Editorial

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1 Introduction

Innovation is increasingly acknowledged as essential for value creation in modern economic systems, and the role of innovation management may be seen as a strategically important catalyst affecting the future growth. Up the mid-1990s, a linear-supply driven view of the innovation process prevailed according to which reinforcing the scientific and technological resources of a region would automatically generate economic growth. The rationale behind policy intervention was the 'market failure argument', where there is a need to support investment in knowledge, which would otherwise be under-funded by the private sector because of the public good nature of the output and excessive risks associated to these kind of investments.

However, in the last decade theoretical thinking has evolved from a linear understanding of the innovation process, where scientific advances stem from the knowledge-producing sector and are progressively transferred to the economic sector, to a more interactive vision, accepting the idea of an open view of the firm's environment, where innovation arises from complex feed-back loops between the market place and the firm, between various units of firms, between the firm and the sources of knowledge, emphasising the concept of a 'regional innovation system' that shifts the focus from the production system to the institutional system of a geographical area. This new paradigm has required a radical change in the design of the measures, programmes and policies supporting the innovation process. Henceforth, over the last decade, together with the traditional policies and programmes devoted to the upgrading and creation of R&D capacities, and to the fostering of technology transfer centres and mechanisms in order to facilitate the process of industrial absorption of technologies created in the academic or

public research laboratory, the innovation supporting framework has evolved into a multipurpose, multiactor policy tool, with a more horizontal focus of its objectives.

Such a change in policy emphasis implies a corresponding change in the evaluation methodology, as the 'traditional' mode of evaluation of one single instrument based on control and audit concepts which addresses multiple participants may be insufficient to assess its contribution to innovation capability building and the innovation performance of the individual actors. Different from the evaluation of the R&D programmes which is relatively easy to conduct, because of the fairly small range of R&D policy instruments that are usually pursued, and the similarly limited range of impacts that are typically looked for (i.e. publications, citations, scientific prestige and number of patents), innovation programmes aimed at supporting the systemic and highly decentralised nature of innovation come in many forms in contrast, and the impacts on industrial performance are similarly diverse. In this new framework, evaluations should be integrated in the planning of a policy measure to be effective and a clear evaluation strategy should be in place at the planning phase of the policy measures design.

This Special Issue collects papers that cover several aspects of innovation evaluation and assessment.

In the last decade, assessing academic research productivity considering the patenting and not only the publication activity has become a major concern of policy makers but also the scholars. Research productivity measured using patent-based indexes is considered as a useful measure of the effectiveness of scientists efforts to produce useful knowledge that has both scientific value and potential commercial application. The paper by lo Storto provides a theoretical framework and a method based on patent analysis to investigate some determinants of university research productivity. This framework is based on the assumption that university and public lab research productivity is dependent on the knowledge search behaviours pursued by their scientists. Three dimensions of search are considered by the scholar: search type, search focus and search dynamics. Using data relative to 873 biotechnology patents granted, from 1960–2007, to 255 academic researchers affiliated to 36 Italian universities, he investigates the relationship between the research productivity of a university institution and the knowledge search behaviours pursued by its academic staff. Indexes to qualify knowledge search are built and measured. Findings show that two different profiles of knowledge search behaviours clearly emerge, the first one associated to high research productivity and the latter to low research productivity.

Innovation is a complex process in which several actors are involved and interact to create and transfer useful knowledge and technology. Science and technology parks (STPs) – perceived as a central node of the regional and national innovation systems and a platform facilitating the creation of knowledge and its transfer to the economy – have been henceforth proliferating since the 1960s. STPs are indeed expected to act either as a catalyst that stimulates and supports the start up of high-tech small companies or an industrial policy instrument useful to contribute to the re-industrialisation of a given area or eliminate the so-called 'shadow areas' (Bigliardi et al., 2006), thus holding a relevant position in the political agenda of a country innovation policies. However, even though STPs have largely diffused both in developed and less developed countries, there are still doubts relative to their actual effectiveness and capability to generate value added. Landoni, Scellato and Catalano in their paper underline that a large part of the literature is focused on the measurement of economic and financial performance of firms located in the parks, while limited attention is given to assessment of the impact that Science Parks

have on local development and the scientific and technological performance of the actors located in the Park. They suggest the adoption of a multilevel comparative approach to analyse STPs performance. Using the Area Science Park – Trieste as a case study they compare the scientific and technological outputs of the actors located in the STP with the outputs of other actors belonging to the local (Trieste city in this case), the regional and the national system of innovation. They find that the presence of the Area Science Park – Trieste has significantly contributed to the development of a strong scientific base, one of the most relevant in Italy, and of a local innovation system.

The Lisbon strategy has made innovation a top priority and the European Union has developed a comprehensive policy agenda for this purpose. In particular, it has been acknowledged that the public sector has an important role to play as a catalyst for innovation, with potentially important spill over effects, and improved and transformed public services that can contribute significantly to the achievement of the Lisbon goal of making Europe the most dynamic and competitive, knowledge-based economy by 2010 by improving citizens' quality of life, by supporting the single market in areas such as citizen mobility and by reducing administrative burden on private companies. In this context, the innovative use of ICTs can act as a powerful catalyst and a key enabler in transforming public services. ICTs are identified as drivers of innovation, being both a tool capable to transform government and business models, work methods and trade and consumption patterns, and an instrument for improving the quality of life of people. The innovative use of ICTs can also make a significant contribution to achieve Europe's sustainable development goals. They allow to improve efficiency and enhance quality in the exercise of those competences through cooperation between administrations, and provide inclusive services playing a key role in reducing exclusion. However, innovation in the public sector is typically much more difficult than in the private sector, and designing and implementing policies and tools to support innovation in the public sector are a formidable challenge for a number of reasons. In the public sector, the crucial incentive of the market is missing. Furthermore, while the private sector has a clear, quantifiable goal (maximising profits) and has relatively clear-cut constraints (laws, regulation and capital), the public sector has a variety of complex goals which cannot be easily quantified and evaluated, which are often not easily, causally, attributable to the activities of the public sector, and cannot easily be compared in terms of cost-benefit in order to decide on efficient allocation of resources. The paper by Gaudino and Moro reports some major findings of a research project carried out by the Evaluation Unit for Public Investment Projects and Programs Assessment of the Puglia Regional Administration.[1] The project was aimed at evaluating the implementation process of the Puglia Integrated Regional ICT Network[2] (RUPAR) and main effects of penetration and enhancement of e-government in order to support policy maker decisions to successfully implement the Information Society's new regional strategy. RUPAR makes it possible to interconnect different administrations with a service infrastructure that has been available to local authorities since December 2003, and was financed by using EU and national funds. Findings show that organisational and users-skills barriers remain major obstacles to an effective implementation of an integrated programme for creating an information and communication technology network for local governments.

As the output of R&D is uncertain for the specific nature of this latter, private companies are usually reluctant to invest a large amount of money in R&D irreversible capital when uncertainty substantially increases (Dixit and Pindyck, 1994). However, scholars found that public funding for R&D can mitigate the negative incentive of market

uncertainty to invest in R&D of private companies (Czarnitzki and Toole, 2007). Indeed, public funds, policies and instruments for R&D make it possible to stimulate private R&D investment, enhance collaboration among universities, public research labs and private companies, and support the gain of efficiency of research institutions and universities. Modelling within a strategic perspective how value is created through R&D and identifying determinants of value creation can be useful to design effective public incentives and policy measures to support private companies R&D. According to Coccia, a major issue is to decide how much to invest and how to invest in R&D to stimulate innovation and technology transfer supporting economic development. Using data from the Eurostat database, the scholar has implemented an econometric study to analyse the relationship between public and private financing in the field of R&D as well as their interaction with productivity growth. In particular, he found that public and private R&D expenditures are complementary. However, the relative amount of public expenditure has to be lower than the private one to increase country productivity in the long run and produce spillover effects. He also emphasises how the structure and specificity of National Systems of Innovation, and size and level of country development have an influence on the effectiveness of the public to private R&D expenditure ratio.

The real option framework is generally recognised as being useful to discover the hidden value of R&D opportunities. Tseng and Wu using data relative to a sample of 101 Taiwanese firms and a real option framework, examine the relationship between R&D value and R&D capital, patent life time, volatility and risk free rate. As a final output of their investigation, they find that R&D value increases with these variables.

Even though both technological and market uncertainties are usually considered detrimental to R&D investment and discourage private companies to invest in R&D, mechanisms commonly used by governments, policy makers and funding agencies to decrease uncertainty may discourage valuable innovations as they may lead to "unfavourable situations, such as rigid routines that hinder innovative new options or protective niches that foster less-adapted technology" (van Lente, this issue). Three approaches – according to van Lente – may overcome the limitations of traditional approaches: the *Constructive Technology Assessment*, the *Strategic Niche Management* and the *Techno-Economic Networks*. However, the scholar underlines that "[…] no approach can just 'deliver' a specific desired technology as developments are non-linear and branching", while it is necessary "[…] to monitor, evaluate and optimize the processes by which the technology is shaped and stimulate learning between all parties involved".

Van Horne, Poulin and Frayret analyse how collaborations among university, industry, intermediary organisations and governments create value. They build a conceptual framework to understand how value generated by these collaborations is perceived and captured by each actor. Their framework may be also a useful tool to govern the development of the network between the collaborating actors along the stages of the innovation process in order to increase value. They also suggest tangible and subjective measures to measure, compare and benchmark performance.

Effects and impacts of publicly funded R&D programmes can be assessed in several ways and using different frameworks and evaluation concepts. Traditional evaluation methods use economic indicators, but these methods are unable to isolate the impact of the particular programme or policy under evaluation from the general economic and social background bias due to the intricate and complex network of more or less integrated linkages that characterise the regional innovation system (Georghiou, 1999;

Georghiou and Roessner, 2000). In this context, 'additionality' has become a leading concept in evaluating the impact of policy measures and programmes aimed at stimulating R&D (Luukkonen, 2000). However, as McPherson and McDonald underline in their paper, there is a debate relative to the theoretical justification and the correct implementation of the additionality framework in measuring added value of innovation and R&D policy instruments. In particular, they make a review of the implementation of the framework across a number of micro-evaluation projects relative to regional policy interventions and some innovation-related programmes. Their study identifies the limitations of the framework based on the 'Type I additionality' concept, but, in the same time, it also confirms its usefulness (Type II, especially) as an evaluation method.

References

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Notes

[1]Nucleo di Valutazione e Verifica degli Investimenti Pubblici (NVVIP).

[2]Rete Unitaria della Regione Puglia.