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The 'fit' between forward-looking activities and the innovation policy governance sub-system: A framework to explore potential impacts

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ABSTRACT

Forward-looking activities (FLAs) can influence innovation systems in various ways to a significant extent. This paper focuses on changes induced by FLAs in the innovation policy governance sub-system (IPGSs) of a given national innovation system. Our knowledge is surprisingly limited even on this subset of FLA impacts, despite several decades of practice and non-negligible analytical efforts. We identify key features of FLAs and IPGSs in order to explore hypotheses on the likely 'fit' between different types of FLAs and various IPGSs. Countries selected to illustrate the relevance of our analytical framework include Germany, Greece, and Hungary. Our intention is to contribute to a more refined conceptual framework concerning the role and likely impacts of FLAs. Further, as a better understanding of impacts supports the design of more appropriate and effective FLAs, as well as more insightful evaluations of FLAs, this approach is of practical relevance, too.

1. Introduction

Forward-looking activities (FLAs) have been in the toolbox of science, technology and innovation (STI) policies for several decades. They can influence national, regional and sectoral innovation systems in various ways to a significant extent by introducing new policies and institutions ('rules of the game') governing the behaviour of, and interactions among, the main players, as well as creating new 'nodes' in these systems (e.g. new policy-making bodies, research and innovation performing organisations, or those facilitating these activities). Of these many types of potential changes this article focuses on changes induced by FLAs in the innovation policy governance sub-systems (IPGS) of the national innovation system (NIS). Our knowledge is surprisingly limited even on this subset of FLA impacts, despite several decades of practice and non-negligible analytical efforts. What we know is based on individual case descriptions or evaluation reports – rather than systematic comparative analyses.

A possible reason for this knowledge gap is the wide variety of FLA approaches and methods ranging from highly participatory to expert-based ones and from creativity-driven to evidence-based exercises.[1] Further, R&D and innovation (RTDI) activities, to be influenced by FLAs, are complex in nature. Complexity applies *a fortiori* to innovations systems, as shown by evolutionary economics of innovation. Thus, reconsidering existing theories on innovation systems and our current knowledge on FLAs in a new, systematic way is likely to improve our understanding.

The innovation policy governance sub-system contributes to identifying and prioritising certain policy needs and problems in a given innovation system, on the one hand, and translates insights from FLAs into policy actions, on the other. Overall, analysing actual or exploring potential impacts of FLAs on national innovation systems requires handling a great deal of diversity, both with regards to FLAs and the IPGSs, in which they are embedded.

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[1] We can only indicate the richness and diversity of FLAs by referring to Amanatidou and Guy (2008); Cagnin et al. (2008); Coates et al. (eds) (2010); Fleissner et al. (1998); Gavigan and Cahill (1997); Georghiou et al. (eds) (2008); Gokhberg et al. (eds) (2016); Grupp (Ed.) (1999); Meissner et al. (eds) (2013); OECD (1996); Porter (2010); Salo and Cuhls (eds) (2003). We assume that the interested readers are well aware of the conference series on *Future-oriented Technology Analysis* (FTA) organised by the IPTS (EC JRC) since 2004, the ensuing special issues of *foresight*, *Futures*, *Science and Public Policy*, *Technology Analysis and Strategic Management*, and *Technological Forecasting and Social Change*, the briefs and reports produced by the ESTO Mapping project, the European Foresight Monitoring Network, the European Foresight Platform, as well as several outcomes of actual FLA projects.

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Hence, we present a framework as the basis for exploring hypotheses on the likely 'fit' between FLAs and IPGSs; or from a different angle, on the potential impacts of different types of FLAs in different settings. The relevance of this proposed framework is to be tested by reconsidering actual cases of FLAs, relying on available analyses. This framework could be used by policy-makers who consider launching an FLA project, practitioners designing that, as well as by analysts conducting ex-post evaluations.

The article draws on a rich literature covering various fields of theories from innovation economics, policy governance studies, policy evaluation research, as well as case studies and the authors' practical experience. The conceptual framework, mainly relying on evolutionary economics of innovation and the policy governance literature, is introduced in Section 2. Then we characterise FLAs and IPGSs with the specific aim to explore an interrelated set of hypotheses on the likely 'fit' between different types of FLAs and various IPGSs in Section 3. These observations might contribute to future theorising on FLAs, on the one hand, and could be used as a 'focusing device'[2] when designing or evaluating FLAs in practice. While we believe that our approach can be extended beyond national innovation systems (to sectoral or regional innovation systems), here we concentrate on the national level. The possible use of the proposed framework is illustrated in Section 4 by brief analyses of actual FLA projects conducted in Germany, Greece, and Hungary. We can only make this first step here; for a thorough test more cases would need to be assessed, and then some of our current hypotheses might have to be revised. Finally, Section 5 offers some conclusions regarding the wider applicability of this framework both for the design (or ex-ante impact analysis) and ex-post evaluation of FLAs.

2. Conceptual framework

FLAs do not have a single, all-encompassing theory to underpin them; rather, they rely on a range of – somewhat overlapping – theories and methods, including evolutionary and institutional economics of innovation; other branches of economics; sociology of science and technology; statistics; actor–network theories; political sciences; analyses of policy processes; systems theories; social psychology; theories on communication, co-operation, and participation; as well as decision-preparatory, (project) management and future-oriented methods and techniques.[3] This list is far from being exhaustive, and most likely several disciples of these theories would change the grouping or the 'labelling' used here. That might be an interesting discussion, indeed, for theoretical purposes (Öner, 2010; Piirainen and Gonzalez, 2015). Yet, our intention here is just to indicate the complex nature of FLAs, rather than attempting to provide a meticulous, comprehensive treatise on the congruence of these theoretical bases,[4] let alone to construct a comprehensive, definitive theory of FLAs.

2.1. Evolutionary theorising, FLAs and implications for STI policies

Our discussion mainly draws on evolutionary economics of innovation and political sciences, in particular the policy governance literature. The former provides useful observations to understand the relevance of FLAs from different angles. Uncertainty and change are the underlying notions both for forward-looking activities and analyses on innovation processes and systems.

A principal thesis in evolutionary economics is that "innovation involves a fundamental element of uncertainty, which is not simply the lack of all the relevant information about the occurrence of known events, but more fundamentally, entails also (a) the existence of techno-economic problems whose solution procedures are unknown, and (b) the impossibility of precisely tracing consequences to actions" (Dosi, 1988: 222 – emphasis added). Thus, *optimisation* – the cornerstone of mainstream economics – is excluded on theoretical grounds.

The notion of uncertainty is of fundamental importance not only for theoretical analyses; it also has several policy implications. First of all, relying merely on analyses of the current state, performance and deficits of innovation systems as the basis for devising STI policies is insufficient: this approach ignores the fact that the future can be (structurally, fundamentally) different from the past and the present. No doubt, tackling current shortcomings is necessary, but – in view of uncertainty – it must be complemented by forward-looking approaches to policy development and governance.

Secondly, dealing with future developments has been pursued for many years under the heading of forecasting, which is based on the extrapolation of (supposedly) known trends. The space of events, in which *forecasting* can be meaningful is strictly limited: the only certain – and thus easily predictable – feature of innovation activities is that most of the underlying technological, business, and societal trends can change quite radically even in the space of 10–15 years.[5] The scientific and policy relevance of forecasting is thus limited, as it ignores the existence of fundamental uncertainty associated to innovation.

From a policy perspective, therefore, new methods are required, which can take uncertainty into account during a decision-preparatory process. Certain types of FLAs, most notably *foresight*, are prominent from this angle, for two reasons. First, it is capable of dealing with uncertainty by devising multiple (fundamentally, qualitatively different) 'futures' (visions of future, future states). Second, participatory FLAs – that is, foresight processes – can reduce uncertainty, too, because participants can align their endeavours once they arrive at a shared vision. To this effect, however, it is a necessary condition to involve the major stakeholders, who not only can enrich outlooks on multiple futures drawing on their wide-ranging knowledge, experience and perspectives, but also significantly influence the underlying trends by

[2] This metaphor was probably first used by Rosenberg (1969), and then frequently used and extended by STS and systems of innovations scholars. In a recent interpretation, a focusing device "helps to see, understand and control phenomena that could not be seen, understood or controlled without using this (or a similar) concept. In this sense it does what theory is expected to do: it helps to organize and focus the analysis, it helps to foresee what is going to happen, it helps to explain what has happened and it helps to give basis for rational action." (Lundvall, 2007: 99)

[3] The order, in which these disciplines are listed here, does not indicate their importance in any sense. The literature on these strands of theories is so huge that any attempt to identify the most important contributions would be pretentious; hence only a few pieces of work can be referred to here, in a somewhat arbitrary way: Bauchspies et al. (2006); Bijker (2010); Dosi et al. (eds) (1988); Edquist (Ed.) (1997); Fagerberg et al. (eds) (2005); Fagerberg et al. (2012); Freeman (1994, 1995); Georghiou et al. (eds) (2008); Hackett et al. (eds) (2008); Haegeman et al. (2013); Hall and Rosenberg (eds) (2010); Jasanoff et al. (eds) (1995); Joerges and Nowotny (eds) (2003); Latour (2005); Lundvall (Ed.) (1992); Martin (2012); Metcalfe (1998); Nelson (1995); Nelson (Ed.) (1993); and Pavitt (1999). Needless to stress, when a given FLA project addresses the futures of a certain S&T, economic, societal or environmental domain, it also relies on the disciplines that are relevant to the specific domain(s) or challenge(s).

[4] A diversity of theoretical underpinnings, approaches and methods can be a rich and valuable resource in the early phase of formation of an epistemic community, but it could turn into an obstacle once the community becomes more established. „Starting with the very first FTA conferences, participants have signalled their concern that an excessive disparity of interests, theoretical starting points, terminologies and expected outcomes could undermine the utility of such gatherings for both researchers and policy makers. (…) a lack of shared sense-making frameworks might make it impossible to determine if presentations and debates at FTA [conferences] contribute to a deeper understanding of far-flung experiences and research or, on the contrary, simply provoke conflicts and confusion due to misunderstanding. (…) All of which threatens to undermine the credibility and relevance of anticipatory thinking for decision-making." (Marinelli et al., 2014: 2–3)

[5] Obviously, there are certain trends, e.g. demographic ones, which are not directly influenced by RTDI activities, on the one hand, and their 'stability' (predictability) extends to a much longer time horizon (in this case around 40–50 years), on the other. Also, the pace and intensity of RTDI activities – and hence their impacts on major technological, business, societal and environmental developments – vary significantly across time (different historical periods) and countries (socio-economic systems).