
Editorial

Knut Blind

Berlin University of Technology
Faculty of Economics and Management
Chair of Innovation Economics
Fraunhofer Institute for Systems and Innovation Research
Karlsruhe, Germany
E-mail: Knut.Blind@TU-Berlin.de

Biographical notes: Knut Blind is a Professor of Innovation Economics at the Berlin University of Technology and Head of the Department of 'Regulation and New Markets' at the Fraunhofer Institute for Systems and Innovation Research in Karlsruhe. He has been active in standardisation research for more than ten years, but also focused on the role of the regulatory framework, including the system of intellectual property rights, for innovation.

1 Introduction

The topic of regulation, innovation and their impact on competitiveness in global markets has been discussed for several decades. However, little has been done to understand the effect of regulation on the ability of industries to innovate and to be competitive. The debate has taken place at the level of anecdotal evidence and with poor systematic empirical foundations. Finally, surveying the studies in the past provides no clear picture whether the negative impacts of regulation outweigh the positive effects. On the level of OECD countries, Bassinini and Ernst (2002) find a negative correlation between the intensity of product market regulations and the intensity of research and development expenditure. Swann (2005) shows that for a significant share of British companies, the content of regulations is both an important source for innovation, but also a severe obstacle for innovation activities. Following the seminal contribution of Porter and van der Linde (1995), several further contributions (*e.g.*, Jaffe *et al.*, 1995; Jaffe and Palmer, 1997) produce ambivalent results regarding the influence of regulation on the development of new environmental technologies. However, most of the approaches assume a static framework, not recognising the long-term dynamic feedback loops between regulation and innovation.

Currently, the discussions among policymakers responsible for innovation policy started to extend the focus on the regulatory framework as a possible policy instrument (Blind *et al.*, 2004). Due to restrictions in public budgets, policymakers have little leeway to increase public spending in research and development in order to promote innovation. Therefore, policies to improve the framework conditions relevant for innovation become more important. Consequently, regulatory impact assessments as an important instrument for regulatory policies, do, meanwhile, not only consider the burden for companies to

fulfil specific regulations, but also take into account possible impacts on innovation. This requires a rather dynamic and open conceptual framework, since product, process or even organisational innovations cannot be integrated in a static approach.

Besides limiting the negative impacts of regulation on the innovative activities of industry, policymakers are starting to look more systematically for options to use specifications of the regulatory framework to promote these activities. Static efficiency concepts are not sufficient to achieve this aim, instead, dynamic frameworks are required which allow at least for temporary static inefficiencies. However, the extension of the traditional objectives of regulatory policies for innovation-related goals needs to be systematically checked for possible conflicts or synergies. For example, the protection of the environment can often be achieved by innovative environmental technologies, which is more likely to be a win-win constellation, whereas the introduction of new pharmaceuticals may be in contradiction to safety considerations, due to the lack of long-term experience with the new products.

In addition to the internal consistencies or inconsistencies between the traditional and the innovation-related objectives of a regulation or a regulatory body, the various regulatory policies along the innovation cycle have to be coordinated in order to exploit possible synergies and avoid unnecessary frictions or even contradictions. For example, regulatory activities focused on the research and development activities in a specific technological area have to be coordinated and timed with regulations fostering the demand side, either by increasing the purchasing power via subsidies for new products or by promoting their acceptance by safety regulations, which take into account new emerging risks.

Successful innovations need a coordinated interplay of all relevant stakeholders of the innovation system concerned. Shaping regulatory policies to foster innovations within the systems of innovation approach requires the involvement of the relevant stakeholders and institutions from the very beginning of the emergence of the regulation until its implementation and revision.

Finally, the relationship between regulation and innovation has to take into account that the regulatory framework is also influenced or pressurised by the progress in science and technology, and is, therefore, an endogenous, and not exogenous, factor in the innovation system. This dynamic dimension represents not only a further challenge, both for regulatory and innovation policy, but also an opportunity to use the regulatory framework for the promotion of innovation.

Taking all these varied and complex dimensions together, which are required for the successful use of the regulatory framework to promote innovation, makes very obvious that this relationship represents a great challenge for theoretical concepts and analyses, empirical investigations and practical policy implementation.

The objective of this special issue is to, first, assemble emerging research and scholarly works that contribute to the theoretical and empirical knowledge base for identifying solutions that would improve the interface between regulation and innovation. In particular, the integration of the principles and methodological approaches of diverse disciplines in conducting scientific studies should lead to the creation of evidence-based knowledge for improving, not only regulatory but also, innovation policies.

The special issue starts with a paper by Montalvo, who proposes a model to generate and validate behavioural indicators for governance of innovation and policy analysis. He explains and predicts the impact of regulation on innovation within a dynamic model in terms of the interaction between regulators and firms. The proposed model explores the

conditions under which the firm would be most likely to innovate. In addition, it aims to enable us to identify the preconditions determining the willingness and ability of regulators to design and enforce schemes that influence the innovative behaviour of the firm.

Following this very general and theoretical starting point, Ragwitz *et al.* introduce the issue of energy. This contribution provides an overview of policy instruments across the European Union and its Member States to promote renewable energy sources in the electricity sector. In particular, existing support schemes are analysed in terms of their effectiveness in achieving efficiency gains. Their findings show that instruments, which are effective, also tend to be efficient. Further, the short- and long-term diffusion of specific renewable energy technologies depended on the support schemes in place. Finally, the paper concludes with a discussion of the compatibility of different instruments to support renewable energy sources with more general energy policy objectives.

The emerging role of wind energy is taken into account by Walz, who analyses the role of the regulation of wind energy as a sustainable infrastructure innovation. Regulation is especially important for infrastructure systems such as wind energy, which are characterised by a triple regulation challenge in the fields of spill-overs of R&D, environmental protection, and access to monopolistic bottlenecks. He uses a heterodox approach to study the effects on regulation, which starts from a system of innovation approach and distinguishes different innovation functions. These functions are used as a bridge to incorporate the various paradigms of the effects of environmental and natural monopoly regulation explicitly into the analysis. The importance of instrument design confirms that the analysis of the interaction between regulation and innovation must be performed on a rather detailed level, which is able to account for the specific characteristics of the technology and the regulation.

Another area of renewable resources is covered by the paper of Decker *et al.* They analyse the regulation and innovation in biogas technology in Germany, Austria and Denmark, which made specific efforts to promote biogas plants being different in the political targets, approaches and initial situation. However, in all countries, the most important incentive to invest in and build a biogas plant is related to regulations concerning the long-term guaranteed payments of electricity produced in biogas plants.

In contrast to the either theoretical or rather qualitative approaches of the previous papers, Schleich applies an econometric approach to analyse the determinants for the diffusion of new technologies in the German steel industry. The empirical findings confirm that the diffusion of these innovations is promoted by energy and material input prices, which are heavily influenced by tax policy.

Technical standards are an important component of the regulatory framework, especially in the area of information and communication technology. Reimers and Li analyse the effectiveness of the standardisation process of the so-called third generation (3G) mobile communications systems and its implications for China's 3G policy. They apply a transaction cost-theoretic framework by distinguishing between two types of transaction costs related to coordination of the development of new complementary products and services, on the one hand, and the communication of knowledge necessary for evaluating products, incorporating new technology from a buyer's point of view, on the other hand.

The final paper by Wu focuses on policy design and implementation to encourage industrial innovation in Taiwan. His paper systematically reviews Taiwan's approach to encouraging industrial innovation by examining the policies designed for each stage of the innovation process, including the shaping of the regulatory framework.

The editor thanks all contributors who responded to the call for papers for this special issue. Furthermore, he would like to thank the numerous reviewers for their critical comments, which certainly helped the authors to improve their papers.

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