

Introduction to a special issue: Academic knowledge production, diffusion and commercialization: policies, practices and perspectives

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This special issue is a bridging effort to bring together science policy and academic research productivity analysis by focusing on knowledge production, diffusion and commercialization policies and practices. The discussion addresses two major issues: (1) the changing national science policies and their influence on knowledge management in universities; and (2) the impact of policies and organizational characteristics on academic knowledge production, diffusion and commercialization. The purpose of this chapter is to introduce the key debates on the two issues as well as to present the articles included in the special issue.

THIS SPECIAL ISSUE examines academic knowledge dynamics and management through a number of studies that combine and articulate science policy and academic research productivity analyses. The articulation in this special issue of these studies, which tend to be somewhat isolated in the literature, is important as a bridging effort. Academic research productivity studies mostly highlight the determinants of knowledge production at individual and organizational levels while science policy studies tend to focus on the effect of science policies on institutions at national level. The articulation of these perspectives is essential to provide broader, more encompassing perspectives of a set of complex dynamics that involve the production, diffusion and commercialization of academic knowledge. Only with a complex understanding of the phenomena may these studies inform policy-makers, university managers and researchers about

the key challenges affecting academic knowledge, and which policies can be set up to tackle them. Therefore, based on the science policy and research production, diffusion and commercialization literature, we identified the following issues, which guide the articles included in this special issue:

1. The changing national science policies and their influence on knowledge management in universities; and
2. The impact of policies and organizational characteristics on academic knowledge production, diffusion and commercialization.

These issues are contextualized by changing national science policies, *vis-à-vis* structural changes in society and industry, and the acknowledgement that knowledge is perceived as an increasingly important asset in assuring society's well-being and in driving economies forward. In this context, it is important to consider knowledge, not as something static, but rather as something that is in a process of continuous transformation. Knowledge is accumulated, but in its generation new knowledge replaces knowledge that becomes less relevant, emphasizing the significance of the learning process (Lundvall and Johnson,

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1994). Therefore, it is important to assess the determinants that affect the production and diffusion of knowledge: the mechanisms associated with the production of new knowledge have the potential to be different from the production of past knowledge.

It is absolutely critical for policy-makers to be aware of and informed about these changes and, in particular, how the production, diffusion and commercialization of knowledge evolve in universities. This is relevant for two reasons. First, the higher education sector is one of the most important research-performing sectors in most scientific systems and certainly the sector which produces most of the basic research (Horta *et al.*, 2008). Second, learning is a process based on two formal mechanisms that are the fundamental pillars of the mission of the universities: research and teaching.

Naturally, the importance of knowledge and related learning dynamics has not been ignored by governments, which have employed several policy instruments that emphasize research priority-setting, research evaluation and performance-based funding. Public policies have been increasingly prioritizing certain areas of knowledge under the banner of building research capacity, visibility and relevance, even in times of constrained national public budgets (Xielin and Tingting, 2010). Concurrently, universities as drivers of economic growth in the learning society are increasingly embedded in public policies that aim to foster innovation while facing mounting societal demands and financial strain, deriving from shrinking public budgets. Both governments and universities have implemented policies to foster academic production, diffusion and commercialization. The management of knowledge production at universities was also strengthened in order to monitor,

evaluate and enhance knowledge production while accounting for spending efficiency and performance; typical features of the 'evaluative state' (Neave, 1998).

In this framework, research governance became a complex multi-layered, multi-level and multi-actor endeavor (De Boer *et al.*, 2007), and science policies have also become more multifaceted, often combined with higher education and economic policies, to allow for broader systemic impacts and synergies (Clark, 2010). These policies highlighted the role of the third mission of the university. The logic of knowledge commercialization, fostered by governments and university administrators via research commercialization policies, has become institutionalized through establishing technology transfer offices, hiring intellectual property (IP) officers, implementing internal procedures regarding IP rights and licensing, and creating ecosystems for venture capitalists (Geiger and Sá, 2008).

In this changing context, some authors argue that the interaction between universities, industry and government has blurred the traditional boundaries between different sectors (Nowotny *et al.*, 2001), while others argue that these changes have kept the institutional boundaries intact as academics are mainly giving advice to social actors which assume the role of advice-taking (Krücken *et al.*, 2009).

Taking this context into account, it is important to ask about the implications of these new arrangements for academic knowledge production, diffusion and commercialization in different national settings. This is important to be analyzed, when the success of knowledge-related policies — particularly those related to knowledge transfer — has been varied, limited, and path-dependent (Borrás and Kahin, 2009). Therefore, in this special issue, we provide a set of papers which address policy, organizational, and individual levels of analysis.

The first two studies by **Sá and Litwin** and by **Leisyte** focus on how science policies to promote knowledge commercialization have evolved and how universities have responded to them, adapted their practices and designed strategies of their own to foster them at the organizational level. Sá and Litwin examine policy developments in Canada from a national perspective. The authors explore how a variety of policy instruments have been used to foster knowledge transfer. They find that the Canadian Federal Government has used an increasing variety of policy tools to foster university–industry linkages.

Leisyte carries out a comparative analysis between the Dutch and the United States' national innovation systems. She analyses how the Dutch and US governments have attempted to bolster research commercialization in their respective systems, and how regulation and funding policy mechanisms have been used by universities to institutionalize university–industry linkages. She finds that despite the differences in the traditional research governance models, the incentive schemes used in the two countries share

several similarities indicating policy–borrowing and institutional isomorphism. The creation of university–industrial firm linkages is a challenge for universities, as well as governments, partly due to the organizational inertia and the strength of informal institutions. While the first paper concentrates solely on the policy level, the second paper also pays attention to the obstacles of the policy implementation.

To further grasp the complexity of processes shaping knowledge production and diffusion, two further studies focus on the determinants of knowledge productivity. As such, perceiving the determinants that affect knowledge production and diffusion require an in-depth analysis as well. Moreover, since learning is a continuous, dynamic and evolving process, it is important for deepening the understanding of the mechanisms that foster or hamper academic knowledge production and diffusion. These are also bound to change with time as the nature of learning, and with whom one learns, changes. For example, recently it was found that the individual determinants of research productivity had actually little explanatory power (Stephan, 1996). However, since research productivity analyses performed at the organizational level produce mixed findings at best (Von Tunzelmann, 2003) there has been an effort to combine both individual and organizational levels.

Horta and Lacy analyze how individual and organizational characteristics, and particularly the size of research units, affect the research productivity and the information exchange patterns of academic scientists in Portugal. They find that organization size and structure are important in fostering communication among peers. They also find that organizational size does not lead to a greater research output, but to different research output profiles. **Huang et al.** produce a similar analysis, but focus on patenting by academics and engineers in the USA. They find that department incentives, individual preferences and characteristics predict the patent productivity of academics. Still, they find that university patent policy and technology transfer offices play a role in the academics' first-time patenting.

The final two studies in this special issue examine how academic work has been changing towards the diversification of tasks and to what extent these are compatible. **Kitagawa et al.** provide evidence from Sweden by exploring the changing nature of academic work and its diversifying activities. They focus on the involvement of scientists in commercialization and public dissemination activities. They analyze 'high-performing' researchers based in Sweden to argue that there is a strong, virtuous, cyclical model connecting different academic activities.

Ki-Seok Kwon, in his paper, analyzes the relationship between universities' academic research and knowledge transfer activities in South Korea. He shows that publishing and patenting activities and the industrial structure co-evolved closely throughout

time. Additionally, the role of public science policies is identified as key in shifting university–industry cooperation from traditional to high-tech industry, and in promoting a greater interaction in terms of publishing and patenting between public research institutes, universities and industry.

Together, the studies included in this special issue present a broad and complementary vision of key aspects of academic knowledge production, diffusion and commercialization. To achieve such goals, these studies were free from a rigid thematic structure (other than the two guiding issues presented above) or a single methodology. When some of these studies were presented at the Research Management track of the European Higher Education Society Forum in Vilnius in 2009, it became consensual among presenters and the audience that the understanding of issues related to academic knowledge production, dissemination and commercialization needed to follow this rationale. It is this rationale that we embody in this special issue.

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