MNEs, R&D and location: new misunderstandings in a global world

Rajneesh Narula
The multinational firm has changed

• Three types of MNEs:
  – 1. organised as a loosely coupled network of relatively autonomous subsidiaries, each with its own strategic goals and activities
  – 2. tightly coupled organization, with a high degree of interdependence and coordination between subsidiaries
  – 3. tightly coupled associations between legally separate firms, but with a common set of goals.

• Value chains and production networks
  – Dominant firms within a chain exert control on the location, profits and employment of suppliers (Dicken and Yeung).
HOME COUNTRY

<table>
<thead>
<tr>
<th>R&amp;D</th>
<th>Primary processing</th>
<th>Manufacturing</th>
<th>Sales, distribution</th>
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HOST COUNTRY

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Host country A

Host country B

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The break-up of MNEs value chains: effect of globalisation

- Few locations host all parts of the value chain of one product subsequent spatial redistribution of their value chains led to a downgrading of subsidiaries in terms of scope and competence.

- 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.

- 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.
MNE R&D

- **demand-driven R&D**’ 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.

- **‘supply-side R&D’**. Such innovation activities are more stand-alone are considerably more knowledge intensive than the forward integration, and imply a considerably greater dependence on domestic knowledge sources and infrastructure.

- Embeddedness is often a function of the duration of the MNEs’ presence, since firms tend to build incrementally. MNE entry relies 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.

- **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’.
## Average annual growth rate of USPTO patents by nationality of owner (%)

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Foreign owner</th>
<th>National owner</th>
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<tbody>
<tr>
<td>NMS</td>
<td>-4.5</td>
<td>8.7</td>
<td>7.9</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>6.0</td>
<td>4.6</td>
<td>5.1</td>
</tr>
<tr>
<td>Core</td>
<td>2.7</td>
<td>6.7</td>
<td>4.2</td>
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- 'Crowding-out’ in NMS vs. ‘Crowding-in’ in core and Med. members

## Total USPTO patents per million inhabitants

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<td>6.3</td>
<td>3.9</td>
<td>9.2</td>
</tr>
<tr>
<td>Mediterranean</td>
<td>32.8</td>
<td>57.9</td>
<td>88.1</td>
</tr>
<tr>
<td>Core</td>
<td>252.2</td>
<td>244.4</td>
<td>452.6</td>
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- The NMS still lag a long way behind not only the most technologically advanced core countries, but also the Mediterranean countries of the EU
What determines collocation?

- Technological competences of firms tend to be associated with specific location-bound assets.
- Technological specialisation of both firms and locations changes relatively slowly over time.
- Knowledge spillovers tend to be more intense between parties that are located close to each other in space.
- Thus, close spatial proximity presuming that firms wish to benefit from and promote knowledge transfers.
- But, while all firms seek to have positive inflows of knowledge, few firms wish to be the source of (unintended) knowledge outflows.
  - Firms may seek to avoid collocation of R&D to minimise leakages of value assets.
  - Firms collocate to have access to the same location-specific assets (such as skilled labour), which may be achieved by staying broadly in the same regional vicinity.
  - Especially in industries where loss to rivals is perceived as costly, and the private good aspect of knowledge is more important than the public good aspect.
Not all firms want to cluster

• Thus, despite arguments for industrial clustering there are also powerful reasons firms *avoid* collocation.

• balance between the local system which provides a combination of factors that contributes to innovation (such as skills, finance, production, user-producer linkages), the fear of knowledge spillovers to competitors determines intra-industry spatial concentration.

• *Firms behave differently if they are technological followers or leaders.*
Why would location matter in non-equity R&D cooperation?

• location indirectly influences the choice of partners because of the role of informal institutions in collaboration.
• being part of the same spatially localized social network reduces opportunistic behaviour and improved knowledge transfer, because partners are “likely to have a greater awareness of the rules, routines, and procedures each follows”
• firms exhibit considerable inertia in the location of their R&D activities, partly because of the complex relationships firms have with system of innovation through formal and informal institutions that have taken years to evolve
work on clusters emphasises that there are ‘goods’ associated with clusters that are only available to those that are part of the spatial agglomeration, because they have evolved under (and helped create) the same informal institutions. Thus they are semi-public goods, for which membership is *de rigueur*
R&D alliances can act as a complement or substitute for collocation

- **R&D alliances as complements to collocation**
  - Firms often locate their R&D to take advantage of an important public research establishment. The number of such institutions is finite, so even where a technological leader would prefer to avoid spatial proximity with its less-able rivals, it cannot prevent these firms from collocating.
  - alliances as a *complementary mechanism* within which to control knowledge exchange.

- **‘keep your friends close and your enemies closer’**.
- **R&D alliances as a substitute for collocation**
  - If firm A has deliberately avoided collocation with the rival firm B, but both wish to exchange knowledge on a specific task, an R&D alliance allows such exchanges to take place.
  - This allows social networks to overlap with spatial networks
  - membership of a social network may include other firms which do not wish to collocate (or cannot collocate) but wish to participate in joint activities
policy perspectives

- creating regional systems of innovation and strong location-specific assets can promote a certain level of agglomerative behaviour by firms, but not all firms wish to be collocated. Firms – particularly technology leaders – in certain industries only collocate with rivals reluctantly, and instead of increased knowledge flows between firms due to spatial proximity, firms can also utilise STP to monitor, gauge and control the strategic positioning of their technological profiles vis-à-vis their competitors. In other industries, firms do their best to avoid spatial proximity to rivals, preferring to use alliances where contact is necessary. This implies that initiatives to create industrial and science clusters may not always be successful, and policy makers need to be conscious that industry structure plays a significant role.

- policies to promote industry restructuring of less competitive sectors, and those that are aimed at building stronger regional systems of innovation should not necessarily be seen separately. Governments sometimes waive anti-competitive regulations to allow a weak industry to restructure through alliances, and this may allow firms to extend their cooperation to other areas which ultimately weakens the overall innovation system, although it may help particular firms become more competitive. In other words, firms may start displaying an inertia not just in their location, but in their choice of alliance partners as well, which ultimately impacts negatively on their long term technological competitiveness.
Collaboration has diminishing returns for SMEs…..

• first, there is a limit to how much of a firm’s R&D activities can be externally acquired particularly due to technological and strategic considerations.
• Second, even if costs are reduced through the use of non-internal means, they remain non-trivial, and the constraints of absolute limits of resources remains.
  – Some level of in-house capacity is essential to absorb the externally acquired information.
  – Managerial costs rise (and not fall) with collaboration
• SMEs have fewer technological assets with which to barter.
• Technological portfolio of large firms is larger, and besides they can offer cooperative agreements at other levels too, from either production or their marketing and sales operations.
• The market wants integrated ‘packages’ not partial solutions
SMEs are not always in a position to ally...

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MNEs are simply not internationalising their core activities that rapidly

- Firms need more than just cheap inputs and proximity to markets
- R&D is a holistic activity, involving a large system of players. Innovation involves complex interactions between a firm and its environment
  - consisting of public research institutes, universities, organisations for standards, intellectual property protection, etc that enables and promotes science and technology development

- These links (‘institutions’) have taken years to develop, and there is an exit and entry cost. There is therefore systemic and institutional inertia
• NMS receive clearly less FDI in R&D and HQ while much more in manufacturing
• Source: Investment Monitor database, Ernst&Young
• Sample size: 22503 investment announcements (4543 NMS / 2093 Mediterranean / 15867 core)
The challenge from China and India is exaggerated

- In the short and medium term, India does not pose a serious threat in general
  - Knowledge and physical infrastructure provide natural limits to this
  - Although there is a large supply of human capital, the quality issue is not always taken into account

<table>
<thead>
<tr>
<th></th>
<th>Researchers per million</th>
<th>Internet users</th>
<th>Time Required to start a business (days)</th>
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<tbody>
<tr>
<td>China</td>
<td>663</td>
<td>73</td>
<td>48</td>
</tr>
<tr>
<td>India</td>
<td>119</td>
<td>32</td>
<td>71</td>
</tr>
<tr>
<td>Portugal</td>
<td>1949</td>
<td>281</td>
<td>54</td>
</tr>
<tr>
<td>Turkey</td>
<td>341</td>
<td>142</td>
<td>9</td>
</tr>
<tr>
<td>Spain</td>
<td>2195</td>
<td>336</td>
<td>47</td>
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</tbody>
</table>
The R&D activities of firms stays concentrated in a few locations.

All locations

Foreign locations
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China and India look good…
(courtesy Athreye and Prevezer 2008)

Patents granted by application year

- China
- India
- Brazil
- Russia+USSR

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But in a comparison with Asian Tigers and Israel, not so good…..
(courtesy Athreye and Prevezer 2008)
And the world certainly doesn’t look flat if we go global…..
Policy roles and issues (1)

‘Physician, heal thyself’

• The role of governments in improving the quality of human capital and infrastructure cannot be over-emphasised.
• However, the presence of a highly skilled labour force is not an *sine qua non* for improved innovativeness, although it is certainly a necessary condition.
• It is no accident that firms often locate R&D facilities in physical proximity to locations with the best knowledge infrastructure.
• But needs to be done systematically: Sustaining or strengthening firm-level innovatory capacity requires developing the capacity of the non-firm sector.
• Encourage the cross-border movement of skilled manpower.
• Promote start-ups and small firms without pandering to large ones.
Policy roles and issues (2)

- Targeting new technologies needs to be done, but not by direct intervention.
- The risk of outsourcing and alliances to competitiveness is highly exaggerated.
- Greater danger to long-term competitiveness is by *discouraging* firms from venturing abroad – source of reverse technology transfer.
- But also to encourage them to stay by providing the right conditions.
- Techno-nationalism should be used with caution.
- The strategy of technological self-sufficiency is particularly untenable in economies that have limited resources.
Policy roles and issues (3)

• The conventional wisdom today points towards a balance between an interventionist role for governments where governments attempt to ‘pick winners’, and one which seeks to overcome market failures and imperfections with an intention to establish the appropriate milieu or ‘ecology’ for innovation
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