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A new geography of innovation – China and India rising

by

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With some delay, the internationalization of business R&D is following the globalization of production. Starting on a small scale during the 1970s and 1980s, the emergence of globally distributed R&D networks of multinational enterprises (MNEs) accelerated rapidly in the 1990s. The “*globalization of innovation*” was facilitated and driven by a complex set of factors, including changes in trade and investment governance, improved intellectual property rights through TRIPS, the growing ease and falling cost of communicating and traveling around the globe, and the concomitant vertical industry specialization and unbundling of value chains. The growing and sustained level of cross-border M&As was one major direct driver, often having the effect that merged firms inherited multiple R&D sites in a number of countries.

Until the end of the 1990s, the geography of (business) innovation was largely congruent with the triad of developed world regions: North America, Europe and Japan. Developing countries played a subsidiary role, either primarily supplying talent (brain drain) or functioning as sector specialists in smaller newly industrializing economies such as Taiwan Province of China, Singapore and Israel. Then, around the turn of the century, two interrelated strategies led to the “iron cage of the triad” starting to open: a R&D FDI shift to the two main emerging economies of China and India, and the upward move of Indian and Chinese vendors and contract research organizations (CROs) from providing routine services to knowledge process and R&D offshoring (Bruche 2009).

By around 2001, the number of MNE R&D centers had only gradually grown to under 100 in each of the two countries from the days of Texas Instruments’ early engagement in India in the mid-1980s and Motorola’s pioneering R&D investments in China in the early 1990s. The subsequent upsurge in MNE R&D centers in China and India calls to mind a take-off situation. In a rather sudden shift, the number of MNE R&D centers in China rose more than tenfold to

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around 1,100 (representing 920 MNEs) by the end of 2008 and to 780 (670 MNEs) in India (Zinnov 2009). The *internal* MNE R&D offshoring growth took place in parallel to the learning processes of Indian and Chinese vendors and CROs, leading to a similar expansion of *R&D offshore outsourcing*. Most surveys point to a continuation of this trend as companies report plans to move future R&D expansion to these two countries.

Why has there been such a sudden shift to China and India? There are a number of clearly discernible factors. Toward the end of the 1990s, China had established itself as a global lead market and world manufacturing center in a number of high and medium tech industries. While this implied a growing need for local asset exploiting R&D, greater competitive intensity also required increasingly *new* product development for the local market. Compared to the primarily market and customer oriented R&D investments in China, the bulk of R&D offshoring to India is so far mainly asset seeking, designed to take advantage of India's large and growing low cost intellectual infrastructure. In India, especially US-based MNEs profited even more than in China from the large diaspora of highly qualified non-resident Indians in leading positions, and from return migration. The Chinese Government's skilful carrot and stick policy (trading market access for technology) and India's longstanding knowledge export promotion via privately owned science and technology parks are other important determinants. A push factor came from skill shortages in computer science and engineering in the US, and to some extent in Europe and Japan as well.

While after 2000 China and India have become the most favoured R&D destinations of MNEs outside of the triad (with the exception of Israel which does however not offer a sizeable market), they are in competition with other emerging economies like Russia, eastern Europe or Brazil for R&D FDI and R&D outsourcing contracts. Although their *combination of comparative advantages* like market size, the large low cost talent pool, English communication skills (India), very large highly qualified diasporas and reasonably developed R&D ecosystems is a difficult match for competing emerging markets, escalating wage cost and attrition of qualified R&D personnel recently seemed to endanger this position. The financial crisis can in this context be seen as a windfall helping to constrain escalating costs and providing the time and space for a restructuring and further advancement of the talent pools in both countries.

To put the MNE R&D shift to China and India into a broader perspective, some other circumstances need to be taken into account. First, the bulk of business R&D in large triad countries is still carried out in the home country, and R&D FDI flows still take place predominantly *within* the triad (Jaruzelski & Dehoff 2008). Moreover, the new MNE R&D investment and offshoring to China and India is limited in sectoral scope: by far the largest share is accounted for by information and communication technologies, in India focused on software and engineering R&D; the remainder is more or less covered by the health sector (pharma, biotech and various chemical, preclinical, and clinical services) and the automotive industry. Finally, most MNE R&D work is concentrated in only a few regional clusters: taken together, Beijing & Shanghai and Bangalore/Pune/National Capital Region represent 60-80 % of all MNE R&D work.

Even if the argument for a new geography of innovation *today* may be questioned, one can still ask whether the dynamics of the R&D shift *herald* the start of fundamental medium-term

changes. Despite the dearth of systematic research on this issue, there seems to be a general consensus that the dominant share of MNE R&D in China and India comprises routine activities adapting *existing* designs or processes, or providing modular contributions transformed into innovative products and processes in the triad's higher order R&D centers. However, scattered evidence points to fast learning and upgrading processes resulting in ever more centers and CROs taking on selective regional or global roles as centers of excellence within MNEs global innovation networks. It is still an open question whether this will also lead to a shift in the geographic loci of the eventual innovation - as long as the knowledge generated is globally transferable and China and India lack important complementary assets for its independent application and integration in new products (as, for instance, in pharmaceuticals and automobiles), the innovation may still be realized in the MNE home countries. In this sense, the R&D shift may strengthen rather than weaken the triad countries' economic position, and especially that of the US. The argument that the catch-up of China and India can be accelerated by spillover effects of local MNE R&D to Chinese and Indian companies and institutions may have some validity. So far, however, the R&D investment levels even in more advanced Chinese and Indian companies are low and local challengers may even suffer from an in-situ brain drain to MNEs able to offer more stimulating and rewarding work to talented R&D professionals. On the other hand, emerging country MNEs such as Huawei from China or Tata from India have started to acquire or establish R&D centers in the U.S. and Europe as a way to tap into advanced knowledge and technology clusters.

It remains to be seen how far the financial crisis will trigger changes in the ongoing R&D relocation plans of MNEs. MNEs under pressure may have to cut R&D spending to maintain core operations in their home countries. Strong companies that closely track their innovation drive, such as, for example, Bosch or Siemens in Germany, or Cisco and Microsoft in the US, as well as companies in less affected industries, e.g., pharmaceuticals, may seize the chance to further enhance R&D efficiency and profit from a relaxation in the talent markets in China and India. They may also prepare for even stronger positions after the crisis when China and India may still be the fastest growing markets in the world economy. While the Chinese and Indian Governments will certainly welcome the emergence of a new geography of innovation the current global crisis may trigger a renewal of a more 'techno-nationalist' stance among policy makers in the U.S. and Europe and lower the inclination to perceive this development in the frame of a long-term win-win scenario.

Selected Sources

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