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Discussion Paper **Internationalisation of Research and Development**

Internationalisation of R&D is providing new opportunities for businesses to draw on local strengths and specialisations on a global scale. The resulting global trade in knowledge and intellectual property and the strengthening of economies through R&D can provide economic benefits similar to other forms of trade. By the same token, companies and nations will find traditional strengths challenged by others, so these gains will only be realised by those who are able to respond effectively to the competition.

The commercial reasons for drawing on an international research base are concerned primarily with business strategy and a capacity to address changing business objectives. Cost is one, but (at least in the first instance) not the chief determining factor in decisions to establish new R&D facilities, which are more concerned with access to markets, people, facilities and standards. The availability of well-educated workforces and increasingly affluent customers in the former Eastern Bloc, China and India means that these regions are becoming more attractive locations for business R&D.

The outsourcing of R&D is not a new phenomenon but has taken on greater momentum in today's world, often described in terms of Open Innovation plus Globalisation. Companies supplement their in-house capabilities through relationships and contracts with academic groups, commercial laboratories and other companies. They can now search the world for these partners. R&D is going global and this is strengthening competition.

In responding to these trends, it remains important for governments to establish fair rules and efficient procedures across a wide range of public policies, concerning the use and protection of intellectual property, and to ensure the education and mobility of talented people.

A. Trends in Globalisation of R&D: Why do Businesses locate R&D facilities elsewhere?

1. R&D is an integral part of business strategy.

Carrying out R&D is an integral part of running a business rather than somehow to be seen as an independent activity. The planning and execution of this R&D reflects and derives from considerations of the company's business strategy. Developing successful strategies depends on first answering the question: *Where are the markets?* While in the first instance, R&D is usually based close to headquarters, as the company grows, its R&D will also develop to reflect changes in its markets. The movement may be less rapid or delayed by the time and costs involved in establishing top-quality facilities, but the trend is the same.

Companies locate R&D in regions that offer the potential for controlled, sustainable market growth, because they need to understand and be well connected with the needs of their customers in these regions. Currently, Asia offers the greatest potential for new and rapidly-expanding markets, while markets in North America tend to be more flexible than those in Europe.

2. The consequences of Open Innovation

In the past, it was appropriate to distinguish between research activities (which were often more fundamental in nature) and development (which is necessarily carried out closer to market). Today, this distinction has become less relevant. Models are shifting away from supply-side models towards more demand-driven approaches that combine "R" with "D" and focus on speed and reducing complexity. The trends in managing research and development are towards closer collaboration between talented researchers in different public and private institutions and between companies, their suppliers and their customers.

Practices in internationalisation of R&D reflect this need and possibility to establish useful connections with partners, customers, public institutes and other bodies, whose knowledge will contribute to producing and supporting the required products and services. Restrictions placed on the use of this knowledge (for example, by requiring that implementation is handled by domestic companies) can act against the interests of host nations.

3. Access to human capital

Leadership in a knowledge economy depends entirely on the quality of human talent that is available and the ways and areas in which these talented people choose to work. Large countries, like India and China, which are now producing large numbers of scientifically- and technically-proficient people, can and will host significant volumes of leading R&D activity. Competition for this talent, improved communications technologies, good infrastructures and easier market access will drive the process of R&D globalisation.

Strong academic communities linked to dynamic business communities within supportive government frameworks are essential features of the growth and clustering of R&D.

It is not only the developing countries that attract such R&D clusters. Such movement is also taking place within the OECD. It is worthwhile to note the relative strengths of the biotechnology and information technology sectors in the US compared to Europe. The capabilities of the native workforces were no different. Different patterns of strength today have clearly been influenced by flows of students from other parts of the world. While there are differences among EU countries, the EU has not benefited in recent years from the same influx of foreign human talent as the US.

The obvious consequence of a shortage of human capital is that technology-dependent business growth will occur somewhere else. The business community does not regard the globalisation of

its R&D as “off-shoring” but as the management of excellent people needed to support business growth.

4. Localised knowledge and access to markets

With today’s products demanding the integration of knowledge from many disciplines, it is important to have people who have local expertise and knowledge of local standards. It is also important for multinational companies to demonstrate strong local presence and commitment to the development of these standards.

A more market-oriented approach to R&D drives the R&D community to work more closely with customers in the development of new products and services. Given the increasing quality of production facilities in developing countries, it makes sense to conduct process R&D close to these facilities. It also allows the company to develop solutions tailored to local needs, to understand local technical challenges and contribute to the emergence of suitable technical standards.

5. Cost reduction

Despite public belief that globalisation is mainly about reducing labour costs, other factors are more significant than local wages in determining the cost of operating research centres.

It is very expensive to set up a high-quality R&D facility in any location. These costs relate to establishing a laboratory with the critical mass of tools, people and technologies to do sustainable top quality work. The best people are in demand internationally. But once a facility is operating successfully, there are also high disincentives to relocate again.

There are clear economic reasons for locating certain types of R&D work in countries which currently have lower wage costs, but it is not the lower wages which provide the main reason.

6. Regulation and public attitude

Public attitudes towards science affect market opportunities and are one of the factors driving regulation. Taken together, this combination of regulation and public attitude influences the internationalisation of R&D, which will tend to become stronger when the pathways to market are smooth and when there is a clear perception by the consumer that the results of new science offers real value.

This has been well demonstrated recently by the example of genetically-modified foods. The European public has so far failed to see much value and this has damaged the region’s strengths in relevant areas of biotechnology. Similar situations are likely to play out again and again: for example as experiences with products like asbestos affect the introduction of materials based on the fruits of research in nanotechnology; as attitudes towards safety issues, waste disposal and climate change influence the rate of development of technologies associated with nuclear power and renewable energy sources; and as perceptions of the moral status of the embryo affect work in stem cell research.

In seeking to embed a research-led culture within a region, it is important that companies and governments demonstrate the real value that new science and technology can offer, particularly where this value may not be self-evident to the final customer. With a general shift from a “Trust Me” to a “Show Me” world, this often depends on bringing stakeholders together to talk through these matters.

7. Intellectual Property and the Protection and Movement of Knowledge

In order to gain most value from knowledge, it is also important to balance the protection and free movement of intellectual property. (BIAC's views on the conditions for Intellectual Property Rights protection are discussed elsewhere.) The effectiveness of IPR regimes to serve the needs of knowledge economies (including, for example, their impact on fields such as ICT) will influence the extent to which companies will locate their research activities in a given region.

Equally, knowledge is carried largely in the brains of people. The quality of the education system at all levels from kindergarten through to continued adult education, and the ease with which people can move (for short periods as much as on a permanent basis) will underpin the attractiveness of different locations for R&D purposes.

Building on points already made in section (6), there are some differences in which what constitutes "allowable research" from country to country. An example today is stem-cell research. While respecting the sovereignty of the nation state, it is important to ensure that foreign national research workers do not suffer because of differences in what is permitted in their home territories and in the territories where they currently work.

B. Public Policy: The Role of the Governments

Gaining full benefit from R&D depends on providing effective and consistent policies across a wide range of public affairs. Innovation has to be seen more broadly than traditional notions of R&D and intellectual property. As internationalisation of R&D progresses, the consequences of shortcomings in individual areas of public policy are likely to become more significant.

Firstly, economically-sound innovation, competition, tax and regulatory policies provide the fertile ground in which R&D can flourish, because these policies provide the basis for achieving effective markets.

Secondly, the availability of sufficient human talent and people's attitudes towards the value of science and entrepreneurship depend upon providing top-quality education systems at all levels from primary school to higher education and on achieving effective public debate on these matters. Universities must be challenged to provide the right talent for the future; steps taken to improve mobility; labour laws made more flexible; and risk taking encouraged.

Thirdly, the community's ability to gain full benefit from its science base and the ability to provide advanced, relevant life-long learning depends on reforming the university system in ways that improve connections between universities and industry and the transfer of knowledge to market without harming the fundamental purposes of these universities to educate people and perform advanced research.

Fourthly, while market competition will generally provide the main stimulus for growth, in some situations, progress will occur within public-private partnerships. A great deal needs to be done in order to ensure that these partnerships can operate effectively.

Fifthly, governments need to deliver regulatory policies (particular on matters of human and environmental protection) that do not stifle the ability to innovate competitively.

Sixthly, the potential benefits of Open Innovation are likely to be reduced by restrictions that constrain the formation of partnerships or whereabouts the resulting knowledge must first be transferred to market.

Finally, it is important for governments, just as for companies, to reflect upon questions of sustainable competitive advantage. What is it that one region can offer that another cannot? In this regard, countries should invest in their R&D strengths and be innovative when deciding how to use public R&D funding.

Conclusion

In order to maintain the scientific and technological leadership needed to stay at the top of the value chain, corporate R&D develops according to the requirements of business strategy. It is inevitable, considering the dynamics of global business development that R&D will tend to be located in regions that offer a higher speed of innovation; where entrepreneurialism and skilled workforces can bring knowledge more rapidly through to market; and where the opportunities for market growth are greatest.

Globalisation of R&D is no different in this respect to globalisation of trade and information. The general economic principle of comparative advantage applies without exception. Everyone benefits when everyone finds their competitive niche. Eventually, these benefits go beyond the country where one particular activity is located.

In order to use strength in R&D as a basis for economic growth, governments should seek to establish environments which:

- Enable the growth of a knowledge-based economy by providing an effective mix of market-based regulation, fiscal, tax and procurement policies, and consistent investment;
- Offer a strong public science base and well-educated human talent;
- Encourage good connections between the science base and industry;
- Provide intellectual property rights that appropriately balance protection and mobility of knowledge;
- Achieve a positive attitude among the public towards the value that such R&D can bring; and
- Anticipate future trends, skill needs and new opportunities.