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INNOVATION ASSESMENT IN THE EUROPEAN UNION. NATIONAL AND REGIONAL APPROACHES

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Abstract. Innovation is a priority of all European Union Member States and various policy measures and support schemes for innovation have been implemented, both at national and regional level. This paper focuses on the European experience in implementing regional innovation projects benchmarking, considering three main European innovation scoreboards.

1. INTRODUCTION

Innovation is a key factor in Europe's global competitiveness, encompassing new technologies, successful production methods, improved services, innovative management practices, and it is also a tool for the transfer of know-how, experience and good practice at both national and regional levels. The diversity of regional innovation management measures and schemes in the European Union mirrors the diversity of the economic conditions and political priorities in the Member States. The new 2007-2013 National Strategic Framework of the European Union has stressed the role of regional development policy for increasing national competitiveness and productivity. In this sense, regional policy should maintain distinctive characters even if it has to be strongly integrated with the objectives of the national policy. The regional perspective aims to become a focal point for innovation management.

The European Commission's Enterprise and Regional Policy Directorates-General have jointly implemented two complementary programmes – Regional Innovation and Technology Transfer Strategies (RITTS) and Regional Innovation Strategies (RIS).They address two main objectives: (1) To improve the capacity of regional actors to develop policies which take into account the real needs of the business sector and the strengths and capabilities of the regional innovation system; and (2) To provide a framework within which the regions can optimise policy decisions on future investments in research, innovation and technology transfer initiatives.

In this context our paper addresses the problem of the effects of implementing EU regional innovation projects and the statistical measurement of their impact focusing on three main European innovation scoreboards.

2. THE EUROPEAN INNOVATION SCOREBOARD

The European Innovation Scoreboard developed a methodology for innovation assessment and covers a list of 26 indicators, measuring how countries are good at transforming their innovation assets into innovation results. In order to capture the complex, multidimensional nature of the innovation process a composite indicator is needed. It is obtained by aggregating a number of key variables, and expressing the result in the form of an overall index.

Table 1 - The European Innovation Scoreboard Indicators

INPUT - Innovation drivers	
1.1	S&E graduates per 1000 population aged 20-29
1.2	Population with tertiary education per 100 population aged 25-64
1.3	Broadband penetration rate (number of broadband lines per 100 population)
1.4	Participation in life-long learning per 100 population aged 25-64
1.5	Youth education attainment level (% of population aged 20-24 having completed at least upper secondary education)
INPUT – Knowledge creation	
2.1	Public R&D expenditures (% of GDP)
2.2	Business R&D expenditures (% of GDP)
2.3	Share of medium-high-tech and high-tech R&D (% of manufacturing R&D expenditures)
2.4	Share of enterprises receiving public funding for innovation
2.5	Share of university R&D expenditures financed by business sector
INPUT - Innovation & entrepreneurship	
3.1	SMEs innovating in-house (% of all SMEs)
3.2	Innovative SMEs co-operating with others (% of all SMEs)
3.3	Innovation expenditures (% of total turnover)
3.4	Early-stage venture capital (% of GDP)
3.5	ICT expenditures (% of GDP)
3.6	SMEs using non-technological change (% of all SMEs)
OUTPUT – Application	
4.1	Employment in high-tech services (% of total workforce)
4.2	Exports of high technology products as a share of total exports
4.3	Sales of new-to-market products (% of total turnover)
4.4	Sales of new-to-firm not new-to-market products (% of total turnover)
4.5	Employment in medium-high and high-tech manufacturing (% total workforce)
OUTPUT - Intellectual property	
5.1	EPO patents per million population
5.2	USPTO patents per million population
5.3	Triadic patent families per million population
5.4	New community trademarks per million population
5.5	New community designs per million population

Source: European Innovation Scoreboard 2006. Comparative Analysis of Innovation Performance, 2006, p.7

Innovation is a non-linear process and a particular emphasis has been given to five categories that cover different key dimensions of innovation performance: innovation drivers measure the structural conditions required for innovation potential; knowledge creation measures the investments in R&D activities; innovation & entrepreneurship measures the efforts towards innovation at the firm level; application measures the performance expressed in terms of labour and business activities and their value added in innovative sectors, and intellectual property measures the achieved results in terms of successful know-how.

New evidences show that an even performance on all dimensions is a positive driver for a strong overall innovation performance, therefore suggesting to rather investing in areas of marked weaknesses. Table 1 shows the sub-indicators of the five groups which are aggregated into the final synthetic innovation index.

The Summary Innovation Index (SII) provides an overview of the overall national innovation performance, with Sweden, Finland, Switzerland and Denmark as the European innovation leaders. Comparing the current performance as measured by the Summary Innovation Index SII on the vertical axis against short-run trend on the horizontal axis, the EU countries can be divided in the following clusters (Figure 1):
- Sweden, Switzerland, Finland, Denmark, Japan and Germany are well above the EU average, representing the ***innovation leaders***.
- The US, UK, Iceland, France, Netherlands, Belgium, Austria and Ireland are still above the EU average, but below the leaders, therefore are considered ***innovation followers***.
- Slovenia, Czech Republic, Lithuania, Portugal, Poland, Latvia, Greece and Bulgaria form the group of ***catching-up countries***, with Summary Innovation Index scores well below the EU average, but with faster than average innovation performance improvement.
- Estonia, Spain, Italy, Malta, Hungary, Croatia and Slovakia are the ***trailing countries***, with scores far below the average and innovation performance growth which is either below or only just above that of the EU25.
- Cyprus and Romania form a separate fifth cluster of ***fast growing catching-up countries***, the former being one of the smallest EU countries and the latter starting from very low levels of innovation performance; nevertheless this cluster is less robust than the others and therefore may not be seen as a real cluster.

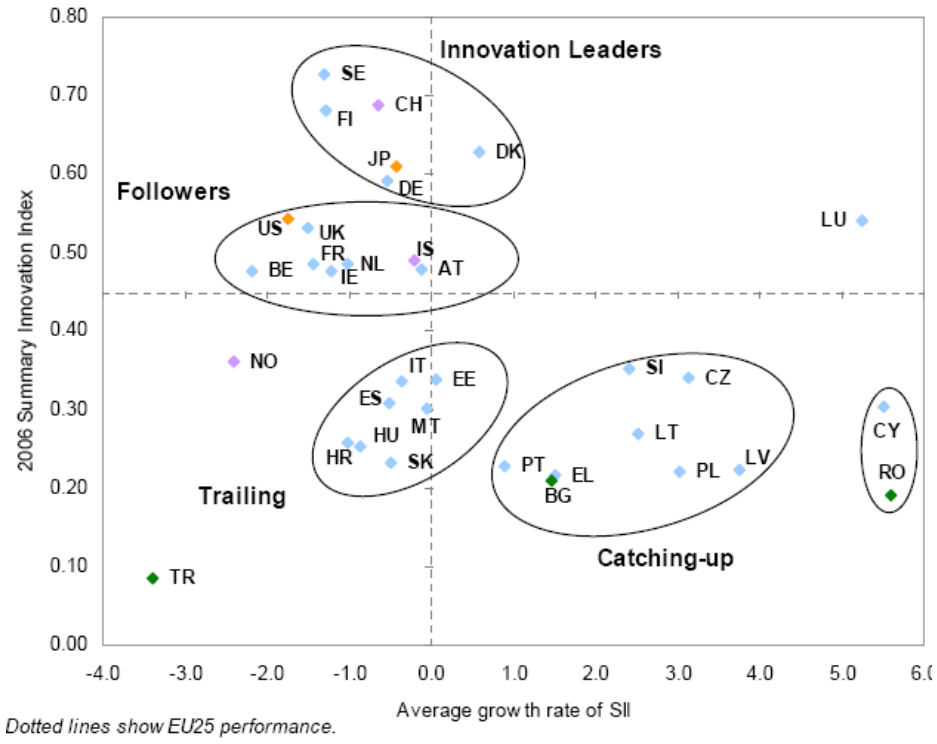

Figure 1. Clusters of countries by Summary Innovation Index and its growth rate
Source: European Innovation Scoreboard 2006. Comparative Analysis of Innovation Performance, 2006, p.9.

3. REGIONAL INNOVATION SCOREBOARD

Regional data are available for 7 of the 26 variables in 2005 European Innovation Scoreboard indicators (Table 2).

Table 2. Indicator definitions for the Regional Innovation Scoreboard

Indicator	Numerator	Denominator	Interpretation
Human Resources in Science and Technology – Core (% of population)	Number of persons who have successfully completed education at the third level in a S&T field of study and who are employed in S&T	Total population as defined in the European System of Accounts (ESA 1995)	Data on Human Resources in Science and Technology (HRST) can improve our understanding of both the demand for, and supply of, science and technology personnel
Participation in life-long learning per 100 population aged	Number of persons involved in life-long learning	Reference population is all age classes between 25 and 64 years inclusive	Individuals need to continually learn new ideas and skills or to participate in life-long learning.
Public R&D expenditures (% of GDP)	Difference between GERD (Gross domestic expenditure on R&D) and BERD (Business enterprise expenditure on R&D)	Gross domestic product as defined in the European System of Accounts	Trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth of the EU. Research and development spending is essential for improving production technologies and stimulating growth.
Business R&D expenditures (% of GDP)	All R&D expenditures in the business sector (BERD)	Gross domestic product as defined in the European System of Accounts (ESA 1995)	The indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sector (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories.
Employment in medium-high and high-tech manufacturing (% of total workforce)	Number of employed persons in the medium-high and high-tech manufacturing sectors	Total workforce includes all manufacturing and service sectors	An indicator of the manufacturing economy that is based on continual innovation through creative, inventive activity. A better indicator than using the share of manufacturing employment alone, since the latter will be affected by the hollowing out of manufacturing

Employment in high-tech services (% of total workforce)	Number of employed persons in the high-tech services sectors. (post and telecommunicatio n, information technology including software development and R&D services	Total workforce includes all manufacturing and service sectors.	The high technology services provide services directly to consumers, such as telecommunications, and inputs to the innovative activities of other firms in all economy. It can increase productivity throughout the economy and support the diffusion of a range of innovations.
EPO patents per million population	Number of patents applied for at the European Patent Office (EPO), by year of filing.	Total population as defined in the European System of Accounts	The capacity of firms to develop new products will determine their competitive advantage. One indicator of the rate of new product innovation is the number of patents.

Source: 2006 European Regional Innovation Scoreboard, p.4.

The European Regional Innovation Scoreboard used a composite indicator - the Revealed Regional Summary Innovation Index which is calculated as the weighted average of the re scaled values for Regional National Summary Innovation Index and the Regional European Summary Innovation Index. It locates *local* leaders by taking into account both the region's relative performance within the EU and the region's relative performance within the country.

4. SPECIFIC REGIONAL INNOVATION SCOREBOARD. EVIDENCE FROM ITALY

Lazio is a region in Italy to produce its own Regional Innovation Evaluation (Lazio Region Innovation Scoreboard), a tool based on the European Innovation Scoreboard model by adjusting the European methodology to the local needs. Adding new indicators to the original 7 indicators of EIS, it measures the level of innovation of a territorial area through a summary of more than 20 specific indicators covering both economic and industrial aspects and the creation and transmission of knowledge. A complete set of regional indicators allows internal benchmarking (within the Lazio region), competitive benchmarking (among 20 Italian regions) and functional benchmarking (focusing on particular areas). The indicators are covering the following fields:

1. Education: 1.1 S&E graduates (‰ of 20-29 years age class);1.2 Population with tertiary education (% of 25-64 years age class); 1.3 Employed persons participating in training and education activities (% employed adults).

2. Employment: 2.1 Employment in medium-high and high-tech manufacturing (% of total labour force); 2.2 Employment in medium-high and high-tech services (% of total labour force); 2.3 Labour productivity in SMEs

3. R&D: 3.1 Public R&D expenditure (% of GDP); 3.2 Business expenditure on R&D (% of GDP).

4. Patents: 4.1 EPO high-tech patent applications (per million population)

5. Innovation: 5.1 Enterprises innovating in-house, 1998-2000 of enterprises (% of total); 5.2 Innovation expenditures per employed person, 2000; 5.3 Enterprises that introduced new products or processes, 1998-2000 (% of all enterprises innovating in-house); 5.4 Venture capital in high-tech enterprises (% of GDP).

6. Spread of new: 6.1 Internet access by households (% of households) technologies; 6.2 Number of enterprises with a website (% of total enterprises); 6.3 Population of Municipalities with computerized services; 6.4 ADSL coverage (% of population).
7. Performance, dynamism: 7.1 Volatility rate of enterprises and quality; 7.2 High-tech export as % of total export of enterprises; 7.3 IT expenditure per employed person.
8. Competitiveness: 8.1 Capital accumulation rate; 8.2 Foreign investment attraction; 8.3 Development rate of "services for enterprises".

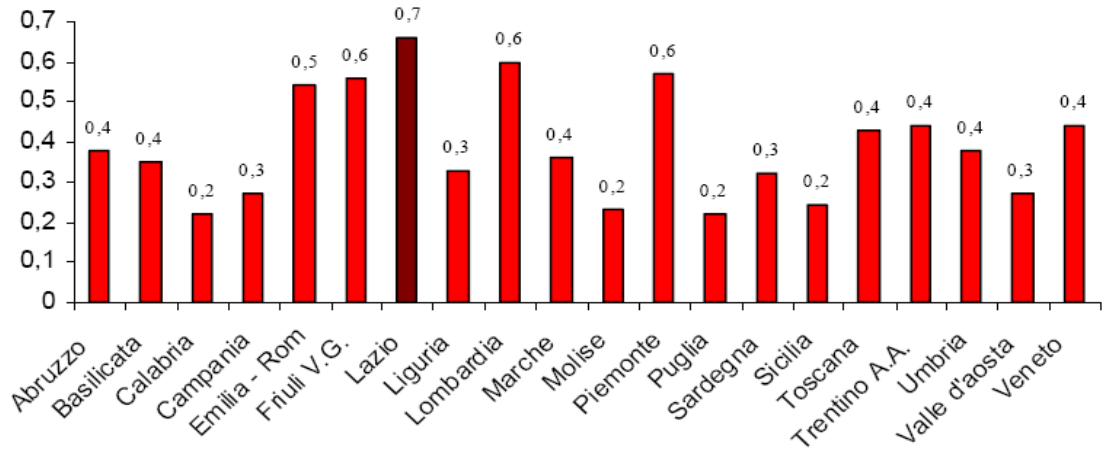

Figure 2. Regional values of the Innovation Synthetic Index, Italy, 2003
Source: The Region Lazio Innovation Scoreboard (RLIS 2003)

Many research and development statistics highlight Lazio as one of the dominant and most dynamic regions in terms of R&D and innovation in Italy. According to the most recent data from the Regional Innovation Scoreboard, among the Italian regions, Lazio has the highest value of the composite index (0.57). Lazio is also one of the best performers in terms of innovation input-output indicators. Likewise, the 4th Regional Innovation Scoreboard developed by the Lazio region has further confirmed the dynamism shown in the last few years acknowledging the region's leadership in terms of innovation (Figure 2).

5. CONCLUDING REMARKS

The developed national and regional benchmarking tools to measure innovation are now being put to use in a European setting, looking at impact assessment and benchmarking of innovation policy. The results of the evaluation have given policy-makers a useful summary of the strengths and weaknesses of the region's innovation performance, allowing them to see where improvements need to be made. Businesses are also finding the scoreboard increasingly useful, bigger companies using it to plan improvements in their innovation activity.

The scoreboards have further developed into valuable tools for a range of policy-makers and they have proved to be an important source of information for local decision-makers when they drew up regional programmes to support innovation

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