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The Evolving Diaspora of Talent: A Perspective on Trends and Implications for Sourcing Science and Engineering Work

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ABSTRACT

This perspective paper highlights the changing dynamics underlying the supply and demand for STEM (Science, Technology, Engineering, and Mathematics) talent. As a global ecosystem of innovation emerges, the emerging diaspora of STEM talent networks is potentially a game changing phenomenon affecting where, by whom and how innovation activities are executed. We discuss several emerging trends, such as global sourcing, open sourcing, new on-line STEM talent markets and the shift of organizations becoming mobile workplaces, that have the potential to reshape and define the diaspora of STEM talent network, as well as the organization and conduct of the globalization of innovation. We propose future research agenda by drawing implications on the impact of the diaspora of STEM networks at the country level, company level, as well as individual level.

1. Introduction

1.1. Global organization of talent and work

The dynamics of supply and demand for STEM (Science, Technology, Engineering, and Mathematics) talent are undergoing fundamental change driven by demographics, advances in information and communication technologies, and new approaches for organizing innovation. On the demand side, structural changes in labor markets for STEM talent are driven by a steady decline in young adults selecting to enter STEM careers in the US (see Fig. 1) and EU countries, as well as by demographic forces such as aging of population (Butz et al., 2003; OECD, 1998). On the supply side, emerging economies in Asia, Eastern Europe and Latin America, particularly India and China are predicted to become the source of an increasing availability of STEM talent (Farrell and McKinsey Global Institute, 2006; Schaaf, 2005). The migration of highly skilled workers such as scientists and engineers has given rise to the politics of the "Brain Drain", which focuses on the flow from developing to the developed countries and its implications (Adams and Ghose, 2003; Meyer and Brown, 1999).

Although comparable statistics across different countries are difficult to assess, a UNCTAD (1987) study concluded that 825,000 skilled immigrants entered North American countries between 1960 and 1987, and that the share of developing countries nationals within this population had dramatically increased over the period. Meyer and Brown (1999) have pointed out that data on flows generally do not incorporate international students as skilled migrants. Based on analyses of the National Science Foundation, which provides the most precise and comparable information on this subject, Meyer and Brown (1999) concluded that in 1995, 1.434 million people were of foreign origin among those who have STEM degrees or who work in STEM occupations in the USA and also estimated that close to 400,000 STEM individuals were originally from a developing country and working in the "triad".

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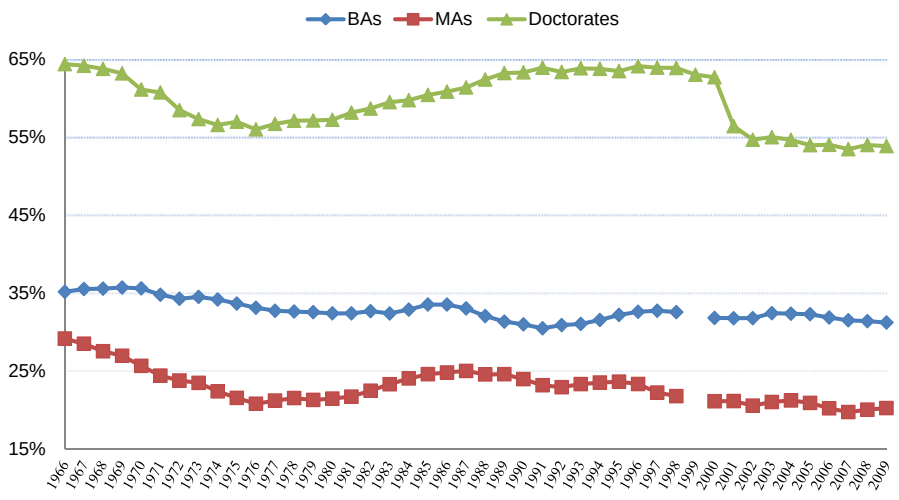

SOURCES: Tabulated by National Science Foundation/Division of Science Resources Statistics (NSF/SRS); data from Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey and NSF/SRS: Survey of Earned Doctorates

Fig. 1. Percentage of S&E degrees awarded in US among all disciplines by degree levels.
Sources: tabulated by the National Science Foundation/Division of Science Resources Statistics (NSF/SRS); data from the Department of Education/National Center for Education Statistics: Integrated Postsecondary Education Data System Completions Survey and the NSF/SRS: Survey of Earned Doctorates.

Although the number of students graduating with STEM degrees is growing in the emerging economies, a large and growing number of these graduates (from developing countries) are pursuing advanced degrees in the developed economies and the "stay" rate is quite high[1] (see Fig. 2 below). Both pull factors (such as prestige, job satisfaction, and higher wages), and push factors (including lack of career choices, lack of funding and/or infrastructure, and political instability, corruption and persecution in the home countries) have been used as explanatory mechanisms for explaining the decisions of STEM expatriates to remain in the host countries (Chang, 1992; Hossain, 1984; Kapur and McHale, 2009; Mahroum, 2000; Skeldon, 2009).

However, the underlying assumption in such "pull" and "push" analyses usually views scientists and engineers as stocks of individual capital assets. Such analyses often fail to capture a very important dimension of such STEM talent flows on the process of knowledge creation, transmission and application (Meyer and Brown, 1999). The sociology of science and technology literature emphasizes the role of the scientific community in sustaining such knowledge creating processes, where socio-cognition is very specialized and is enacted within the community (Kuhn, 1970; Merton, 1979). The tacit knowledge underlying knowledge creation is a collective outcome of communities of practice through formal and informal group interactions and embedded with cultural norms (Latour and Woolgar, 1979). Not surprisingly, studies have shown that repatriated STEM talent is often underutilized in their country of origin. One often cited cause is the absence of an equivalent community of practice in the home country and the challenge of staying connected to their root knowledge-creating communities of practice (Gaillard, 1991).

In recent years, however, have witnessed a restructuring of where innovation activities are undertaken and the growing utilization of STEM talent anywhere in the world. The dynamics underlying the globalization of innovation include advancements in information technology such as the advent and application of the UNIX platform; relational databases that can be accessed and worked on from anywhere at high-speed; rapid expansion and access to ever higher-bandwidth; the relentless cost decline of telecommunications (Kenney, 2003); and in particular the enabling effects of web based social networking and collaboration tools as well as the emergence and adoption of open source practices. The new challenges faced by companies in the developed economies involve how, where and when to access and mobilize expatriate STEM talent around the world and thereby greatly enhance the productivity of knowledge creation globally (Kaplan, 1997; Meyer et al., 1997). The impact of the new social networking tools and practices on expatriate STEM communities are multi-fold ranging from new forms of information and communication channels for potential immigrants (Hammar et al., 1997), to new forms of social and emotional connectivity within the existing diaspora networks (Gurak and Caces, 1992; Meyer, 2001), where cohesive identity increasingly forms around the nature of work practice.

The emerging global ecosystem of innovation also induces changes in the processes of corporate R&D work. An increasing number of western firms have been growing their R&D activities outside their home countries as a way of augmenting and/or exploiting their home based capabilities (Kuemmerle, 1999) as well as, surprisingly, replacing home based capabilities (Lewin et al., 2009). Strategically, companies are increasingly recognizing the importance of globalizing their innovation activities and that access to and mobilizing STEM talent around the world is central to the effectiveness of their global R&D enterprise. In large multinational firms,

[1] Hybrid forms between emigration and repatriation may to some extent bias the definite "stay" rate and anecdotal interviews may provide certain support (Wang, 2012). However, we could not identify empirical data to adjust our trend data.

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