

## Innovation Briefing 05-05: Out-sourcing vs. Off-shoring – The Shifting Balance for R&D

*Over the past few months there has been a plethora of articles touching on an apparent escalation in out-sourcing of innovation, and particularly R&D. From Business Week and the FT through to The Economist, Technology Review and the Sunday Times there has been a range of commentaries – some with useful, focused insights and others more alarmist. What many are getting all hot and bothered about is actually not too confusing. There are two different dimensions at play: Out-sourcing vs. off-shoring and Research vs. Development. While many firms are increasingly taking advantages of the opportunities for out-sourcing the development of new products and services, few are out-sourcing the more fundamental research activities. Yes, research effort is changing location but, in the main, this is to company-owned facilities that happen to be off-shore. The fact that R&D jobs are moving is an undeniable trend. The fact that the key activities and positions are moving out of the company is largely fiction.*

Out-sourcing and off-shoring are two terms that have become increasingly intertwined, especially in such areas as call-centre operation, software development and product manufacture: As companies have sought to take advantage of lower-wage economies at the same time as the low-cost countries have significantly increased their scientific and engineering skill bases, the misconception that price is the key driver of job migration has clouded the issue. Within the context of R&D, the rationale behind much of the related activity location to such countries as Hungary, India, China and Taiwan has been just as much in accessing leading edge capability. To help clarify the situation, it is useful to look in more depth at the context for R&D relocation and the varied options that lie within.

**Out-sourcing** of development activities has been a key part of innovation delivery for many years. Design consultancies such as IDEO have been long-term favourites for external innovation support in the same manner as that provided today by software developers such as Wipro and Infosys in India. Companies work with such organisations either to access capability that they do not have internally, or else to manage gaps in project-based resource: Location and cost have in many cases been secondary issues to capability and experience. At the same time, the growth of Singapore-based Flextronics first as a manufacturer and then developer of electronics has mirrored that of Taiwan-based companies such as Acer and HTC from being OEM suppliers to being 'original design and manufacture' partners. In a global market, companies are out-sourcing more and more work to external sources of expertise – but the vast majority of this is still development and not research: It is work that could potentially be done equally well within and outside the organisation but for which tactically it is more beneficial to move externally.

**Off-shoring of development** has also been in place for some time. Texas Instruments set up its first facility in Bangalore in 1985, with GE and Intel soon joining in, and many companies have since opened proprietary development facilities in new markets across many sectors and across multiple geographies. Just as Honda and Toyota set up new development centres within the target US and European markets to be closer to the end consumer, so did Canon and Sharp. Just as Ireland grew to be a major centre of IT and pharma development and manufacture for the likes of Nortel, IBM, Pfizer, Merck and Lilly to access low-tax regimes and educated workforces, so initially did China, Hungary and India. The difference is however in what is now happening in the research arena – while off-shoring of development was a two-way street with as many cases of inward investment as there were of foreign relocation, off-shoring of research is far more of a one-way trend. With the exception of the pharmaceutical industry and recently a few elements of the ICT sector, research has been steadfastly kept strategically internal and hence 'within the tent'. Microsoft, HP and IBM are all seeking to achieve nearly 100% internal research, but much of this is increasingly off-shore.

**Off-shoring of research**, the opening of new research facilities outside the home territory to access competitive world-leading expertise, is rising massively. China now has 600 foreign-owned R&D centres, one third of which have opened in the last two years. IBM, Microsoft and Intel have had centres leading research into such topics as speech recognition and wireless networks for a number of years, while Nokia, Siemens, Ericsson, Motorola and Fuji are all now opening new facilities and GE has built a \$64 million research centre in Shanghai. Although overall R&D spend in China is still relatively low by US levels at around 1% of GDP, China now has 0.74m researchers, as compared to 1.3m in the US, and is expected to be the major world centre for R&D within ten years. In 2004, China produced 325,000 engineers – five times as many as the US. Likewise there is similar growth in India where IBM started research activities in 1998 and Microsoft has just opened its latest lab: Bangalore is the fastest growing city in India and colleges in Karnataka alone are producing 30,000 engineers a year. This migration of R&D activity into such areas is happening for three core reasons – customers, cost and capability: These new facilities are in the heart of the fast-growing economies and populations that will be the largest consumer bases in the future; Chinese / Indian engineers and scientists typically cost around 25% of those in the US / Europe / Japan; and, most significantly, they are as certainly just as effective.

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As mentioned above, the pharmaceutical industry is the key sector that is not following this general trend but is instead pioneering another approach – one of increasingly out-sourcing activities throughout the drug discovery – development spectrum. Given that the typical drug development costs around \$900m a shot, takes around 10 years from end to end and has an overall strike rate of 10000 to 1, companies such as GSK, Pfizer and Lilly have all been looking for way to both improve success ratios and spend less. Driven initially by the key 'make or buy' decision for active ingredients, big pharma has been outsourcing both R and D for some time. Outsourcing development, be it preclinical, toxicological or clinical trials, has thus become a favourite for cost reduction: As in other sectors, organisations such as Pharmacopoeia, Phoenix International and Quintiles International have all grown to be major suppliers of development capability. However, where the pharmaceutical sector is taking the lead is in outsourcing the front end discovery phase of research activity.

Outsourcing fundamental research is now a major focus as big pharma increasingly partner with biotech firms, universities and independent research organisations to supplement or even replace internal capability. The key, and mostly US-based, biotech partners include Amgen, Genetech, Chiron, Biogen and Genzyme, while core specialist providers of genomic research, again primarily based in California and Massachusetts, comprise Affymetrix, Aurora, Genetech, Gemoni Systems and Human Genome Sciences. In addition, there are numerous providers of combinatorial chemistry expertise such as Affymax, Isis, and Sphinx, each with their own big pharma partner as well as multiple strategic academic research partnerships. GSK, for example, currently funds research with Duke (Alzheimer's), Oxford (HIV), and both Harvard and UCL (Cardiovascular). In a major combination of off-shoring and potential out-sourcing, Novartis has even relocated its global R&D HQ from Switzerland to Boston to be near to the key centres of biotech research, be they academic or corporate. All in all, some pharmaceutical majors are now outsourcing 30% of research and 50% of development activity, a signpost for the future of other sectors maybe? Furthermore, this widening approach to outsourcing the core industry knowledge creation activity within new drug development is now also itself moving offshore, especially to China where Roche and GSK are just two of several big pharmas shifting biotech research to genomic centres in Shanghai.

Both out-sourcing and off-shoring are in a period of significant growth that shows little sign of abating. Right now the challenge for many corporations is in managing their global facilities to provide the greatest impact, wherever they may be and this increasingly demands cultural as well as tactical expertise. In the search for technology to underpin new innovations that can be developed and delivered to customers in the most cost-efficient manner, every margin-focused business should be considering the respective off-shoring and out-sourcing options for R&D.

The challenge for the developed economies is however perhaps greater than for the multinationals that are currently headquartered there. Although, for now, the profits that derive from most of these off-shore R&D facilities continue to flow to the shareholders 'back home' alongside the associated corporate tax into government coffers, this will not go on forever. As the research base in the US, Europe and Japan first stagnates and then enters into relative decline, the much vaunted 'value-add' activities will disappear and the full economic balance of power will begin to switch. Moreover, as alumni of both found new start-ups and as companies like Acer, Lenovo, Tata and Infosys that have grown on the back of out-sourcing increase their own research credentials, the ownership of the next wave of innovation will also migrate in line with capability. With China fast approaching the US in terms of GDP PPP and India not too far behind, many Western hosts of the existing centres of innovation need to act now to develop coherent national innovation strategies that prioritise their future agenda and ambitions within the fast changing global context.

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