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**Attracting and embedding R&D by multinational firms: policy  
recommendations for EU new member states**

**Rajneesh Narula**



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Abstract: This paper asks: what can governments of new member states do to encourage MNEs to invest in R&D? There are two types of MNE R&D. Innovation can be undertaken in order to adapt its existing products and services to local stimuli. This is ‘demand-driven R&D’. Innovation can also be in stand-alone R&D facilities which are considerably more knowledge-intensive, and imply a considerably greater dependence on domestic knowledge sources and infrastructure. This is ‘supply-side R&D’. These two types of R&D require somewhat different approaches, and necessarily imply different policy options. In this paper, furthermore, we focus on the MNE and the potential for linkages, and do not limit ourselves to FDI and spillovers. MNEs engage in a variety of other informal and non-equity agreements to engage in knowledge exchange. We also deliberately consider the scope and competence at the MNE subsidiary level. These two novelties are useful in helping highlight the point that the tendency to focus on FDI flows is flawed, since knowledge exchanges and innovation are establishment level phenomena. An MNE policy is required which must link FDI policy and industrial policy in tandem. This paper argues that it is most practical to recommend that new member states focus on attracting and fostering demand-driven R&D activities by MNEs. Furthermore, we recommend that governments reduce the emphasis on costs while increasing the emphasis on specialised location-bound knowledge assets, and setting up programmes that foster *demand-oriented* upgrading of public R&D and human capital.

keywords: R&D, MNEs, EU expansion, human capital, new member states, innovation policies

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## **Attracting and embedding R&D by multinational firms: policy recommendations for EU new member states**

### Introduction

EU integration and expansion is a complex, cooperative socio-economic undertaking. At the most basic level, it requires new waves of members to evolve their political, economic and sociological milieu to converge upon the core member countries. With each new wave of membership, the diversity of members means that multiple groups of countries at different stages exist within the EU which each have different GDP levels, resource endowments, comparative advantages and industrial and economic structures. Such diversity also implies different growth trajectories.

It is also increasingly obvious that continual EU expansion means that it is not possible to have a common set of industrial and technological policies that can be applied across the board to promote growth, or even a single set of targets. In this paper we take the view that it is better instead to view EU countries as consisting of a tangible groups which share certain key features, and which can realistically be the basis for common policy recommendations. We contrast the ‘core EU countries’ with the ‘non-core’ countries, which in turn can be split into 3 groups: The first group can be referred to as the *cohesion countries*, consisting of Spain, Portugal, Greece and Ireland. These countries have been long-standing members of the EU, and have market economies. They are referred to here as the cohesion countries. The NMS can be divided into two sub-groups. The first consist of Czech Republic, Slovakia, Hungary, Slovenia, Estonia and Poland, which have proceeded the furthest from the centrally planned economic structure, and furthest towards convergence. They are referred to here as the *Advanced NMS*. The second sub-group are Bulgaria, Romania, Latvia, and Lithuania which are still somewhat in transition. They are referred to here as the *New NMS*<sup>1</sup>.

This paper will focus on the promotion of innovation activities by MNEs. This requires a somewhat different approach than promoting general value adding activities by MNEs. Two decades ago, MNE operations tended to be miniature replicas of the home country operations with most or all aspects of the value chain being undertaken in each host country. This is now only the case in very few investment projects, reflecting important changes in the global economic milieu associated with increasing interdependencies between countries, industries and

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<sup>1</sup> Malta and Cyprus are excluded from this analysis.

firms. MNEs are progressively distributing their activities across regions and countries to most efficiently exploit the technological capabilities of locations that best suits specific aspects of the activities. MNEs also increasingly fragment their innovative activities in different locations to best exploit specific aspects of particular systems. In certain cases these may be demand oriented – such as the presence of a large market or the availability of generic price-sensitive inputs. These are the centrifugal factors which promote the establishment of production and other value adding activities where MNEs attempt to exploit their existing assets and competences in conjunction with locally sourced inputs. In such cases, innovation activities are a case of **‘R&D in response to demand conditions’** where innovation is undertaken in order to adapt their existing products and services to local stimuli. Such R&D facilities tend to be relatively low knowledge-intensive, and remain somewhat footloose, requiring greater integration with the parent firm than with local knowledge infrastructure. It requires the MNE’s market-seeking FDI activities to integrate forward into R&D We refer to this as **‘demand-driven R&D’**.

In other circumstances MNEs are situated (or seek to establish themselves) in particular locations especially (and in some cases only) to undertake innovation because of specific location-bound assets, which may or may not include quasi-public goods provided through universities and public research institutes. Such innovation activities are stand-alone R&D facilities which are considerably more knowledge-intensive than the demand-driven R&D, and imply a considerably greater dependence on domestic knowledge sources and infrastructure. We refer to this as **‘supply-side R&D’**.

These two types of R&D require somewhat different approaches, and necessarily imply different policy options. Such technology and industrial policies are inextricably linked with the outcomes of FDI policies. The paper proceeds as follows. The first section discusses and develops the innovation systems framework as a basis for understanding the interaction effects between technological capabilities, quasi-public goods by governments. The next section explains the complexities of globalization and extends the innovation systems approach to allow for cross-border influences, relationships and the interlocking nature of FDI, industrial and innovation policies. The last section provides policy suggestions for NMS governments to link FDI and innovation policies.

## **Innovation systems as a basis for analysing policy options**

This paper begins from the premise that all economic actors expand their activities depending upon the strength (or weakness) of their competitive assets. These are not only confined to technological assets in the sense of ownership of plant, equipment and technical knowledge embodied in their engineers and scientists. Economic units of all sizes also possess competitive advantages that derive from (a) the ability (i.e., knowledge) to create efficient internal hierarchies (or internal markets)) within the boundaries of the firm and (b) from being able to efficiently utilise external markets.

Economic actors refer to organisations that are engaged in the regular production of outputs (whether a physical good or a service) for the purposes of meeting a specific or general demand. By economic actors we refer to two groups. The first group are firms – private and public – engaged in innovatory activity. Although they may not always be organised with the primary intention of generating economic rents (as is the case for state-owned firms), ongoing activities are evaluated on the basis of achieving their owner-defined output criteria. The second consists of non-firms that determine the knowledge infrastructure that supplements and supports firm-specific innovation, whose objective may be to make available their outputs as a semi-public good. Economic actors are distinguishable from political and social actors. These political and social actors do not generate innovative outputs per se, but whose actions and activities shape the nature of the activities of the economic actors.

While innovation may take place at a firm-level, Firms exist as part of ‘systems’. They are embedded through historical, social and economic ties to other economic and non-economic actors. Thus, in order to understand innovation (or the lack thereof) from a policy perspective we need to understand the systemic interactions, relationships and routines of organisations of all the complex interactions between a firm and its environment. The environment consists firstly of interactions between firms—especially between a firm and its network of customers and suppliers. Secondly, the environment involves broader factors shaping the behaviour of firms: the social and perhaps cultural context; the institutional and organisational framework; infrastructures; the processes which create and distribute scientific knowledge, and so on.

\*\*\* FIGURE 1 ABOUT HERE\*\*\*

Figure 1 gives a stylised version of a ‘conventional’ *national* innovation system. By ‘conventional’ we refer to an SI that is typical of non-socialist, market economies, and

essentially represent the EU core countries. An SI approach essentially allows us to map the complex interactions between a firm and its environment. The environment consists, firstly, of interactions between firms—especially between a firm and its network of customers and suppliers. Secondly, the environment involves broader factors shaping the behaviour of firms: the social, political and cultural context; the institutional and organisational framework; infrastructures; the processes which create and distribute scientific knowledge, and so on.

In addition to the firm and non-firm sectors – which account for the majority of innovative activities, knowledge, creation, dissemination, acquisition and utilisation are shaped by the actions (or inactions) of governments. We use the concept of government in this section rather generically, but take it to include policy initiatives, motivated internally (at the country level) and externally (at the supra-national level).

The interactions between the various actors within a system are governed by institutions. Institutions are taken here to be of two types, informal and formal, and are generally understood as ‘sets of common habits, routines, established practises, rules, or laws that regulate the interaction between individuals and groups’ (Edquist and Johnson 1997). We take formal institutions to include the appropriate intellectual property rights regime, competition policy, the creation of technical standards, taxation, the establishment of incentives and subsidies for innovation, the funding of education, etc. Formal institutions are generally politically defined and legally binding rules, regulations and organisations. Indeed, the political and economic spheres are rarely independent, and this is all the more so where a high degree of central planning was undertaken, whether in developing countries that had implemented import substitution programmes, or in the former centrally planned economies. In general, the policy environment in which economic actors function has a high degree of interdependency between the economic and political spheres.

To modify and develop informal institutions is a complex and slow process, particularly since they cannot be created simply by government fiat. It takes considerable effort to create informal networks of government agencies, suppliers, politicians, researchers, and once created, they have a low marginal cost of maintaining. For an outsider, the high costs of becoming familiar with, and integrating into, a new system may be prohibitive (Narula 2003). For an insider, however, such membership comes with privileges which provide opportunities for rent generation. Indeed, more recent work on informal institutions – which are notoriously difficult



to quantify – point to the absence or inefficiency of institutions as a primary force inhibiting economic development (e.g., Rodrik 1999; Rodrik, et. al., 2004, Asiedu, 2006).

\*\*\* FIGURE 2 ABOUT HERE\*\*\*

The former centrally planned economies among the NMS had much more national and closed economic systems, and a fundamentally different structure. Figure 2 shows the stylised version of pre-transition SI model. Prior to economic reforms, transition economies had a largely domestic innovation system where knowledge sources were determined primarily by domestic elements (Radosevic 1999, 2003). The technological development trajectory had been planned centrally in response to state-defined priorities. Likewise, domestic governmental organisations formulated domestic industrial policy, which in turn determined domestic industrial structure. National non-firm actors also defined the kinds of skills that the local labour force might possess; the kinds of technologies that these actors had appropriate expertise in; the kinds of technologies in which basic and applied research was conducted, and thereby, the industrial specialisation and competitive advantages of the firm sector. FDI was non-existent in those countries prior the transition era and any linkages to international sources were sporadic and state controlled.

One of the primary conditions for EU membership was that economic systems of candidate countries needed to demonstrate a convergence towards the EU norm, and this has necessarily meant that NMS from the former centrally planned economies needed to demonstrate significant and tangible transition towards a more market based approach.

Although some countries from the NMS responded successfully to radical changes in their industrial structure, the response of others has been less successful, and this broadly reflects the division between ‘advanced NMS’ and ‘new NMS’. The primary difference between these two groups essentially reflected in a fundamentally different policy stance, where some countries maintained the basic principle of domestic firm-led industrialisation, while others moved to a MNE-led development strategy (Radosevic, 2006). Largely speaking the latter group modified their institutions and attempted to redesign their SIs around the ‘conventional’ market economy model, with varying degrees of success (Radosevic, 2006). This often reflected the extent to which there was a political imperative and a popular sentiment to distance themselves from the pre-transition dependence on the Soviet Union and realign their economies with the European Union. In other words, the ability of different economies to transition reflected the strength of

the existing institutional arrangements and the political will to implement reforms (Newman 2000).

There are two levels of government at work in every individual EU economy – formal institutions established by the national government, and those promulgated by EU law, and implemented through the European Commission. Bruzst and McDermott (2008) argue that the supranational institution-building required through EU efforts impinges greatly on national institution restructuring in post-communist states. It alters the supply side by making resources available to states to overcome interests groups and other entrenched actors' inertia to change, while at the same time affecting demand for institutional change by empowering actors to participate in institutional building through the creation of linkages among domestic and foreign actors. For instance, structural and cohesion funds in many instances are greater in terms of capital investment than the equivalent funds available from individual nation states of the NMS. EU-wide regulatory and competition policy, social and economic treaties and the like are binding and over-ride national law. As we shall discuss in a later section, while this provides certain location advantages relative to non-member states, it also constrains policy options available to member states.

It is equally important to emphasise that the significance of non-domestic knowledge sources would also have changed quite dramatically, and this is not entirely because of the growing significance of MNE affiliates, or indeed FDI. Foreign knowledge sources and associated interdependencies with domestic actors take many forms, and the next section will discuss these in greater detail.

### **The role of foreign knowledge in an innovation system SI model**

The sources of knowledge available in a typical 'national' system are a complex blend of domestic and foreign ones, as illustrated in a simplified (and stylised) framework depicted in Figure 3. Learning processes are not just limited to intra-national interaction, but increasingly include international interaction. The pervasive role of MNEs in a globalising world, and their ability to utilise technological resources located elsewhere makes the use of a purely national systems of innovation approach rather limiting.

\*\*\* FIGURE 3 ABOUT HERE\*\*\*

In a domestic innovation system (such as in the case of the pre-transition CEE NMS), the path of technological development is determined primarily by domestic elements. The technological development trajectory is now driven largely by the changing demand of local customers, although in the pre-transition phase, this was driven by government-set targets. Likewise, domestic governmental organisations determine domestic industrial policy, which in turn determines domestic industrial structure. National non-firm sources of knowledge and national universities also determine the kinds of skills that engineers and scientists possess, and the kinds of technologies that these individuals have appropriate expertise in, the kinds of technologies in which basic and applied research is conducted in, and thereby the industrial specialisation and competitive advantages of the firm sector. However, two decades after the transition process began, few – if any- such domestic systems still exist. Although this is not yet true in the NMS, in much of the core and cohesion countries MNE subsidiaries are sometimes so well embedded that they are regarded as part of the domestic environment. Nonetheless, the interaction between the domestic firm sector and foreign -owned firm sector varies considerably, either because the domestic sector is largely in different sectors, or because the two have evolved separately. In the transition economies of NMS, FDI in the centrally planned era was non-existent, and thus, the presence of foreign MNEs was a new phenomenon in the early post-transition years. Local actors in many instances were reluctant to integrate MNEs into the system (Damijan, et.al., 2003; Sinani and Meyer, 2004; Javorcik and Spatareanu, 2008).

Universities and research institutes collaborate – both as organisations and as individual research groups – with other universities and research institutes in other countries<sup>2</sup>. The framework programmes of the European commission have played an important role in facilitating cross-border collaboration between economic actors within the EU (Narula 1999, 2003), and this extends further to collaborations between public research organisations and firms (Arundel and Geuna 2004, Fontana et al 2006).

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<sup>2</sup> A recent study (Thelwall and Zuccala 2008) shows that EU cooperation amongst universities still displays considerable divergence. The core EU countries continue to dominate inter-university EU collaboration, particularly the UK and Germany. The new EU countries are not yet integrated into the EU network, but some show strong regional links.

Figure 3 also includes a number of actors and arenas which are not directly associated with knowledge creation, but are nonetheless crucial in determining the efficiency with which knowledge is created, diffused and utilised in an innovation system. Perhaps most significantly for the purposes of this paper is the blend of EU level organisations, and national governments. EU law supersedes national regulatory frameworks. Among other things, competition policy and other forms of regulation are determined at the EU level. Likewise, prior to their EU membership countries have to accept the *acquis communautaire*, such that discrimination between domestic and foreign firms is no longer possible. Thus, this constrains and predetermines the use of EU and domestic funds. At a global level, supranational institutional level, countries are constrained by international treaties which either the EU or the individual country has acquiesced to. This includes WTO agreements such as TRIPS, TRIMS that also shape policy tools available to countries.

It is not the intention of this paper to analyse the broader implications of globalisation on knowledge systems in the EU. Our focus remains on the role of the MNE in innovation systems, and the next section discusses this in greater detail.

### **To what extent does MNE activity benefit national systems?**

Much of the literature focuses on the subject of FDI and knowledge spillovers, for the purposes of this paper we take a broader perspective – that of the MNE and the **linkages** it creates. This allows us to account for a variety of other forms of interdependencies between and amongst firms, regions, countries and industries.

\*\*\* FIGURE 4 ABOUT HERE\*\*\*

Linkages may be domestic (and thereby knowledge flows between the affiliate and other actors in the domestic economy) or they may be linkages between foreign sources of knowledge and domestic actors. We discuss this concept with the aid of Figure 4, which shows using a two-country scenario and is based around a joint venture between an MNE and a domestic firm. If we rely on foreign *direct* investment (instead of the MNE) as the unit of analysis, we limit the discussion of linkages potential spillovers to the organisations linked with the block arrows, as these involve equity relationships. However, For instance, technology may be licensed or purchased by the MNE affiliate from unaffiliated public research organisations either abroad or

based locally. Indeed, a recent report indicates that the most innovative Bulgarian companies are primarily interested in selling their innovations to foreign firms, rather than using these innovations themselves (Innovation.bg Report 2006). A second set of linkages are active two-way collaborations (indicated in figure 4 by the dashed lines) which may involve a large array of actors, both domestic and foreign. Such agreements represent a higher level of knowledge exchange, and may be undertaken with a variety of partners. In general, these non-equity linkages present considerable potential to increase knowledge flows and the potential technological competitiveness of domestic firms, as it creates important new sources of demand for commercially driven economic units engaged in R&D.

The nature of the affiliate and the nature of their role within the MNE's global portfolio of affiliates plays a significant role as well. Some affiliates may be passive in the sense that they may receive ready-made innovations from their parent firms. Thus, they do not establish these other types of linkages that enhance the indigenous innovation milieu. In other words, at one extreme, the affiliate may be operating in an enclave, utilising foreign suppliers and foreign collaborators that have been pre-specified by their parent firm.

\*\*\* FIGURE 5 ABOUT HERE \*\*\*

The quality of the knowledge spillovers that derive from an investment are associated with the scope and competence level of the subsidiary, and these are co-determined by a variety of factors (see figure 5). These include MNE internal factors such as their internationalization strategy, the role of the new location in their global portfolio of subsidiaries, and the motivation of their investment, in addition to the available location-specific resources which can be used for that purpose (Benito et al 2003). High competence levels require complementary assets that are non-generic in nature and are often associated with agglomeration effects, clusters, and the presence of highly specialized skills. In other words, firms are constrained in their choice of location of high competence subsidiaries by local resource availability. For instance, R&D activities tend to be concentrated in few locations, because the appropriate specialized resources are associated with only few locations. The embeddedness of firms is often a function of the duration of the MNEs' presence, since firms tend to build incrementally. MNEs most often rely on location advantages *that already exist* in the host economy, and deepening of embeddedness occurs generally in response to improvements of the domestic technological capacity. However, while the scope of activities undertaken by a subsidiary can be modified more or less instantly,

developing competence levels takes time. MNE investments in high value-added activities (often associated with high competence levels) have the tendency to be 'sticky'. Firms demonstrate greater inertia when it comes to relocating R&D activities. This reflects the high costs and considerable time required to develop linkages with the innovation system (Narula 2002).

Increasingly firms are engaged in rationalising their activities globally, so as to maximise the link with specific value adding activities and locations which have specific competitive and comparative advantages. This has led to a tendency amongst MNEs to 'break-up' their value chains and locate specific aspects in particular locations for purposes of maximum efficiency. As such, few locations host all parts of the value chain of one product for any given MNE, leading to an agglomeration of specific types of activities in particular locations. Prior to economic liberalization and EU integration, MNEs responded to investment opportunities primarily by establishing truncated miniature replicas of their facilities at home, although the extent to which they are truncated varied considerably between countries. The extent of truncation was determined by a number of factors, but by far the most important determinant of truncation - and thereby the scope of activities and competence level of the subsidiary - were associated with market size, capacity and capability of domestic industry (Dunning and Narula 2004).

\*\*\* FIGURE 6\*\*\*

One of the results of globalisation and the subsequent spatial redistribution of their value chains has been that many countries have seen a downgrading of their subsidiaries in terms of scope and competence, moving towards sales and marketing operations, although some – rather few – locations have seen a reduction in the scope, but an increase in the competence levels towards R&D units. Only very few have seen a shift towards strategic centres, or indeed maintained a multi-activity unit.

As firms have used global production networks, this has by and large been to the benefit of the MNE, while most host countries with generic location advantages have seen a shift in scale, scope and competence. The competition for such activities between locations is considerable, and few locations provide the specialised and well-developed innovation systems that are needed. The benefit from subsidiaries varies considerably. A sales office or an assembly unit may have a high turnover, employ a large staff, but the technological spillovers will be relatively fewer than a manufacturing facility. Countries that are at an early stage of transition (and furthest away from convergence with the EU norm), with a very limited domestic sector and

a poorly defined innovation system are often host to single-activity subsidiaries, primarily in sales and marketing, as well as natural resource extraction. The most advanced economies with domestic technological capacity (such as the core EU members) have hosted the least truncated subsidiaries, often with R&D departments (see Majcen et al 2006 for a more in-depth discussion).

Few MNEs still utilise miniature replicas when engaging in Greenfield investments. Rationalisation of activities within the single market has, in many cases, led to a downgrading of activities from truncated replica to single activity affiliates. MNEs have taken advantage of the EU single market to rationalize production capacity in fewer locations to exploit economies of scale at the plant level, especially where local consumption patterns are not radically different to justify local capacity and where transportation costs are not prohibitive. This has meant that some miniature replicas have been downgraded to sales and marketing affiliates, which can be expected to have fewer opportunities for spillovers.

To what extent the NMS will be able to benefit from an increase in the quality of MNE activity is still unclear. Although there will be some investment in new affiliates resulting in new (greenfield) subsidiaries that did not exist previously, there will also be a downgrading of subsidiaries (as discussed above). MNEs may divest their operations in response to better location advantages elsewhere in the EU (as Spain and Portugal are experiencing as their low cost advantages are eroded), or reduce the intensity of operations by lowering the level of competence and/or scope of their subsidiary, and shifting from truncated replicas to single activity affiliates. There may also be a redistribution effect. That is, sectors that were dominated by domestic capital are transferred to foreign ownership, particularly where domestic capitalists have failed to improve their competitive advantages to compete effectively with foreign firms. Indeed, in many of the NMS, *the share of foreign ownership in total capital stock is already typically much higher than in older EU member states*, although with considerable variation across sectors (Narula and Bellak 2009). Garmel et al. (2008) predict that three-quarters of capital in the NMS will ultimately be acquired by investors from the core member states in the long run. In general, government incentives and subsidies are rarely pivotal in determining the scope and competence of MNEs (which normally imply greater potential for greater technological spillovers). We want to emphasise that from a growth and learning perspective, externalities only matter if they can be captured by other economic actors in the host economy.

For externalities to be optimally utilised there needs to be an appropriate match between the nature of potential externalities and the absorptive capacities of domestic firms.

### **MNEs and new member states: linking MNE policies to innovation policies**

One must exercise caution in proposing policy recommendations to new member states as a general group, since there is considerable diversity in their economic structure. There are also path dependencies which reflect each individual member country's socio-political and economic histories. In particular, member states that have transitioned from socialist, non-market systems demonstrate significant artefacts of the pre-transition era in their innovation systems, although this again varies considerably between countries. For similar reasons, the role of MNEs and other international economic actors can also be fundamentally different. On a more positive note, the criterion for EU membership has required convergence of economic and political institutions. The transition process has thus broadly resulted in some convergence in policies and trajectories of economic and structural change. Likewise, policies towards MNEs have also broadly speaking converged for the new member states. However, the level of institutional convergence varies considerably, with Czech Republic arguably the closest to the EU core levels, and Bulgaria and Romania the furthest away. The considerable levels of systemic inertia in some states has meant that insufficient effort has been made to embed them. Where MNEs have been embedded, they have done so as 'domestic production substitution', replacing previous state-owned firms in the industrial milieu of the host country through M&A of a former state-owned firm. In some cases the domestic linkages of the acquired firms have been maintained; but in most cases, a considerable percentage of these linkages have been substituted with those of the parent MNEs global network of affiliates and partners.

Thus, the tendency in most cases has been to focus on FDI flows, but not the after-care or embedding aspect necessary for FDI-assisted development. While some countries – such as Hungary, Czech Republic, Slovakia and Romania have tended to consider FDI policies in tandem with industrial policy, others have focused on the two separately, or at best have made a loose connection between MNE activity and industrial restructuring and growth. Few countries – even among the core EU economies – have seen the necessity of a three way link between



MNE policies, industrial policies and innovation policies. In our view, the three are inextricably linked.

It is important to emphasise here the difference between advanced NMS and ‘New NMS’ countries, although in terms of attracting foreign investment in R&D, it seems clear that neither group of countries are likely to attract significant supply-side R&D. Few of these countries have developed their science and technology infrastructure to the level that they possess an absolute advantage in basic research for which MNEs will in rare circumstances seek to locate a stand-alone, specialised affiliate R&D facility. Where this might occur in the advanced NMS, of which there is some activity in the Czech Republic and Hungary (OECD 2008). Indeed, there are only a few locations within the EU which have the appropriate science and technology infrastructure to achieve this. *It is therefore most practical here to recommend that NMS focus on attracting and fostering demand-driven R&D activities by MNEs.* These recommendations, therefore, do not differ greatly from those applicable to the embedding of FDI in general. As with all MNE-embedding policies, the focus must at all times be centred on the deepening of existing MNE value adding activities, and the promotion of sequential investments that pull the MNE’s activities such that they are simultaneously deeply integrated with the MNE global structure and deeply embedded within the domestic innovation system. In other words, the goal remains to increase the strategic importance of the MNE’s domestic affiliate to the MNE headquarters, such that sequential investments are increasingly knowledge intensive. Referring back to figure 6, the goal is to move subsidiaries from single-activity units and miniature replicas (quadrants A and B) towards quadrant C and D. This is no easy task.

**Reduce the emphasis on cost advantages.** There is a tendency for many countries to measure their potential attractiveness to MNEs based on their basic infrastructure and relatively low cost labour. But these kinds of location advantages are generic, in the sense that they are widely available. Furthermore, MNEs do not locate their innovative activities based on cheap factor inputs, and where they do so, it tends to be of the sort that is footloose, such as clinical trials for pharmaceuticals (e.g., Kalotay and Fillipov 2008) In addition, the last two decades of increasing liberalization, falling transportation and communication costs and investment in knowledge-based activities in East Asia (by both domestic firms and MNEs) has meant that the basic infrastructure and low wages are not a magnet for investment. It is axiomatic that as industrial

development takes place, the comparative advantage of these countries needs to shift away from low value adding activities to higher value adding activities, which are necessarily science-based, and the infrastructure (which forms an important quasi-public good) which is necessary to achieve this has not always been made available.

**Increase emphasis on specialised location-specific assets.** It is only in those sectors where ‘specialized’ location advantages associated with higher value adding exist can host countries benefit significantly from MNE activity in the long run. This requires a considerable amount of government interaction and investment into tangible and intangible infrastructure. As countries reach a threshold level of technological capabilities, governments need to provide more active support through macro-organizational policies. This implies developing and fostering specific industries and technological trajectories, such that the location advantages they offer are less ‘generic’ and more specific, highly immobile and such that they encourage mobile investments to be locked into these assets. Many of the NMS have the basis for creating such science based location advantages. For instance, Poland has strengths in certain natural and life sciences, as does Hungary in electro-mechanical sectors. Of course, adapting to such challenges is not costless from four points of view. First, countries need considerable resources to invest in such vertical industrial policy actions. Many industrial policies to foster new sectors have failed because investment is often limited to building up only one part of the innovation system. For instance, Norway’s biotechnology initiative did not eventually maintain the initial momentum to encourage domestic and foreign firms to undertake R&D (which initially resulted in more than 50 new biotech companies within 2 years in the Oslo area alone), since they failed to invest in PhD programmes in universities in the natural sciences. Second, introducing targeted programmes requires considerable political will and discipline, not just because picking one sector or industry requires others to be given less priority, but also because other industries will necessarily need to be ‘wound down’. Third, fostering new sectors requires major institutional change. Such radical systemic change requires resources and an effective period of transition given the inertia associated with informal institutions. Fourth, developing a new sector needs to be undertaken in a 10-15 year time frame.

**Creating clusters around MNEs** One of the challenges in creating embeddedness is associated with matching the industrial structure and comparative advantage of the region with the kinds of

FDI that are being attracted. As highlighted in the previous section, benefits from FDI are maximised when the kinds of investment projects being attracted are matched with the potential clusters of domestic competitiveness into which the MNEs may be able to tap into.

In many locations, including the US, and elsewhere in the EU, large projects are attracted with the intention of acting as a 'seed', such that a cluster can be built around them. Large incentives and subsidies are provided with the intention that not only will other foreign investors come to the same region, but there will be substantial linkages and growth of the domestic sector. The Toyota investment in St Petersburg is a case where sequential investments by additional investments have occurred because other Japanese firms followed in Toyota's wake, but little or no attention was paid to the knock-on effects due to growth opportunities for domestic suppliers. Indeed, car firms operate in the same area, either jointly or independently. The St Petersburg-Leningrad Oblast area has other large automotive sector firms and therefore considerable opportunities to link the skills and capabilities available – for instance - in the Kirov tractor and tank facility, but these opportunities were ignored. Policy makers focused entirely on the capital flows and employment, rather than on linkages. Chobanova (2009) notes a similar passive approach in encouraging embeddedness of FDI in Bulgaria, and Romania, in contrast with the Czech Republic and Hungary.

This can be contrasted with the success of Costa Rica in attracting a huge investment by the US MNE, Intel, but taken in the first instance to be the basis for building a sizable domestic industry of both foreign and domestic firms. The subsidies and incentives given to Intel were based more on the provision of a skilled and capable work force rather than sheer incentives (see Mortimore and Vergara 2006). Intel's decision to invest in Costa Rica in the mid 1990s had a huge impact on the Costa Rican economy, and represented the consolidation of the national strategy to diversify out of apparel and natural resources toward electronics. Furthermore, Intel's investment produced a ripple effect throughout the economy in terms of related activities, such as software. Costa Rica chose to design and implement a new development strategy based on attracting FDI to upgrade into more technologically-sophisticated activities. A considerable amount of success was achieved in electronics, medical devices and logistics by way of selective interventions using innovative FDI promotion techniques. These were related to improving domestic capabilities to attract FDI, implementing an active and targeted FDI policy reflecting national developmental priorities, identifying the MNEs to be targeted and negotiating firm-level

packages, and designing and implementing industrial policies to deal with some of the problems which arise from the MNE activities, especially weak technology transfer and assimilation and limited productive linkages. Costa Rica stands out as an example of what can be achieved by coupling the correct policy framework --one that reflects the priorities of the national development strategy-- to a leader MNE's global expansion strategy. The case of Intel in Costa Rica thus demonstrates how national policy goals and corporate strategy objectives can coincide, and the use of national policy to further industrialize by attracting the right kind of TNC activities in the right conditions (Mortimore and Vergara 2006, Mytelka and Barclay 2006).

Attracting FDI with subsidies, but without attempting to maximise the linkages to the domestic economy often leads to a net negative sum game. The US state of Alabama gave \$253 million in subsidies and incentives to Daimler Benz in 1993, and it is only recently that it was judged that the benefits to the economy justified the expense. The NMS cannot afford to play the incentives and subsidies game without considering very carefully what the potential spillovers and linkages will be, and how these can be converted to actual benefits.

A number of NMS – Czech Republic and Hungary in particular - attempted to encourage MNE embeddedness prior to accession by using broad policy measures: high tariffs and customs duties, rule of origin, local content, etc. However, upon accession, many MNEs – even in low-technology area such as Food and Beverages – relocated activities, when such policy tools became redundant (Chobanova 2009). In other words, MNEs – when left to their own devices, and unrestricted by distortions in markets introduced by regulation, preferred to see economies of scale and scope in their existing activities within the core EU countries despite the low cost advantages the NMS offered (Chobanova 2009). Such import-substitution type policies were therefore only a short-term (and short-sighted) strategy, as EU and WTO law requires MNEs to receive national treatment.

**'Help' MNEs create linkages** It is fashionable amongst policy makers and consultants to suggest that attracting MNE affiliates associated with global production chains is an important goal. Unfortunately, this is a fallacy, since such affiliates are rarely embedded in the local economy, but deeply embedded into the MNE. It is generally the case that the most embedded affiliates tend to be those that have a higher degree of autonomy within the MNE structure, and

are able to make local decisions about the nature and extent of their domestic linkages (Castellani and Zanfei 2006). Affiliates that are responsive to, and dependent upon, the parent MNE to make their decision are less embedded, partly because headquarters has incomplete information on local options, and rarely has a vested interest in developing new suppliers. In rare cases, a subsidiary may be deeply embedded in the local milieu as well as deeply integrated into the MNE network, but this implies the case of an acquisition of a domestic competitor with a historical local embeddedness (so that the MNE acquires the ready-made linkages as part of the merger) As Narula and Marin (2004) show for the case of Argentina, MNEs acquired the most technologically competitive of their domestic rivals during the structural adjustment programme. It may also imply a very strategically important subsidiary, often also a result of a long-term and sustained investment. In both cases, such dual integration – while highly desirable by governments – is rarely achieved in most investments. Indeed, as Chobanova (2009) shows that even for the Food and Beverage industry where skills and knowledge content is fairly low, the NMS were unable to sustain domestic production by MNEs even where they acquired existing firms with proven and fairly well-developed supply chains. Creating local suppliers to MNE networks is not something that happens overnight, and their efficiency is not something that is to be measured solely in terms of cost, but in terms of reliability and flexibility, and these measures should be evaluated relative to global rather than EU levels. MNEs cannot sustain higher production costs due to poor quality, unless cheaper and more reliable local suppliers emerge. The competitiveness of local suppliers need to be gauged on a EU-wide, rather than local scale. The Czech Republic and Hungary, invested considerably in creating linkages between MNEs and domestic firms in the food industry, as well as in upgrading their innovation systems. Nonetheless, the competition with other locations in the EU was too strong for them to survive after accession (Chobanova 2009).

As MNE increasingly seek to rationalize their activities (as is the case with industries that operate global production networks), decisions about local linkages are not always made at the subsidiary level, but at the headquarters level, by comparing the various options available to the MNE globally. Thus governments need to create incentives for the MNE to consider local partners, and not expect these to happen ‘naturally’. Since EU member states cannot discriminate by nationality of ownership, in the circumstances where domestic firms are not present, linkages between foreign affiliates and other foreign firms (but located and engaged in economic activity

in the same host location) may represent the sole available mode of industrial upgrading and capability development in the NMS. Thus policies to upgrade reliability and quality in existing domestic firms are important. In most transition countries there are often existing firms which, while in the appropriate industry, do not currently meet the quality and reliability requirements of the MNE. This is often associated with poor management, and agencies such as Enterprise Ireland offer a comprehensive range of services to assist clients to develop their business strategy, enhance their skills and [http://www.enterprise-ireland.com/Grow/Competitiveness/Build\\_new\\_skills.htm](http://www.enterprise-ireland.com/Grow/Competitiveness/Build_new_skills.htm) reduce costs<sup>3</sup>. This service is provided under strict guidelines, and is normally based on a cost-sharing approach. It also tends to provide funding only for feasibility studies, market research, mentor network service, trade fair participation and training support. In order to be eligible firms must be a manufacturing or internationally traded services SME employing 10-249 people.

MNEs seek well-established *existing* location advantages, and the initial scale of entry will tend to be small both in size and scope, with competence levels that match the *existing* capacity of the innovation system. This, as we have discussed is often modest compared to other core EU economies. MNEs also tend to display a strong inertia towards maintaining their R&D activities in a few locations, and this means that the benefits of setting up a new research facility must demonstrate substantial advantages that offset the costs of ‘exit’ from another location. MNEs that arrive in a new location also have entry costs in terms of becoming familiar with new institutions, in order to become ‘club members’ of the ‘innovation system, and this represents a substantial cost for firms. Programmes like the EU’s Twinning programme are also in existence for individual countries, where new entrants are ‘introduced’ to potential partners. For instance, Czechinvest maintains a database of competences and potential suppliers, and introduces potential suppliers to the foreign investor as part of the attraction and aftercare service they provide. The Czech Supplier Development Programme has been run by CzechInvest since 1999. The objective is to intensify and strengthen contacts between domestic suppliers and multinational manufacturers already operating in the Czech Republic or planning to invest here. The main goal of the programme is to increase the competitiveness of Czech suppliers so that

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<sup>3</sup> See Enterprise Ireland website; <http://www.enterprise-ireland.com/Grow/>

they may become partners for multinational companies, and also to help multinational manufacturers find new partners from the ranks of Czech suppliers<sup>4</sup>.

There is an important ‘catch-22’ association in the implementation of industrial and innovation policy. MNEs establish and expand affiliates based on existing opportunities to link up with the innovation system. However, countries sometimes rely on MNEs to reinvigorate their innovation system and boost growth through establishing linkages. MNE activity *per se* does not provide growth opportunities unless a domestic industrial sector exists which has the necessary technological capacity to profit from the externalities from MNE activity. Yet, as there are only very few viable domestic firms left in some industries in these countries, this possibility of growth may be limited.

**Improve opportunities for start-up and SMEs.** Many EU member states (this applies to the EU core members as well) have poorly developed policies for SMEs and start-ups, with a focus on large firms. More than 70% of R&D in the Netherlands, Finland, the United Kingdom, Italy, Sweden, Germany, and France, is done by large firms (OECD 2008). This applies equally to MNEs – the focus is often on larger MNEs, rather than on smaller MNEs. However, smaller MNEs have the advantage of not possessing a large intra-MNE network, and are more likely to embed locally.

In new industries especially, no dominant large firms may exist, and the emphasis must be on establishing start-ups. LIUP in Singapore runs a Startup Enterprise Development Scheme (SEEDS). Start-ups can apply for SEEDS equity financing when they are in their early stages. Every dollar raised by a start-up from third-party investors is matched up to a maximum<sup>5</sup>. In high-tech (and therefore more risky) sectors, Singapore’s enterprise Development Board also provides risk sharing in technology-based ventures with investors via the Enterprise Investment Incentive (Technopreneur) Scheme<sup>6</sup>. This scheme gives qualifying firms loss insurance for their investments, and is not limited only to domestic firms, although all firms need to be incorporated in Singapore. In addition, Singapore encourages inventors to patent inventions and

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<sup>4</sup> Czechinvest maintains a database with over 2000 Czech manufacturers/potential suppliers registered.. <http://www.czechinvest.org/en/czech-suppliers>

<sup>5</sup> [http://www.edb.gov.sg/edb/sg/en\\_uk/index/our\\_services/startups/financing/startup\\_enterprise.html](http://www.edb.gov.sg/edb/sg/en_uk/index/our_services/startups/financing/startup_enterprise.html)

<sup>6</sup> [http://www.edb.gov.sg/edb/sg/en\\_uk/index/our\\_services/startups/financing/enterprise\\_investment.html](http://www.edb.gov.sg/edb/sg/en_uk/index/our_services/startups/financing/enterprise_investment.html)

commercialise their inventions. This scheme helps cover some of the costs of filing patent applications, such as professional and official fees and other related charges of patent filing.

**Improving human resources capabilities in line with demand.** The human resource capabilities are important at two levels. On the first level the emphasis is on human resource capabilities generic to the innovation system. Although traditionally this has implied university level graduates, this is not always the case. Innovation requires a broad range of qualifications, including technicians and skilled workers. It is important that tertiary education institutions focus on all of these different levels, and that programmes developed in the appropriate industries and specialisations for which demand exists, as well as in generic subjects and areas. In Singapore, the Ministry of Trade and Industry, the Economic Development Board and the Council for Professional and Technical Education work closely together to monitor future skills needs, drawing on inputs from foreign and local investors as well as from education and training institutions. This information is matched against national policy objectives and used to build targets for various components of universities, polytechnics, schools and the Institute for Technical Education (UNCTAD 2005). These types of skills more generally meet the needs of the economy, and also include building up educational skills of teachers, trainers and university lecturers, in addition to those needed to run basic infrastructure projects such as electrical power generation, construction, and the like. In addition, business infrastructure education is necessary, and investments in developing more generic skills such as accounting, actuarial sciences, etc, are needed.

There are specific skills needed by particular domestic and foreign firms. Universities and polytechnics can be encouraged to work with specific MNEs to provide specific training in two ways. First, there are specific on-the-job training programmes to develop skills in particular areas for existing employees. These require careful collaboration between firms and tertiary institutions. A number of FDI subsidies are normally tied in to the foreign investor providing some level of specialised training to potential employees which are co-financed by the government. This is done through two means. First, by providing a training subsidy per employee to each company (for instance, 35% of training costs up to a maximum limit of \$500 for up to 100 employees per year for specialist training, 20% for general training). Specialist training refers to training which cannot easily be used by employees if they change jobs, because



of its specific nature to the MNE. This results in an increase in productivity for the MNE, and at the same time raises the overall quality of human capital in the country.

MNEs sometimes seek specialist training programmes in institutions of higher learning to promote the proper training of potential employees, but this is largely the initiative of the firms in question, and is a model that is only viable for large MNEs which have special needs, and can afford to do so (Chobanova 2009). There are several cases where MNEs have financed special courses (particularly in management) for their staff at local universities, but these are again sporadic and at the expense of the MNE.

In many countries, the government requires that every firm provides a certain number of internships in technical positions as part of the educational curriculum of technical schools. This raises the quality of the educational institutions, and at the same time acting as a mechanism for the firm to identify young potential employees. Such schemes currently exist, and are entirely dependent on the goodwill of foreign affiliates. In other countries, this is formally integrated through organisation such as South Carolina's (US) CATT which provides a link between employers and technical institutions. The Center for Accelerated Technology Training (CATT) is a programme subsidised by the US state of South Carolina, and helps investors to find appropriately qualified workers, and also provides some level of specific skills-training for blue-collar employees. It focuses on the training needs of new and existing business and industry in South Carolina. CATT's services are provided through state tax dollars at minimal or no cost to the qualifying client. CATT specializes in custom-designed, short- and long-term, company-specific training for industries seeking to locate or expand in South Carolina. CATT provides recruiting, assessment, training development, and management and implementation services to customers who are creating new jobs with competitive wages and benefits. These services are provided through state funds at minimal or no cost and training is developed to meet specific requirements of each customer. Training may be delivered through pre-employment or on the job activities dependent on the time frames and individual needs of the customer<sup>7</sup>.

**Building Research Capacities in the Public Sector.** There are two aspects to building research capacity in the public sector. First, there are investments in supply-side R&D generation. This includes investments in long-term research projects in specific areas – as is the case with national

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<sup>7</sup> Source: <http://www.cattsc.com/>

laboratories, academy of sciences, etc. These generate outputs such as academic publications, patents, etc, which acts as an important source of knowledge inputs for larger research establishments by MNEs and domestic firms. Public research institutes are also necessary to provide technical services for testing and as a consultancy service to firms as part of the infrastructure for metrology, standards, testing and quality control.

Second, there are demand-driven public institutes which actively work in particular sectors whose primary purpose is to develop specific innovations to meet the need of a sector or group of firms, and are a quasi-public good. The institute sector in Norway consists of approximately 15 technological research institutes and 30 social research institutes, and reflects the various stages of Norwegian industrial policy over the post world war II years. They can be classified into 4 main groups. First, there are the ‘collective’ industry-specific research institutes. These are based around particular sectoral interests. For instance, the pulp and paper industry sponsors the pulp and paper institute. Second, there are the ‘modernisation’ institutes which were established as a part of the policy strategy to upgrade and develop particular industries which were deemed as essential to create a modern industrial sector, beginning in the 1950s. The third group are the regional institutes which are linked to local university-level colleges with the intention of developing and supporting local industry in the various regions of Norway, and linking them to the regional tertiary level colleges. The fourth group of institutes evolved in response to new targeted industries (in particular petroleum, and later electronics), but over time have evolved and merged, and are now merged into one organisation- SINTEF. The SINTEF group has evolved to what is arguably one of the largest R&D laboratories in Northern Europe, with almost 2000 employees. It is by far the largest R&D performer in Norway. It undertakes roughly 60% of the R&D outsourced by Norwegian industry. SINTEF is organised 8 research areas, and also controls 4 stock research companies. The primary rationale for the very strong, centralised (and concentrated) nature of the institute sector in Norway has been to create economies of scale and scope in research.

**Policy tools to promote R&D** policy options such as the use of intellectual property rights policies and competition policies available to other countries outside the EU are not available to NMS, and as such we will not discuss them. Other options, such as R&D tax credits lead to greater innovation activities by firms that already engage in R&D activities. They do not

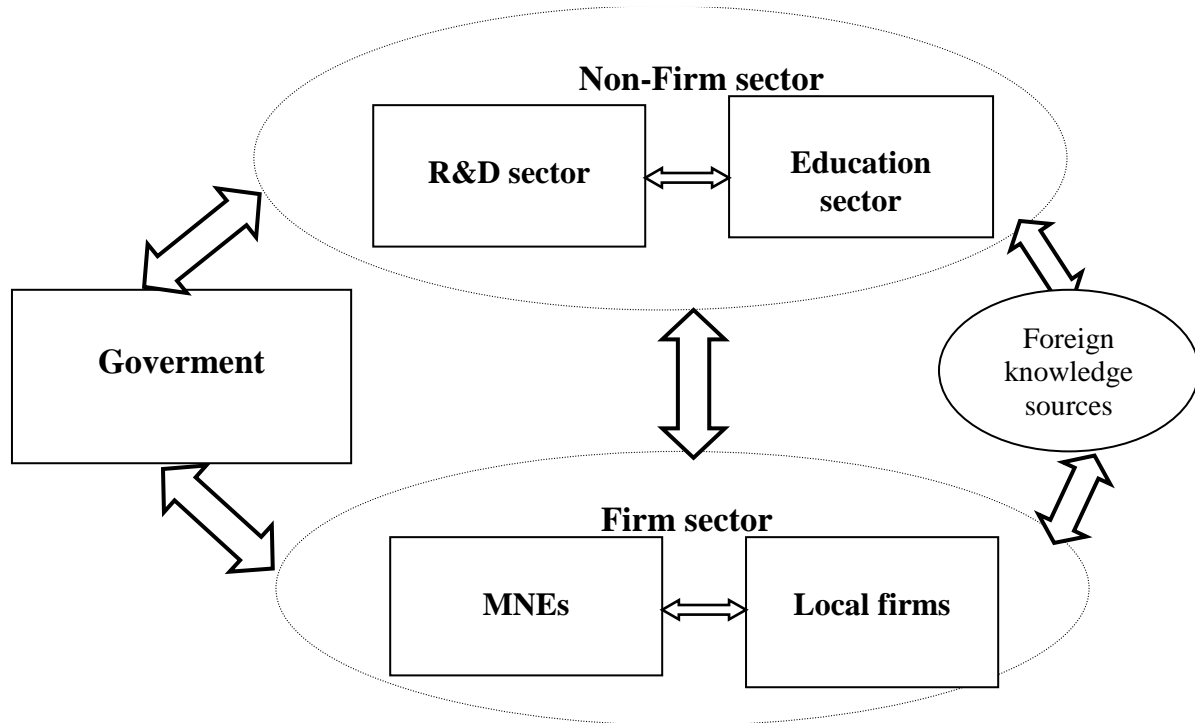
necessarily promote the increased R&D by firms that do not engage in R&D in the first place. Furthermore, the cost of such programmes is often prohibitive if positive and tangible results are to be achieved. Indeed, a recent study by Harris et al (2008) emphasise that in disadvantaged regions of the EU R&D substantial increases in the tax credit would be needed, at a level that might negate the benefit of such tax credits. This is exacerbated by the competition in terms of tax credits by different countries. Competition policy is another area that countries such as China have used to great effect, by using policies to offering large MNEs oligopolistic markets on the condition that knowledge-intensive and R&D activities are undertaken locally, whether independently, or in conjunction with domestic firms (Liang 2007). Apart from the fact that it contravenes EU competition policy as well as WTO rules (they are in effect a performance requirement), China has the added advantage of its large market size to use as a bargaining tool.

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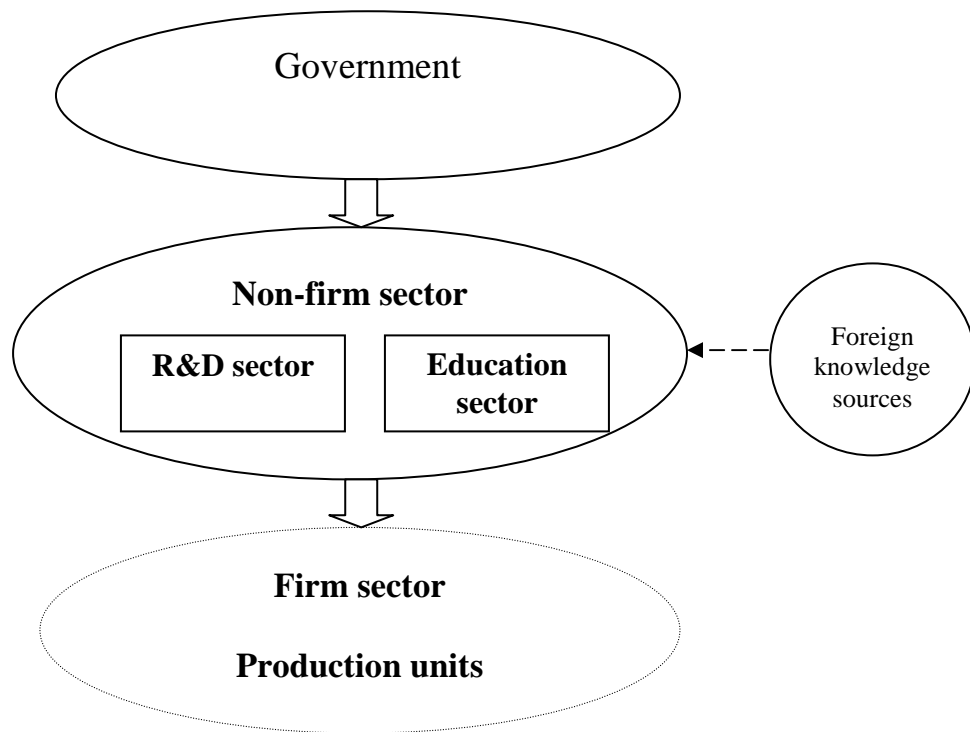
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**Figure 1 The conventional model of an innovation system**



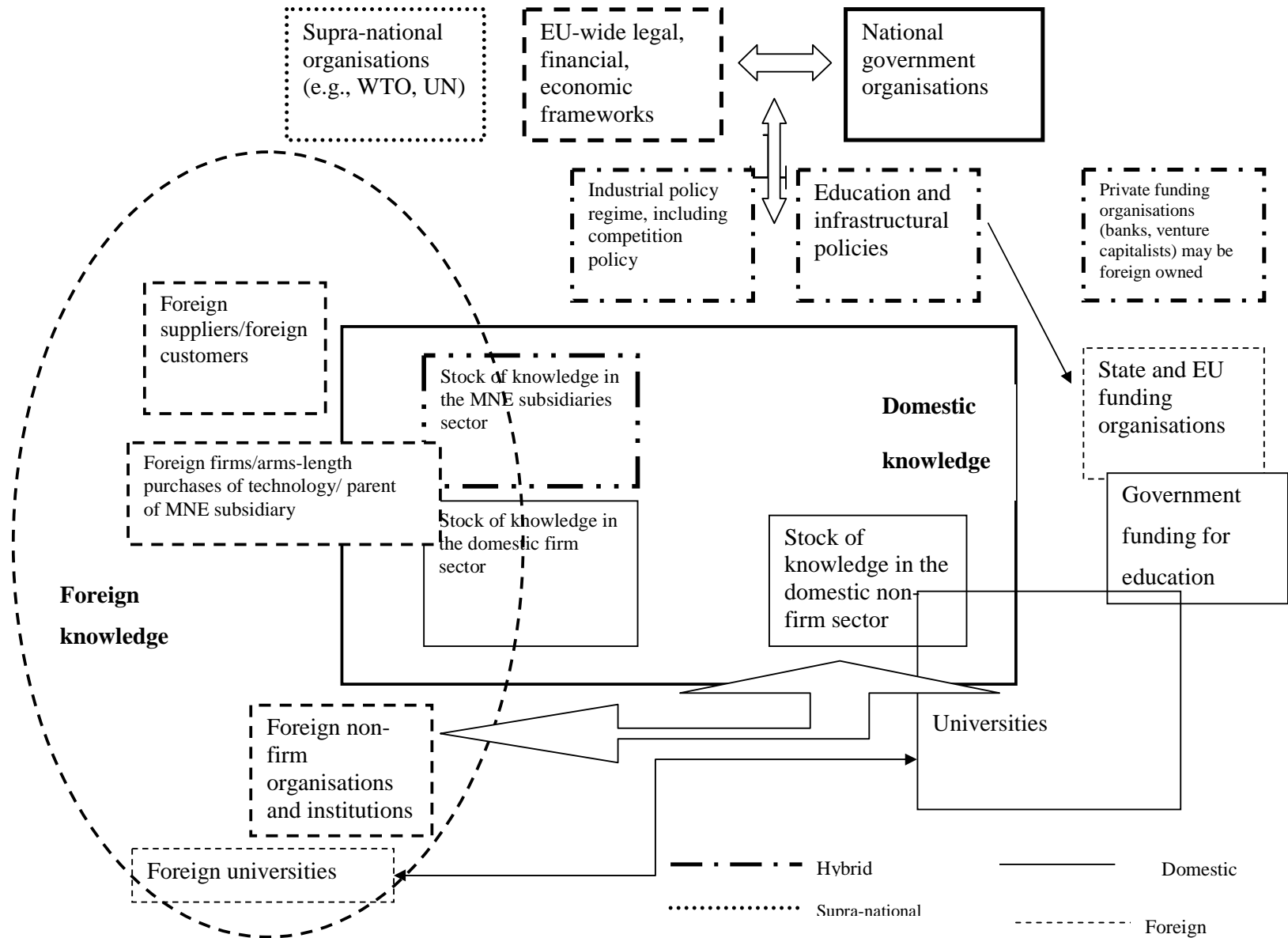
Source Narula and Jormanainen 2008

**Figure 2 The pre-transition model of innovation systems in centrally planned countries**



Source Narula and Jormanainen 2008





**Figure 3: The growing non-national interdependencies on shaping knowledge and innovation in the EU**

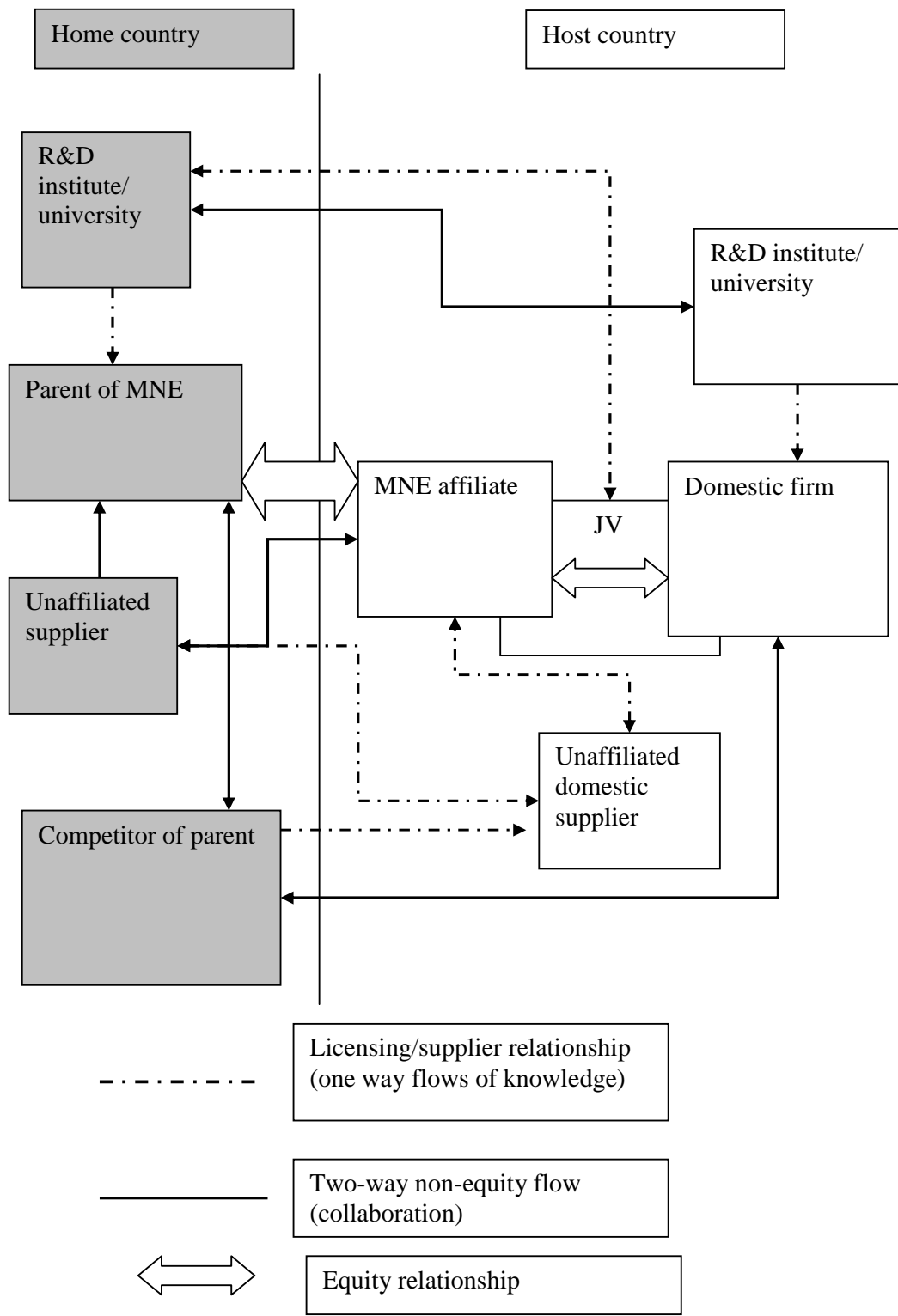
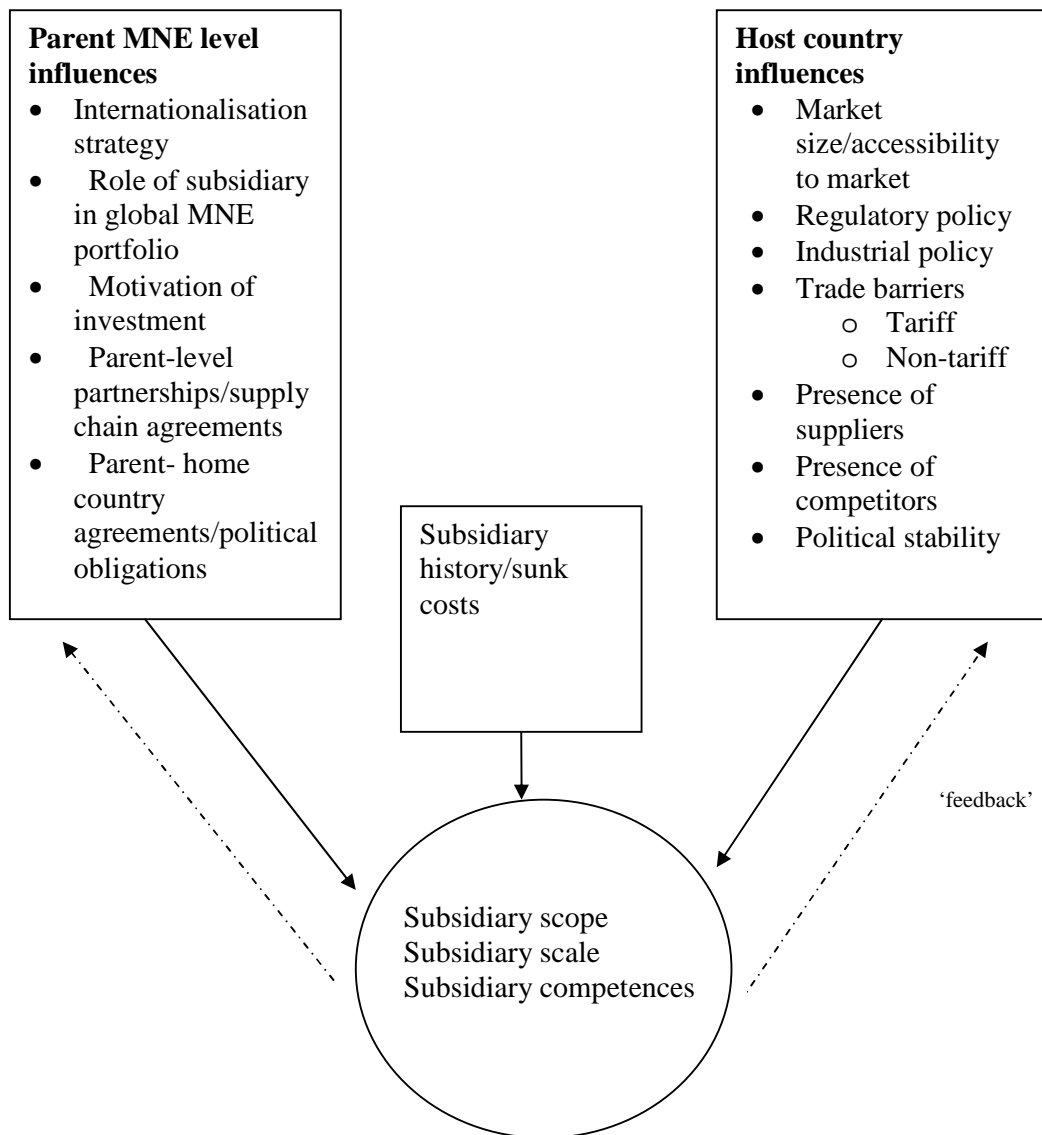
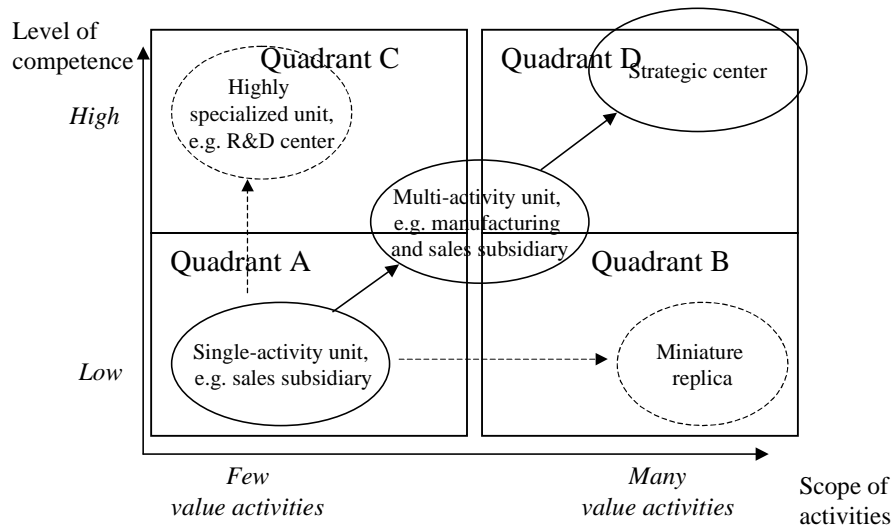


Figure 4: equity and non-equity cross border knowledge flows

**Figure 5: determinants of the competence, scope and scale of a foreign affiliate**

Source Narula and Bellak (2009)





Source: Benito et al 2003

Figure 6 Different types of subsidiaries, and their relationship to scope and competence levels.

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