



The choice of innovation policy instruments



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ABSTRACT

The purpose of this article is to discuss the different types of instruments of innovation policy, to examine how governments and public agencies in different countries and different times have used these instruments differently, to explore the political nature of instrument choice and design (and associated issues), and to elaborate a set of criteria for the selection and design of the instruments in relation to the formulation of innovation policy. The article argues that innovation policy instruments must be designed and combined into mixes in ways that address the problems of the innovation system. These mixes are often called “policy mix”. The problem-oriented nature of the design of instrument mixes is what makes innovation policy instruments ‘systemic’.

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1. Introduction

The purpose of this article is to discuss the different types of instruments of innovation policy, to examine how governments and public agencies in different countries and different times have used these instruments differently, to explore the political nature of instrument choice and design (and associated issues), and to elaborate a set of criteria for the selection and design of the instruments in relation to the formulation of innovation policy. In the everyday process of policy-making, many instruments are developed as a mere continuation of existing schemes, or with poor consideration of the expected effects. This article argues that innovation policy instruments must be designed carefully and on the basis of an innovation system perspective, so that they are combined into mixes in ways that address the complex problems of the innovation processes. These mixes are often called “policy mix”. The problem-oriented nature of the design of instrument mixes is what makes innovation policy instruments ‘systemic’.

Innovations are defined here as new creations of economic and societal significance, primarily carried out by firms (but not in isolation). They include product innovations¹ as well as process innovations.² Innovation *systems* are the determinants of innovation processes and the innovations themselves. Innovation policy comprises *all* combined actions that are undertaken by public organizations that influence innovation processes.³ The public organizations use innovation policy instruments as tools to influence innovation processes. The choice of policy instruments constitutes a part of the formulation of the policy, and the instruments themselves form part of the actual implementation of the policy. This double nature of instruments suggests that it is important to look at how they are chosen and the praxis with regard to implementation of the policy. This article looks at the first aspect, namely the choice of policy instruments, and focuses on the formulation phase of the innovation policy.

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¹ Product innovations are new – or improved – material goods as well as new intangible services; it is a matter of *what* is produced.

² Process innovations are new ways of producing goods and services. They may be technological or organizational; it is a matter of *how* things are produced.

³ Innovation policy thus *includes* actions by public organizations that *unintentionally* affect innovation.

The *ultimate* objectives of innovation policy are determined in a political process. These objectives may be economic (growth, employment, competitiveness, etc.), environmental, social, related to health, defense and security, etc. How different ultimate objectives of innovation policy should be balanced is an important political issue. The determination of innovation policy objectives is typically done in a complex process, which in democratic societies involves executive government initiatives, parliamentary discussions, public agencies, the civil society, etc. Naturally, the objectives of innovation policy have to do with the different national traditions and forms of state–market–society relations, not to mention the ideology of the government in office. The ultimate objectives of innovation policy are concerned with the important consequences that innovations have for socio-economic and political matters such as economic growth and the environment (mentioned above).

Problems to be mitigated by innovation policy must be identified and specified in innovation terms. A *problem*, in our sense – i.e. from a policy point of view – is, for example, a low performance of the innovation system, i.e. a low innovation intensity (or a low propensity to innovate) of a certain category of innovations (product, process, etc.). In other words, a ‘problem’ exists if the objectives in terms of innovation intensities are not achieved by private or public organizations. Low innovation intensities are the problems to be solved or mitigated by innovation policy. Hence we need to know the innovation intensities for specific categories of innovations in the context of the innovation system.

Innovation policy instruments are, of course, not intended to (and cannot) influence the ultimate objectives (e.g. growth, the environment or the health system) in an immediate sense, because these instruments can only influence innovation processes (i.e. innovation intensities). This implies that the ultimate socio-political objectives must be “translated” into concrete problems related to innovation intensities – problems which can be influenced directly by innovation policy instruments. For example, we need to know how the ultimate objectives of economic growth and environmental protection are related to (certain kinds of) innovations. The objectives expressed in innovation terms can be called *direct* objectives, which are to solve the innovation intensity “problems”. The ultimate objectives can (partly) be achieved by means of fulfilling the direct objectives, i.e. in a mediated way. Hence, innovation policy instruments are selected to achieve the direct objectives – and thereby the ultimate objectives.⁴

In addition, knowing that there is reason to consider public intervention is not enough. An identification of a problem only indicates *where* and *when* intervention is called for. It says nothing about *how* it should be pursued. In order to be able to design appropriate innovation policy instruments, it is necessary to also know the causes behind the problem identified – at least the most important ones ([15]: 234–5).⁵ If our car engine stops, we need to know why it has stopped before we can fix it.

Once there is a general picture of the causes of the policy problems, then it is possible to identify, on this basis, the policy instruments that might mitigate the problems, and, most important, how to combine them into a specific mix. If the main cause of a problem is lack of adequate levels of research, then the different policy instruments for enhancing levels of R&D should be in focus. If there is lack of demand for certain product innovations, then a specific set of demand-side instruments such as public procurement for innovation and specific regulations can be used in an instrument mix that targets that specific problem.⁶

This article studies the role of policy instruments in the definition of systemic innovation policy, the types of policy instruments in innovation policy, the problem-oriented nature that defines the criteria for that design and choice, and the politics involved in that. With this purpose in mind, the next section starts by discussing the importance of the choice of policy instruments in relation to the innovation system, and the three dimensions that are crucial in this regard. **Section 3** identifies the different types of policy instruments and defines their combination in instrument mixes, in a general sense, according to the literature of public administration. **Section 4** takes this up into the concrete area of interest, namely innovation policy, providing examples, and discussing the specificities of policy instrumentation in an innovation system context. **Section 5** examines in detail how these policy instruments are related to the problems that might relate to the different activities of the innovation system, in the understanding that policy instruments shall mitigate the problems that might occur in the system. **Section 6** acknowledges that the choice and design of policy instruments in innovation policy is a political process, and the importance of legitimacy of instruments in the context of advanced democratic societies. Last, the concluding section summarizes the arguments, emphasizing the problem-mitigation approach to innovation policy instruments choice and design, conducted from an innovation system perspective.

2. The choice of instruments

The choice of instruments is a crucial decision regarding the formulation of an innovation policy. This entails three important dimensions. *Firstly*, a primary selection of the specific instruments most suitable among the wide range of different possible instruments; *secondly*, the concrete design and/or ‘customization’ of the instruments for the context in which they are supposed to operate; and *thirdly*, the design of an instrument mix, or set of different and complementary policy instruments, to address the problems identified.

Sometimes innovation policy instruments are chosen on an individual basis, meaning, on the basis of their individual features alone. Typically however, innovation policy instruments are combined in mixes, implying that the selection of instruments takes into consideration their complementary or

⁴ “Problems” and how they can be identified through empirical analyses comparing innovation systems are issues that are discussed in much more detail in **Sections 3 and 4** in Edquist [13].

⁵ A causal analysis might also reveal that public intervention is unlikely to solve the problem identified, due to the lack of ability. That should, of course, prevent policy intervention.

⁶ These issues are often discussed in terms of “policy mixes”. (See for example Flanagan and Uyarra [20] and Serris [21]. We define innovation policy as all combined actions that are taken by public organizations and influence innovation processes (**Section 1**). Therefore it becomes somehow inappropriate to talk about “policy mixes” and we think that “instrument mixes” captures the phenomenon of combination of instruments better.

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