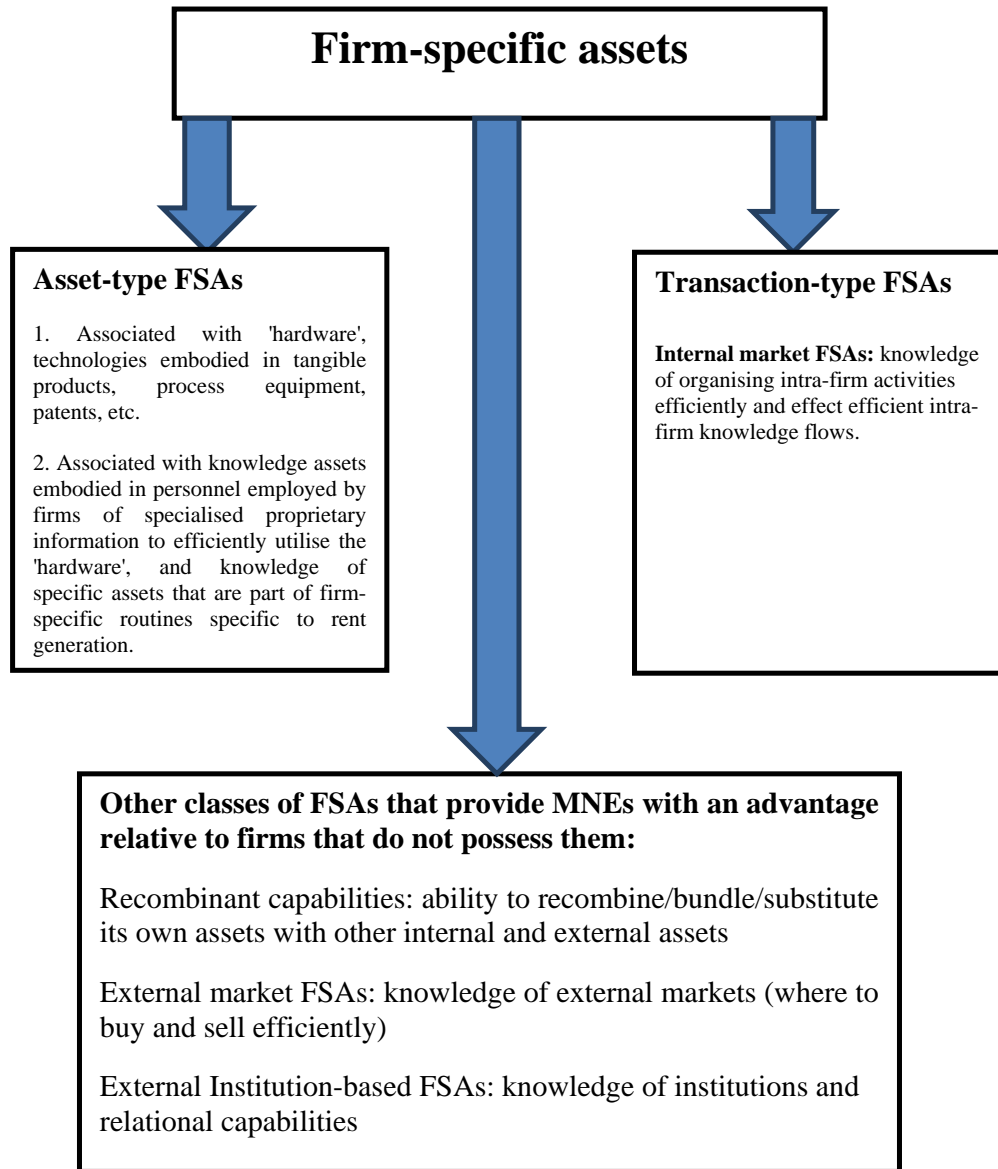
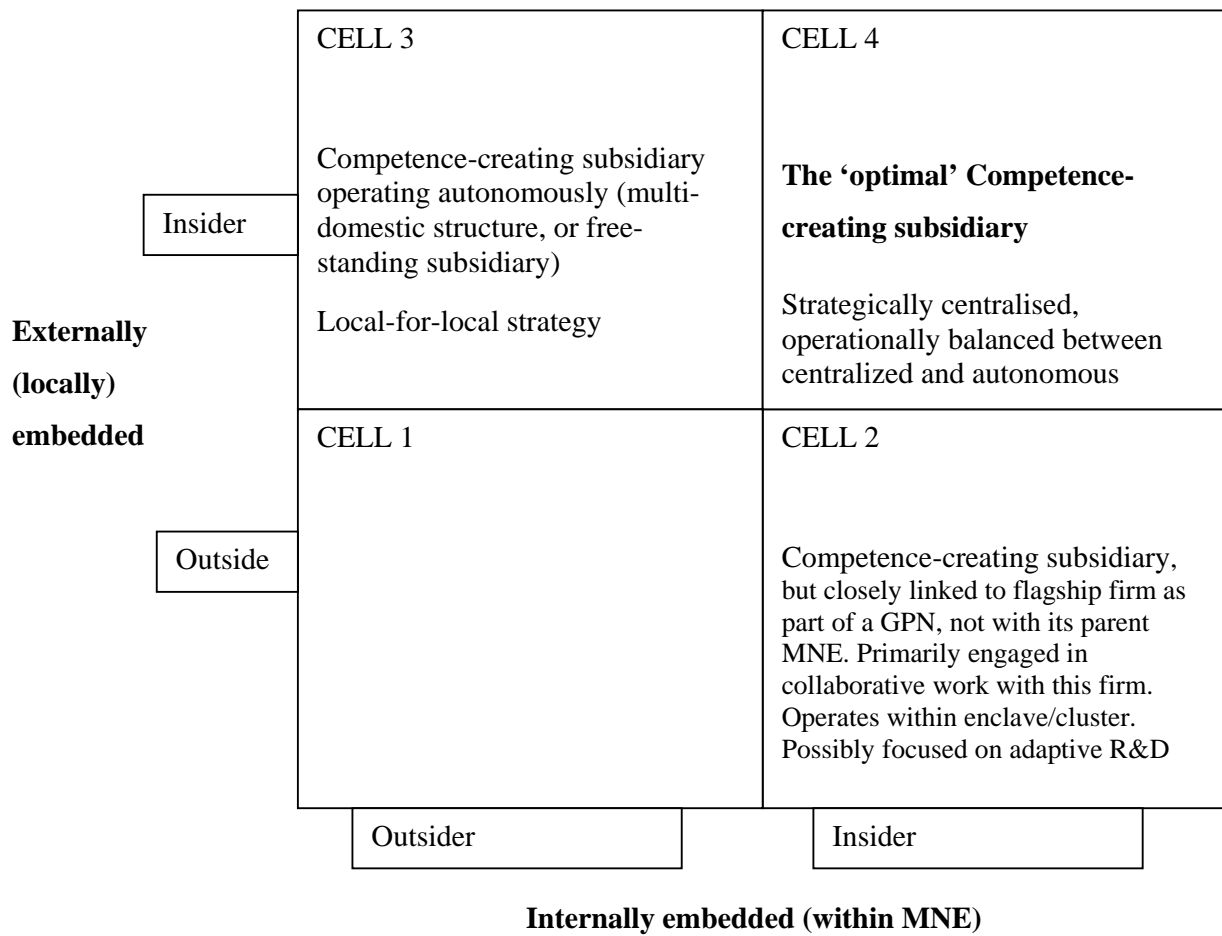


Figure 2 Competence-creating subsidiaries and different degrees of embeddedness



References

Achcaoucaou, F., Miravittles, P., Leon-Darder, F., 2013. Knowledge sharing and subsidiary R&D mandate development: A matter of dual embeddedness. *International Business Review*. <http://dx.doi.org/10.1016/j.ibusrev.2013.08.006>

Alcácer, J., 2006. Location choices across the value chain: How activity and capability influence collocation. *Management Science*. 52(10), 1457-1471.

Alcácer, J., Zhao, M., 2012. Local R&D strategies and multi-location firms: The role of internal linkages. *Management Science*. 58 (4), 734–753.

Ambos, T. C., Ambos, B., Schlegelmilch, B. B., 2006. Learning from foreign subsidiaries: An empirical investigation of headquarters' benefits from reverse knowledge transfers. *International Business Review*. 15, 294–312.

Ambos, T.C., Andersson, U. and Birkinshaw, J. 2010. What are the consequences of initiative-taking in multinational subsidiaries?, *Journal of International Business Studies*, Vol. 41, pp. 1099-1118.

Andersson, U. and Santangelo, G.D. (2013) Coping with non-market supporting regulation in developed countries: subsidiary relational embeddedness strategies and performance, Reading IB conference.

Andersson, U., Dellestrand, H., Pedersen, T., 2014. Local environments contribution to competence creation in multinational enterprises. *Long Range Planning*. in press – paper in this issue.

Andersson, U., Forsgren, M., Holm, U., 2007. Balancing subsidiary influence in the federative MNC: A business network view. *Journal of International Business Studies* 38, 802-818.

Aral, S., Alstytne, M. V., 2011. The diversity-bandwidth tradeoff. *American Journal of Sociology*. 117(1), 90-171.

Athreye, S., Celikel, A. Ujjual, V. (2014) Transnational management and Emerging Markets: Organisational challenges faced by Fiat in the internationalisation of R&D. *Long Range Planning*. in press – paper in this issue

Bartlett, C., Ghoshal, S. 1989. *Managing Across Borders: The Transnational Solution*. Harvard Business School Press, Boston, MA.

- Benito, G. R. G., Lunnan, R., Tomassen, S., 2011. Distant encounters of the third kind: Multinational companies locating divisional headquarters abroad. *Journal of Management Studies*. 48(2), 373-394.
- Birkinshaw, J. and Hood, N. 1998 Multinational subsidiary evolution: capability and charter change in foreign-owned subsidiary companies, *Academy of Management Review*, Vol. 23, No. 4, pp. 773–795.
- Birkinshaw, J., Hood, N., Jonsson, S., 1998. Building firm-specific advantages in multinational corporations: The role of the subsidiary initiative. *Strategic Management Journal*. 19, 221–241.
- Blomkvist, K., Zander, I., Kappen, P., 2014. Win, place, or show? How foreign market entry strategies contribute to the technological growth of the multinational corporation. in press – paper in this issue.
- Cantwell, J., Narula, R., 2001. The eclectic paradigm in the global economy. *International Journal of the Economics of Business*. 8(2), 155-172.
- Cantwell, J.A. and Santangelo, G.D. (2002), “The new geography of corporate research in information and communications technology (ICT)”. *Journal of Evolutionary Economics*, 12(1-2): 163-197.
- Cantwell, J.A., Mudambi, R., 2005. MNE competence-creating subsidiary mandates. *Strategic Management Journal*. 26(12), 1109-1128.
- Cantwell, J.A., Mudambi, R., 2011. Physical attraction and the geography of knowledge sourcing in multinational enterprises. *Global Strategy Journal* 1(3-4), 206-232.
- Chesbrough, H., Rosenbloom, R., (2002). The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change*. 11(3), 529-555.
- Criscuolo, P., Narula, R., 2007. Using multi-hub structures for international R&D: Organisational inertia and the challenges of implementation. *Management International Review*. 47(5), 639-660.
- Criscuolo, P., Verspagen, B. 2008. Does it matter where patent citations come from? Inventor versus examiner citations in European patents. *Research Policy*. 37(10), 1892-1908.

Dimitratos, P., Liouka, I., Young, S., 2014. A missing operationalization: Entrepreneurial competencies in multinational enterprise subsidiaries. *Long Range Planning*. in press – paper in this issue.

Dunning, J. H., 1988. The eclectic paradigm of international production: A restatement and some possible extensions. *Journal of International Business Studies*. 19(1), 1-31.

Dunning, J. H., 1993. *Multinational Enterprises and the Global Economy*. Addison Wesley, Wokingham.

Ecker, B., van Triest, S., Williams, C. 2013. Management control and the decentralization of R&D, *Journal of Management*, 39(4) 907-927

Figueiredo, P. N., 2011. The role of dual embeddedness in the innovative performance of MNE subsidiaries: Evidence from Brazil. *Journal of Management Studies*. 48(2), 417–440.

Foss, K., Foss, N., Nell, P. C. (2012): “MNC organizational form and subsidiary motivation problems: Controlling intervention hazards in the network MNC”. *Journal of International Management* 18 (3), 247-259.

Frost, T. S., Zhou, C., 2005. R&D co-practice and 'reverse' knowledge integration in multinational firms. *Journal of International Business Studies*. 36(6), 676-687.

Håkanson, L., 2010. The firm as an epistemic community: The knowledge-based view revisited. *Industrial and Corporate Change*. 19(6), 1801-1828.

Håkanson, L., Caessens, P., MacAuley, S., 2011. InnovationXchange: A case study in innovation intermediation. *Innovation: Management, Policy & Practice*. 13(2), 261-274.

Hansen, M. T., 1999. The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits. *Administrative Science Quarterly*. 44, 82-111.

Hennart, J.M.A., 2009. Down with MNE-centric theories! Market entry and expansion as the bundling of MNE and local assets. *Journal of International Business Studies*. 40(9), 1432-1454.

Hoenen, A. K., Nell, P. C., Ambos, B., 2014. MNE entrepreneurial capabilities at intermediate levels: The roles of external embeddedness and heterogeneous environments. *Long Range Planning*. in press – paper in this issue.

- Holm, U., Pedersen, T., 2000. The Emergence and Impact of MNC Centres of Excellence: A Subsidiary Perspective. MacMillan, London.
- Kogut, B., Zander, U., 1993. Knowledge of the firm and the evolutionary theory of the multinational corporation. *Journal of International Business Studies*. 24(4): 625-645.
- Krippner, G., Granovetter, M., Block, F., Biggart, N., Beamish, T., Hsing, Y., Hart, G., Arrighi, G., Mendell, M., Hall, J., Burawoy, M., Vogel, S., O'Riain, S., 2004. Polanyi Symposium: A conversation on embeddedness. *Socio-Economic Review*. 2, 109-135.
- Lahiri, N., 2010. Geographic dispersion of R&D units: How does it help innovation? *Academy of Management Journal*. 53(5), 1194-1209.
- Luo, Y., 2005. Toward cooptation within a multinational enterprise: a perspective from foreign subsidiaries. *Journal of World Business*. 40, 71-90.
- Meyer, K. E., Mudambi, R., Narula, R., 2011. Multinational enterprises and local contexts: The opportunities and challenges of multiple embeddedness. *Journal of Management Studies*. 48(2), 235-252.
- Monteiro, F.L., Arvidsson, N., Birkinshaw, J., 2008. Knowledge flows within multinational corporations: Explaining subsidiary isolation and its performance implications. *Organization Science*. 19, 90-107.
- Mudambi, R., 2011. Hierarchy, coordination, and innovation in the multinational enterprise. *Global Strategy Journal*. 1, 317-323.
- Mudambi, R., Pedersen, T., Andersson, U. 2013. How subsidiaries gain power in multinational corporations, *Journal of World Business*.
- Mudambi, R., Piscitello, L., Rabbiosi, L., 2014. Reverse knowledge transfer in MNEs: Subsidiary innovativeness and entry modes. *Long Range Planning*, in press – paper in this issue.
- Nachum, L. Keeble, D. (2003) Neo-Marshallian Clusters and Global Networks, *Long Range Planning*, 36, 459-480
- Najafi-Tawani, Z, Giroud, A., Andersson. U., 2013. The interplay of networking activities and internal knowledge actions for subsidiary influence within MNCs. *Journal of World Business*. forthcoming.

- Narula, R., 2002. Innovation systems and 'inertia' in R&D location: Norwegian firms and the role of systemic lock-in. *Research Policy*. 31(5), 795-816.
- Narula, R., 2003. *Globalisation and Technology: Interdependence, Innovation Systems and Industrial Policy*. Polity Press, Cambridge.
- Narula, R., 2010. Keeping the eclectic paradigm simple. *Multinational Business Review*. 18(2), 35-50.
- Narula, R., 2012. Do we need different frameworks to explain infant MNEs from developing countries? *Global Strategy Journal*. 2, 188-204.
- Narula, R., 2014. Using a systems perspective to explain the limits of internationalization by developing country firms: The role of 'members-only' location advantages, In Cuervo-Cazurra, A., Ramamurti, R., (eds.) *Understanding Multinationals from Emerging Markets*. Cambridge University Press, Cambridge.
- Narula, R., Santangelo, G. D., 2009. Location, collocation and R&D alliances in the European ICT industry. *Research Policy*. 38(2), 393-403.
- Narula, R., Santangelo, G. D., 2012. Location and collocation advantages in international innovation, *Multinational Business Review*. 20(1), 6-25.
- Nell, P. C., Ambos, B. (2013): "Parenting Advantage in the MNC: An Embeddedness Perspective on the Value Added by Headquarters". *Strategic Management Journal*. Vol. 34 (9), 1086–1103.
- Nelson, R. R., Winter, S. G., 1982. *An Evolutionary Theory of Economic Change*. Belknap Press/Harvard University Press, Cambridge.
- Nonaka, I., Toyama, R., Konno, N., 2000. SECI, Ba and leadership: A unified model of dynamic knowledge creation. *Long Range Planning*. 33, 5-34.
- Nooteboom, B., 1999. *Interfirm Alliances: Analysis and Design*. Routledge, London.
- Palmié, M., Keupp, M. M., Gassmann, O., 2014. Pull the right levers: Creating internationally 'useful' subsidiary competence by organizational architecture. *Long Range Planning*. in press – paper in this issue

- Perri, A. Andersson, U. Nell. P.C., Santangelo, G.D. (2013) "Balancing the trade-off between learning prospects and spillover risks: MNC subsidiaries' vertical linkage patters in developed countries". *Journal of World Business*, 48 (4): 503–514.
- Rabbiosi, L., 2011. Subsidiary roles and reverse knowledge transfer: An investigation of the effects of coordination mechanisms. *Journal of International Management*. 17, 97-113.
- Rugman, A., Verbeke, A., Yuan, W., 2011. Re-conceptualizing Bartlett and Ghoshal's classification of national subsidiary roles in the multinational enterprise. *Journal of Management Studies*. 48 (2), 253-277.
- Rugman, A.M, (2000). *Multinationals as Flagship Firms*. Oxford: OUP
- Rugman, A.M., Verbeke, A., 2001. Subsidiary-specific advantages in multinational enterprises. *Strategic Management Journal*. 22, 237-250.
- Rugman, A.M., Verbeke, A., 2004. A perspective on regional and global strategies of multinational enterprises," *Journal of International Business Studies*, vol. 35(1), 3-18
- Santangelo, G. D., 2000. Corporate strategic technological partnerships in the European information and communications technology industry. *Research Policy*. 29(9), 1015-1031.
- Santangelo, G.D. (2012) "The tension of information sharing: Effects on subsidiary embeddedness". *International Business Review*, 21(2): 180-195.
- Singh, J., 2008. Distributed R&D, cross-regional knowledge integration and quality of innovative output. *Research Policy*. 37(1), 77-96.
- T.S. Frost, J. Birkinshaw, and P. C. Ensign. 2002 Centers of excellence in multinational corporations. *Strategic Management Journal*, 23(11): 997-1018.
- Tallman S, Jenkins M, Henry N, Pinch S. 2004. Knowledge, Clusters and Competitive Advantage. *Academy of Management Review* 29: 258-271
- Tsai, W., 2002. Social structure of coopetition within a multiunit organization: Coordination, competition and inter-organizational knowledge sharing. *Organization Science*. 13(2), 179-190.
- Tsai, W., Ghoshal, S., 1998. Social capital and value creation: The role of intra-firm networks. *Academy of Management Journal*. 41, 464-476.
- Verbeke, A., 2009. *International Business Strategy. Rethinking the Foundations of Global Corporate Success*. Cambridge University Press, Cambridge, U.K.

Young, S., Tavares, A.T., 2004. Centralization and autonomy: back to the future. *International Business Review*. 13, 215–237.

Zanfei, A., 2000. Transnational firms and the changing organisation of innovative activities. *Cambridge Journal of Economics*. 24(5), 515-542.

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