ABSTRACT

This entry discusses the following questions concerning Research & Development (R&D): 1) What is it? 2) Who does it (governments versus firms)? and 3) Where is it done (the developed west and Japan versus emerging markets)? The entry ends with a discussion of R&D in relation to innovation more broadly as well as its importance to firms, governments and policy makers worldwide.

Keywords: Research & Development, Innovation, Product Development
**RESEARCH & DEVELOPMENT**

Rajesh Chandy (*London Business School, UK*) and Jaideep Prabhu (*Judge Business School, University of Cambridge, UK*)

**What is R&D?**

The Organisation for Economic Co-operation and Development (2009) defines Research and Development (R&D) as “creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.”

R&D typically covers three activities: basic and applied research, and experimental development. Basic research is defined as “experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view”. Applied research is “original investigation undertaken in order to acquire new knowledge directed primarily towards a specific practical aim or objective”. Experimental development is “systematic work, drawing on existing knowledge gained from research and/or practical experience, that is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed”.

The main measure used to make comparisons of R&D activity across countries is gross domestic expenditure on R&D (GERD). This measure consists of the total expenditure on R&D by all companies, research institutes, government and university laboratories within the country.

**Who does R&D?**

Two main sources of funding drive R&D within countries: public and corporate. Public funding drives R&D activity in government labs and research institutes as well as in public universities. Corporate funding drives R&D within firms. The extent to which public versus corporate funding drives R&D differs across countries. In some countries, most R&D activity is funded by corporations and takes place within in-house labs (e.g., Japan and USA where over 70% of R&D is funded by corporations). In other countries, the government is still the largest spender on R&D and most of this activity takes place within a state-sponsored network of institutes and labs (e.g., India where over 80% of R&D is funded by the state). The overall spending on R&D also varies significantly across countries. While most developed economies (e.g., USA, Japan and Sweden) spend more than the OECD average of 2.2% of GDP on R&D, most emerging markets (Turkey, Brazil, India and Mexico) spend less than 1% of GDP on R&D.

**Where is R&D done?**

Historically, most R&D has been done in the developed economies of North America, Western Europe and Japan (the so-called triad nations). Governments in these countries have spent large amounts of money on R&D to ensure leadership in defence. Likewise, the largest firms in these countries, which also count among the largest firms worldwide, have spent significant amounts on in-house R&D as a way to achieve long-term advantages over their global competitors. In the last decade or so, however, R&D has increasingly been off-shored to emerging markets like China, India,
Taiwan, Brazil and Russia. For instance, a recent study finds that China has the 5th and India the 7th largest number of R&D centers of the Fortune 500 firms worldwide (Tellis, Eisingerich, Chandy and Prabhu 2009). This is particularly remarkable given that the trend towards off-shoring R&D is no more than two decades old at most.

**R&D as a concept and a practice**

R&D is a central concept in the vast academic literature on innovation. It is also a major instrument for policy makers striving to improve the competitiveness of their home economies and for managers seeking to improve the competitiveness of their firms worldwide. While R&D is an important input into the innovation process, it does not guarantee that firms and nations that invest in it will naturally be more innovative. Indeed, a recent paper on innovation across nations finds that innovation and financial performance depend more on key culture traits that enable firms to convert inputs into commercially valuable outputs than on R&D spending per se (Tellis, Prabhu and Chandy 2009). Nevertheless, the tendency of firms, governments and think tanks to monitor R&D spending is likely to continue in the future. The relative ease with which R&D spending can be measured (relative to innovation outputs) as well as its intuitive link with innovation outputs will ensure it retains its appeal and power for some time yet.

**BIBLIOGRAPHY**

*OECD Factbook 2008: Economic, Environmental and Social Statistics.*
