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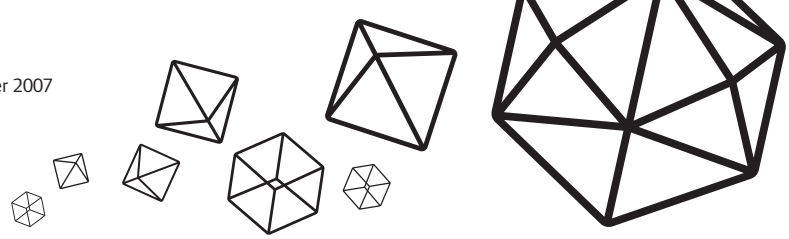

NESTA Making Innovation Flourish

Innovation goes global

Why it's no longer enough to think of a national innovation system

Two trends are converging: first, the world is increasingly interlinked and interdependent; second, the balance of economic power is shifting away from the traditional 'West' and towards countries such as China, India and Brazil. As a result, traditional sources of competitive advantage are being eroded and the capacity to innovate is becoming more important.

However, globalisation is also changing the way innovation happens. Businesses are internationalising their R&D activities and sharing knowledge with external partners, and skilled people are becoming more mobile. As a consequence, deriving value from innovation increasingly depends on absorbing ideas as much as creating them, and centres of excellence are becoming more rare as they become more excellent.

To make the most of this opportunity, the UK must focus its efforts on those areas where it has a true competitive advantage. Furthermore, it must strive to maintain its status as a crossroads in the global network of knowledge. This means supporting universities and businesses to collaborate internationally, and ensuring that the benefits from those activities reach the whole of the UK's economy and society.

The world is increasingly interlinked and interdependent

Globalisation is perhaps best defined as "a marked increase in the movement across national boundaries of goods/services, investment, people and information".[1] It is a "dynamic and multidimensional process of economic integration" whereby national economies across the globe become "increasingly interdependent".[2]

Three waves of globalisation

Since the Industrial Revolution, there have been three waves of globalisation.[3] The first began around 1870 and was characterised by falling transport costs and a reduction in barriers to trade. The second phase followed World War Two and was powered by a progressive liberalisation of trade and capital flows.

The third wave started in the 1980s when many developing countries broke into global markets. This current wave has entered the popular consciousness through the outsourcing of manufacturing and greater availability of cheap clothes. However, more importantly, it is transforming the balance of economic power across the world. Some commentators have predicted that in less than 40 years, Brazil, Russia, India and China together could have larger economies than the UK, Germany, Italy, France, Japan and the USA combined.[4]

Globalisation III: facilitated by ICT

Recent and rapid developments in information and communications technologies (ICT) mean that goods and services can move faster across the globe and new production, marketing and organisational techniques can be diffused inexpensively.[5] As a result, a country's abilities to keep up with technological change and make effective use of ICT to reduce costs and improve quality have become critical to its competitive advantage.[6]

Innovation goes global

Globalisation is changing the way that innovation happens

Many companies are increasingly internationalising their research and development (R&D) activities. In 2003, the world's biggest companies spent $70.6 billion in R&D outside their home countries, up from $33.9 billion in 1995.[7]

Indeed, both domestically and internationally, a growing number of businesses of all sizes are sharing knowledge with external partners such as universities, suppliers and small firms, rather than relying on knowledge generated in-house.[8] As a result, collaboration and networking (often across geographical boundaries) are playing an increasingly central role in innovation processes.[9]

1. DTI (2004) 'Liberalisation and globalisation: maximising the benefits of international trade and investment.' London: DTI.

2. OECD (2005) 'OECD handbook on economic globalisation indicators.' Paris: OECD.

3. HM Treasury (2004) 'Long-term global economic challenges and opportunities for the UK.' London: HM Treasury.

4. Goldman Sachs (2005) 'The BRICs' path to 2050: A dramatically different global economy.' Available at http://coursenligne.sciences-po.fr/2005_2006/gouvernance/braga/cours_1_brics.pdf [accessed 16 November 2007].

5. UNESCAP (1999) 'Economic and Social Survey of Asia and the Pacific.' Available at http://www.unescap.org/drpad//publication/survey1999/svy4a.htm [accessed 16 November 2007].

6. OECD (2007) 'Globalisation, jobs and wages.' Paris: OECD.

7. OECD (2006) 'OECD Science, Technology and Industry (STI) Outlook 2006.' Paris: OECD.

8. Chesbrough, H. (2003) 'Open innovation: the new imperative for creating and profiting from technology.' Cambridge, MA: Harvard Business School Press.

9. Chesbrough, H. (2003) The Era of Open Innovation. 'MIT Sloan Management Review.' 44 (3).

NESTA Policy & Research Unit

1 Plough Place
London EC4A 1DE
research@nesta.org.uk

www.nesta.org.uk

People are increasingly internationally mobile
People are a central component of the movement of ideas and resources.[10] They are the agents of shared knowledge and of new economic and social links between the world's innovation hotspots. In 2000, around 86 million people were economically active in a country other than their own;[11] and in 2004, 2.5 million students were studying outside their home country, up from 1.75 million in 1999.[12]

Those who return to their home countries accelerate the creation and strengthening of local capabilities – something that has been characterised as 'brain circulation' rather than 'brain drain' or 'brain gain'.[13] Consequently, innovation policy must not only take into account companies moving to find deep labour markets, but people moving to find career opportunities.

Think global, innovate local

The world is both 'flat' and 'spiky'
In theory, knowledge can now flow freely across the globe: the world is becoming 'flat'.[14] However, innovation is not becoming geographically dispersed: it continues to cluster in specific geographic regions. For innovation, 'the world is spiky'.[15]

'Sticky knowledge' and collaboration drive 21st century innovation
This 'spiky' but 'flat' world is not a contradiction but an inevitability. As codifiable knowledge such as patents and copyrights flows more and more freely, the most valuable innovation increasingly depends on high-value 'sticky knowledge' – 'know how' rather than 'know what'.[16]

As a result, creating the next innovation increasingly depends on having created the last one – so the best places for innovation can become even better. However, faster connectivity and greater movement of skilled people mean that these centres of excellence will become increasingly rare – not every city or region will have one, nor even every country.

The UK has strengths as a location for innovation

Welcoming capital and ideas: a tradition of openness, flexibility and free trade
According to the OECD, the UK has some of the world's lowest barriers to competition,[17] and is the most lightly regulated economy in the European Union.[18] Consequently, it is little surprise that the UK is the world's second largest exporter of services,[19] the fifth most attractive location for foreign-funded R&D[20] and the fourth most attractive destination for foreign direct investment.[21]

Developing ideas: an efficient research system
The UK represents only one per cent of the world's population, but produces eight per cent of scientific papers worldwide,[22] receiving 11 per cent of the world's citations for those papers.[23] Four UK universities rank among the top ten universities in the world.[24]

Attracting people from across the world
The UK has international strengths in financial services,[25] legal services and high value-added manufacturing clusters (such as aerospace) which attract highly skilled workers. Historically, aside from conducting world-leading research, the UK's universities have proven a compelling destination for international students. From 1996/97 to 2005/06 the number of non-EU international students has more than doubled and the UK is enrolling an ever increasing number of EU students.[26] However, increased competition from universities in Australia, China and South East Asia has meant that, while still experiencing a rise in student numbers, the UK is attracting a lower proportion of overseas students.[27]

The UK needs more and better skills to generate knowledge and absorb ideas

Policy debates around skills, innovation and globalisation tend to focus on the comparison between the four million graduates produced each year by China and India and the 600,000 produced by the UK.[28] It is unrealistic to compete on numbers. The UK must therefore seek to compete on quality – and on ensuring that it produces people with the skills essential to the innovation that matters to the UK's economy.

The UK skills base lags behind
Currently, the UK ranks only 17th on low skills and 20th in intermediate skills in OECD comparisons of 30 countries.[29] It performs better on comparative indicators of high skill levels, but it is still not a world leader (it is ranked 11th out of 30).[30]

In recent years, the numbers of graduates in science, technology, engineering and maths (STEM) have increased, but not as rapidly as in other subjects.[31] Moreover, while numbers of graduates in biological science, computer science and mathematical science have increased, numbers in engineering and technology and physical science have fallen.[32]

10. Saxenian, A. (2006) 'The New Argonauts, Regional Advantage in a Global Economy.' Cambridge, MA: Harvard University Press.
11. International Labour Organisation (2006) 'Facts on labour migration.' Geneva: ILO.
12. UNESCO (2006) 'Global Education Digest 2006 – Comparing education statistics across the world.' Montreal: UNESCO Institute for Statistics.
13. Saxenian, A. (2002) 'From Brain Drain to Brain Circulation: Transnational Communities and Regional Upgrading in India and China.' Available at http://people.ischool.berkeley.edu/~anno/Papers/scid-2005.pdf [accessed 17 November 2007].
14. Friedman, T. (2005) 'The World is Flat: A Brief History of the Twenty-first Century.' New York: Farrar, Straus and Giroux.
15. Florida, R. (2005) The World is Spiky. 'Atlantic Monthly.' Volume 296 (3).
16. "'Sticky' knowledge is defined as know-how or competence that cannot be separated from the person or organisation containing it." OECD (1999) 'Measuring knowledge in learning economies and societies.' Available at http://www.oecd.org/dataoecd/18/20/1855176.pdf [accessed 17 November 2007].
17. OECD (2005) 'The Benefits of Liberalising Product Markets and Reducing Barriers to International Trade and Investment: The Case of the United States and the European Union.' Paris: OECD.
18. OECD (2006) 'Going for growth 2006.' Paris: OECD.
19. BERR website. Available at http://www.dti.gov.uk/europeandtrade/trade-policy/page10188.html [accessed 16 November 2007].
20. OECD (2007) 'Moving up the value chain: staying competitive in the global economy.' Paris: OECD.
21. A.T. Kearney (2005) 'FDI confidence index.' USA: A.T. Kearney.
22. Universities UK website. Available at http://www.universitiesuk.ac.uk/faqs/showFaq.asp?ID=11 [accessed 17 November 2007].
23. HM Treasury (2004) 'Long-term global economic challenges and opportunities for the UK.' London: HM Treasury.
24. The Times Higher World University Rankings 2007. Available at http://www.thes.co.uk/worldrankings/ [accessed 17 November 2007].
25. Financial services now contribute to over nine per cent of UK GDP. HM Treasury (2006) 'Financial Services in London.' London: HM Treasury.
26. Universities UK (2007) 'Patterns of higher education institutions in the UK: Seventh report.' London: Universities UK.

As a result, there remains a potential mismatch between demand and supply of STEM-skilled people. It is estimated that by 2014, the demand for people skilled in STEM subjects will increase by one fifth, compared to an increase for all other occupations of four per cent.[33]

The UK Government has prioritised skills
Following the Leitch Review, the UK Government has pledged to make Britain's workforce one of the most skilled in the world by 2020.[34] It has also introduced mechanisms to increase the number of young people studying STEM subjects[35] by recruiting more specialist teachers, improving school laboratories and changing the curriculum.[36]

More recently, in England, skills and innovation have been connected through the creation of the Department for Innovation, Universities and Skills (DIUS). Scotland is launching a new skills strategy emphasising lifelong learning.[37] In Northern Ireland, the Skills Strategy set out initiatives to improve productivity[38] and, in 2005, a Welsh Government Action Plan aimed "to increase the demand for high-level skills amongst employers" and the "supply of people with management, leadership and technical skills".[39]

Supporting the innovation that matters to the UK

The UK lags behind on R&D expenditure
To boost UK innovation, the Government has set itself a target of raising R&D expenditure from 1.73 per cent in 2004 to 2.5 per cent of GDP by 2014.[40] To help achieve this, it has introduced a Tax Credit to boost business R&D expenditure.

R&D is an insufficient measure of innovation in the UK's large service sector
R&D expenditure fails to capture all the innovation in the UK, particularly in services which account for 74.4 per cent of UK GVA.[41]

The risk is that by focusing on increased R&D spending, policy will not reach the sectors that drive the innovation that matters most to the UK's economic competitiveness.

Policy needs to recognise the importance of innovation in services
If the UK is to maximise innovation in sectors such as financial services, policymakers need to understand better how services innovate and find ways to maximise their levels of innovation by removing barriers and creating opportunities.

Government initiatives such as research into innovation in services and the formation of the Sector Innovation Groups (SIGs) have placed the UK at the forefront of international innovation research.[42] However, few policy initiatives reach beyond the traditional base of manufacturing-based innovation.

The UK needs to look at ways to support UK service sector businesses to improve their creative and absorptive capacity to develop innovations and to identify and exploit innovations from elsewhere.

A strong but flexible IP regime

Globalisation and digitisation challenge traditional IP structures
Globalisation and digitisation mean that ideas produced in the UK can be duplicated and distributed instantly and at negligible cost into new markets. This threatens to undermine the incentives for firms and individuals to invest in innovation.

But globalised innovation increasingly depends on them
Many businesses are moving away from internal systems of 'closed' innovation. Instead, they are looking externally for innovative ideas, involving customers and users and often collaborating with other companies.

This requires an IP system flexible enough to support investment and participation in this 'open' innovation. It also means that UK organisations have to work with the IP infrastructure in other countries. The many different existing systems can be confusing, often discouraging collaborative activity.[43]

The UK Government is implementing many Gowers Review recommendations
In 2005, the Government commissioned the Gowers Review of Intellectual Property to ensure that it was meeting the needs of the UK in the global economy. The Review's recommendations focused on tackling IP crime and ensuring that rights are well enforced; reducing the costs and complexity of the system; and reforming copyright law to allow individuals and institutions to use content in the digital age. The UK Government is currently taking forward many of its recommendations.[44]

Keeping the UK at a crossroads in the global network of knowledge

As leading-edge knowledge is developed in more locations around the world, and as information flows ever faster between firms and continents,

27. HESA Press Release (27 March 2007). 'India now number 2 provider of overseas students to UK.' Available at http://www.hesa.ac.uk/index.php/content/view/118/161/ [accessed 16 November 2007].

28. HM Treasury (2006) 'Leitch Review of Skills final report.' London: HM Treasury.

29. Ibid.

30. Ibid.

31. Since 1995, the total number of STEM graduates has increased by ten per cent. Although this compares to a rise in general graduation of 25 per cent over the same period. Comparative statistics derived from the HESA, Students and Qualifiers Data Tables: Subject of Study, 1995/96 and 2005/06, available at http://www.hesa.ac.uk/holisdocs/pubinfo/stud.htm [accessed 16 November 2007].

32. HESA (1997-2006) 'First destinations of students leaving higher education institutes, annual data volumes.' From 2002-03 HESA re-worked data used in this report to incorporate omissions in the former First Destinations Supplement.

33. SSDA (2006) 'Working Futures Report 2004-2014: National Report.' Available at http://www.ssda.org.uk/ssda/PDF/Working%20Future%20 20042014%20National%20Summary%20R%20060215.pdf [accessed 17 November 2007].

34. DIUS Press Release (18 July 2007) 'The power to change lives: Government publishes new skills ambitions.' Available at http://www.dius.gov.uk/press/18-07-07.html [accessed 17 November 2007].

35. HM Treasury (2007) 'The Science and Innovation Investment Framework 2004-2014: Annual Report 2007.' London: HM Treasury.

36. Ibid.

37. Scottish Government (2007) 'Skills for Scotland, A Lifelong Skills Strategy.' Edinburgh: Scottish Government.

38. Delni (2006) 'Success through Skills: The Skills Strategy for Northern Ireland.' Belfast: Delni.

39. Welsh Assembly Government (2005) 'Skills and employment action plan for Wales 2005.' Cardiff: Welsh Assembly Government.

40. HM Treasury (2006) 'Science and Innovation Investment Framework 2004-2014 – Next Steps.' London: HM Treasury.

41. National Statistics (2007) 'United Kingdom National Account - The Blue Book 2007.' London: National Statistics.

42. For more information, see http://sigs.intelligus.net/portal/site/sigs/menuitem.9fbc7402895eaf7f42c18110239041a0/?message=&mode=0; and http://www.nesta.org.uk/news/media_centre/news_releases/release.aspx?id=5749 [accessed 17 November 2007].

43. HM Treasury (2006) 'Gowers Review of Intellectual Property.' London: HM Treasury.

44. Ibid.

the UK must strive to maintain its position at the centre of the global knowledge network. To do so, policy needs to facilitate increased flows of people. It must increase businesses' ability to develop relationships and collaborate overseas. And it must seek to exploit the strength of the UK's universities and multinational corporations.

UK businesses are not prepared for international collaboration

Currently, the UK is not well-positioned for international business-to-business collaboration. Many businesses don't realise the importance of collaboration and lack the resources to pursue it. Their understanding of foreign markets is patchy and 80 per cent of export managers cannot adequately do business in even one foreign language.[45] Nearly half of the UK's exporting small businesses have experienced linguistic or cultural barriers, and one in five has lost business as a result.[46]

Building and exploiting nodes into the global network of knowledge

Current research focuses on the role of universities in the innovation system being largely about the production of new technologies; some research further explains their role in producing skilled graduates who can generate knowledge and attract multinational corporations to the UK. However, universities and multinationals perform another function: they are excellent links into a global network of knowledge.[47]

By linking to other leading knowledge centres, universities and multinationals facilitate the flow of people and ideas into and out of the UK. These effects spread into the wider area around such institutions, increasing the pool of knowledge and deepening the labour market, thereby attracting additional investment from companies specialising in similar areas. This virtuous circle helps current innovation but also paves the way for the next wave – ensuring that the UK has the skills, connections and foresight to identify the next generation of innovations.

Building a competitive innovation system in a globalised world

Giving people the right skills to innovate and absorb ideas

The UK must ensure that people possess a full range of technical and cognitive skills, as well as the attitudes essential to innovation.[48] Current policy focuses on the development of basic skills and advanced technical skills, particularly in STEM subjects. This needs to be supplemented by a better understanding of the importance of cognitive skills and by a long-term strategy to embed them across the curriculum from 5-19 years.[49]

Simplifying IP for business

The goal of a 'Community Patent' – a single EU patent – must be vigorously pursued to make cross-European collaboration easier and to simplify the exchange of ideas.[50]

In the meantime, the UK Intellectual Property Office should pursue the Gowers Review's proposal that more support should be offered to UK businesses filing for protection in other countries.[51] UK businesses would also be better protected and their interests advanced if the Government explored approaches similar to those in Creative Commons licences and the Adelphi Charter, which offer a middle ground between the extremes of copyright-control and the uncontrolled exploitation of IP.[52]

Policy should support collaboration across borders

Policymakers have traditionally tried to build collaboration through formal, closed networks, frequently confined to an individual geographical area or sector. Future policy should view innovation as a collaborative exercise across geographical boundaries. In achieving this, universities have a central role to play: the Government should look at how it can support UK universities to develop joint research and exchange programmes with foreign universities.

Ensuring that the UK recognises and focuses on areas of competitive advantage

The current rhetoric around globalisation is too closely focused on threats and not enough on opportunities.[53] Too often, this can lead to a distorted perception of globalisation that can impede the UK from making the most of those opportunities. Only 46 per cent of UK businesses see globalisation as an opportunity, compared to 55 per cent of businesses globally.[54]

In a globalised economy, the UK cannot 'win' on every front, but it can focus its resources intelligently. It should begin by identifying and building on its strengths and focusing on emergent and important areas identified through Foresight-type programmes.[55] It should then embrace globalisation through encouraging collaboration and give UK businesses the skills and tools they need to compete.

45. National Centre for Languages (2006) 'Talking world class, the impact of languages skills on the UK economy.' London: CiLT.

46. Ibid.

47. NESTA (2007) 'Five ways universities drive innovation.' London: NESTA.

48. NESTA (2007) 'Education for Innovation.' London: NESTA.

49. Ibid.

50. European Commission website. Available at http://ec.europa.eu/internal_market/smn/smn42/docs/patents_en.pdf [accessed 17 November 2007].

51. UK-IPO website. Available at http://www.ipo.gov.uk/innovationstrategy.pdf [accessed 17 November 2007].

52. For more information see http://creativecommons.org/ and http://www.adelphicharter.org/ [accessed 17 November 2007].

53. Hutton, W. (2007) 'The Writing on the Wall: Why We Must Embrace China as a Partner or Face It as an Enemy.' London: Little, Brown. For a positive view, see Lord Sainsbury of Turville (2007) 'The Race to the Top – a Review of Government's Science and Innovation Policies.' London: HM Treasury.

54. Grant Thornton (2007) 'International Business Report 2007 UK.' Available at http://www.internationalbusinessreport.com/main/pdfs/IBR%202007%20Country%20Focus%20-%20UK%20FINAL.pdf [accessed 17 November 2007].

55. A Foresight Programme identifies potential opportunities for the economy or society from new science and technologies, or considers how future science and technologies could address key future challenges for society. The UK Government has developed a Foresight Programme. For more information, see http://www.foresight.gov.uk/horizonscanning/ [accessed 17 November 2007].