

Mobility of researchers and engineers

The mobility of researchers and engineers can occur within national or international universities, PRIs and enterprises in the same industry or the same sector of the economy. Mobility of researchers and engineers is driven by a variety of job related, academic, personal and family reasons. The evidence on international mobility suggests that it could be a contributing factor to higher quality research, increased international joint publishing and invention, and contributions to the national research system. Mobility of researchers and engineers is closely related to other issues, such as career opportunities, pay, working conditions, R&D in firms and open science. Public policy can foster the mobility of researchers and engineers by implementing international research strategies, funding for international research projects, talent attraction programmes to enhance research and innovation capacities, and coherent and efficient migration regimes.

What is mobility in science and engineering?

Mobility in science and engineering refers, in general, to doctorate holders in these fields who live and undertake research work abroad for a significant period of time. Mobile doctorate holders are those who have stayed abroad and returned to their home country for professional or personal reasons (OECD, 2008). International mobility often starts at the time of researcher training, since many doctoral students register in a doctoral programme abroad and therefore conduct research in the host country (Auriol, 2010). A number of them will also remain in the host country for a postdoctoral degree or a work position. In addition, large and transnational companies increasingly target international students in their recruitment efforts (Salt, 2008).

Why is the mobility of researchers and engineers important?

The mobility of scientists and engineers can be a catalyst for innovative research and development, creating new ideas, skills and knowledge, and becoming a source of innovation, particularly for universities and PRIs, and become an important source of innovation, particularly for universities and PRIs.

Potential benefits of mobility of researchers and engineers

- Opening up opportunities for universities and PRIs to participate in international knowledge discoveries (e.g. co-authorship and co-patents).
- Improving research and administrative practices of universities and PRIs by providing them international researchers.
- Attracting and possibly retaining highly skilled scientists and engineers through international developing the economy and research systems, and up-scaling innovation activities.
- Generating revenue for universities and PRIs, as well as having spillover effects on the wider urban environment (Florida, 2002).
- Helping middle-income developing and emerging countries build their research capacities, particularly for those who have not had prior access to international graduate education and overseas work experience (OECD, 2008).

Incentives for the mobility of researchers and engineers

- Working conditions: strong drivers of international research mobility include research training and facilities aimed to maximise their work opportunities after doctoral graduation.
- Career advancement: international mobility is also a means of gaining the necessary experience and research funding for research requires mobility in order to gain the necessary international experience.
- University-industry collaboration opportunities are also a factor in international mobility explaining the mobility of scientists from academia to industry (the other was stage of life).

- Economic performance of the native country and the foreign country can have an impact on the international flow of people in general from countries with low GDP per capita to countries with high GDP per capita (Freeman, 2006).
- Cultural and linguistic factors could have a significant impact on the international mobility of scientists. With respect to language and culture, that facilitates understanding and the building of trust (Gertler, 2003).

Barriers to mobility of researchers and engineers

- Family responsibilities: researchers with young children and/or who care for elderly parents have less freedom of mobility, as they are likely to be responsible for young children and/or elderly parents.
- Priorities regarding the research: trade-off between countries researchers with organisations having fewer opportunities for participating in international research programmes if the selection criteria are solely based on research.

What is the evidence on the mobility of researchers and engineers?

The measurement of mobility poses a real challenge to statisticians, mainly because of the difficulty of tracking a moving target. In recent years, OECD has developed better statistics on international mobility. The Careers of Doctorate Holders (CDH) project has introduced new ways of capturing mobility by introducing, on the one hand, a new definition of “internationally mobile doctorate holders” and, on the other, a series of questions on national origin, e.g. the list of countries in which doctorate holders have studied, worked or carried out research and the reasons for mobility (OECD, 2011).

Data also show that international mobility makes a significant contribution to the science workforce in many countries. For example, UK universities have pointed out the importance of international staff in ensuring the continued provision of teaching and research at appropriate levels in key subjects in which there are declining numbers of nationals. In fact, the share of science professionals in the tertiary-educated workforce is frequently higher for migrants in some OECD countries, especially those of Asian origin, than for the native population. In the United States, for instance, over 20% of tertiary-educated migrants from Asia are science professionals, compared with 7.7% of tertiary-educated natives. The international mobility of academic staff may also help countries meet the challenge of aging academic workforces (e.g. in the Netherlands, 47% of the applied science teaching staff in universities were age 50 or more in 2005) (OECD, 2008).

There is also some evidence that the mobility of academics is associated with higher quality output. A study of highly cited researchers suggested that relative national mobility and international research performance may be related (Evidence, 2005). This high-quality international research collaboration is likely to become a key feature of research systems and research labour markets (OECD, 2008). However, the link between increased mobility and increased international joint publishing is not yet empirically proven. There is, however, some support for the link. For example, Bell et al. (2007) suggested that increased collaboration in American academic research was driven by advances in electronic communication and improvements in travel that allowed more conference attendance, enabling academics to meet potential collaborators and initiate working relationships.

What other topics are related to the mobility of researchers and engineers?

International R&D linkages are closely related to:

- Researcher careers, pay and conditions: such factors as earnings, working conditions, and visa regulations and procedures that reduce delays or waive certain requirements for researchers and their families can influence the mobility career choices of doctoral graduates. As this issue is often pertinent to female researchers, recruitment and retainment programmes should be monitored from a gender equality perspective. Actions should be taken if the gender proportions of international mobility schemes are heavily skewed towards

one gender.

- R&D in firms: the development of formal and informal networks of researchers, including partnerships between researchers in firms and in universities, could facilitate the sectoral mobility of researchers.
- Services and information: information and support systems for international researchers (e.g. administrative, legal, linguistic, social, and educational) should be developed at national and institutional levels (universities, PRIs).

What policies can influence the mobility of researchers and engineers?

Public policies can play an important role in stimulating the demand for and supply of internationally mobile researchers and engineers. For example, policy and institutional initiatives to attract foreign and expatriate researchers can have a significant bearing on researchers' decisions to move. The regulatory environment, including immigration rules and research ethics legislation, may also affect where researchers choose to work. A very preliminary comparison of national and organisational budgets and targets suggests important differences in the scale of countries' resources dedicated to mobility, and in the number of human resources in science and technology affected by mobility policies (OECD, 2008). Table 1 shows a range of programmes and strategies that could help to encourage the mobility of scientists and engineers.

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