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The IPTS REPORT

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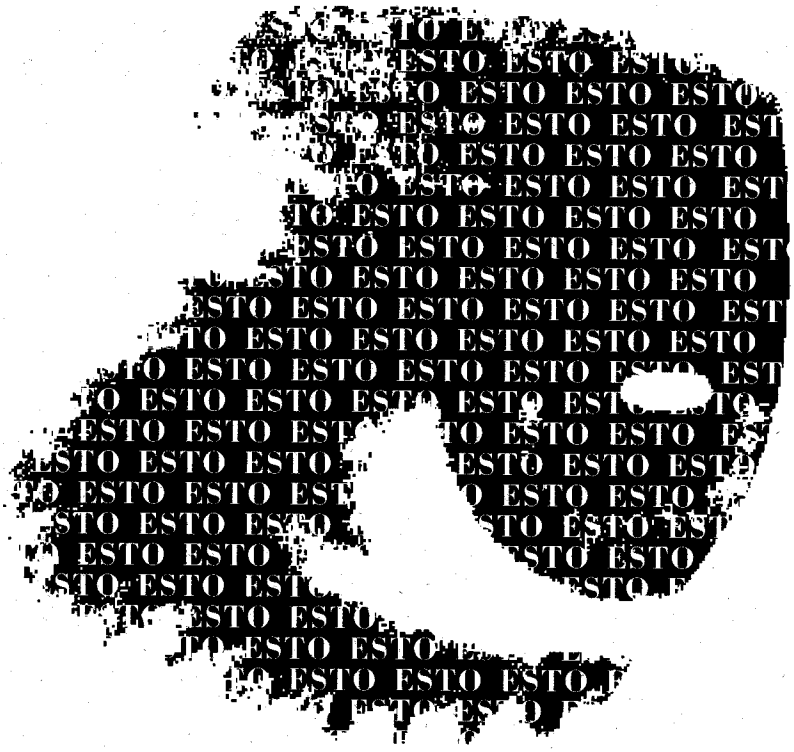

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pean Union has now a significant gap with its main competitors in investment in RTD, particularly RTD investments by the private sector. At the same time, despite the many advances in completing the Internal Market, specific problems remain, particularly in the area of innovation and its diffusion, hampering competitiveness probably as much as the increasing gap in RTD investment. This can be easily acknowledged once the concept of innovation is understood as not being confined to technological improvements but also encompassing organizational aspects.

Employment on the other hand, has been one of the major areas of long-term policy concern in the EU since the dramatic rise in unemployment rates in the late 70s. The persistence of high unemployment rates reflects a variety of structural problems: the fragmentation and national regulation of product and service markets, the (lack of) response to innovation and competitiveness challenges and the structure of EU labour markets.

In other words, many different factors explain Europe's performance in competitiveness and employment. RTD and innovation undoubtedly play a key role since they affect firms' long-term capacity to stay in the market as active players, maintain and renew their range of products and services and ultimately create the conditions for sustainable employment. For open economies such as the European ones, any successful employment policy has to rely heavily on economic competitiveness. Competitive economies attract investors and create wealth and jobs. Economies with poor performance on the competitiveness front are unlikely to sustain any long-term credible employment strategy.

The demands and expectations of RTD policies to deliver on competitiveness have therefore increased strongly. Creating a 'knowledge-based' competitive advantage has become a central policy aim of the European Union. At the same time globalization and the emergence of powerful new technologies such as the cluster of new Information and Communication Technologies (ICT), are increasing further the openness of already, from an internal European market trading perspective, very open economies. This translates into an intensification of global competitive pressures, which at the level of the firm generate further transformation pressures. In other words, firms react to competitive pressure by intensifying their efforts to introduce new products, processes and new forms of organization.

Benchmarking the impact of RTD on competitiveness and employment in the context of Member States' policies will therefore require a thorough understanding of a complex range of factors and processes. They deal with structure and performance, not only of the knowledge base of the individual Member States but essentially with the overall functioning and efficiency of their economies, including the various links with and between different member countries' national innovation systems.

Science, technology and innovation are generally recognized as important determinants of economic well-being. Public support for R&D is therefore expected to have downstream impacts in terms of indicators such as competitiveness and employment. Benchmarks of performance along these dimensions, and of the R&D policies which have an eventual impact on competitiveness and employment, are thus highly desirable as inputs to improved policy-making.

Benchmarks provide standards against which performance can be measured or assessed. They allow comparisons to be made and help illustrate where improvements are possible. In a science, technology and innovation policy context, exercises which benchmark national R&D policies and

educational standards, levels and attainments within the system. A well-educated population is better placed to take advantage of technological developments than a poorly educated one. Broad indicators of 'social and human capital' or 'social capability' are: percentage of GDP spent on education; percentage of working population with third-level qualifications; and the degree of participation in life-long learning.

Research capacity

The long-term strength of a country's research system is a function of the number and calibre of the researchers within it and the amount and quality of the research performed by them. Key indicators here are the proportion of scientists and engineers in the workforce; public investment in R&D; and the number of scientific publications produced per million of the population.

Technological and innovation performance

There are many traditional input and output measures for the technological and innovation performance of a country, including the amount of R&D performed by industry (as a percentage of GDP) and the number of patents per capita. To these the Expert Group added innovation expenditure as a percentage of sales in order to reflect a measure of intrinsic interest to industry.

Absorptive capacity

The ability of a country to absorb and exploit technology is an important reflection of overall innovation performance, exemplified by the successful diffusion of new technologies throughout an economy. Key indicators can thus be based on the capacity of firms to renew product ranges; on improvements in labour productivity; and on overall trade performance.

Analysis of the country data available for all the indicators above revealed wide disparities between EU Member States along all four performance-related dimensions. The analysis also uncovered strong positive associations between three of the four key concepts (research capacity, social capital and technological and innovation performance), but weak relationships between these three and the fourth concept, absorptive capacity. Leaving the concept of absorptive capacity aside for the

Figure 1. A Simple Model of an Innovation System and Related Performance Concepts

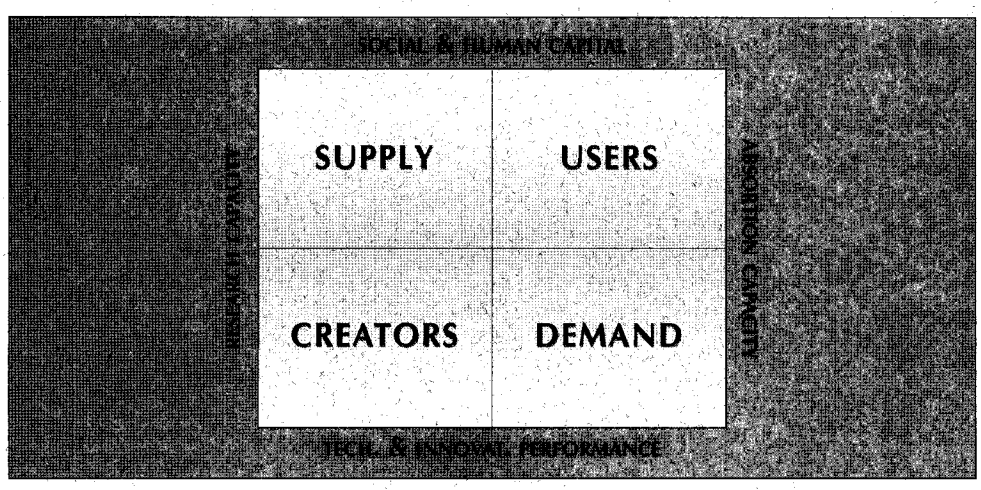
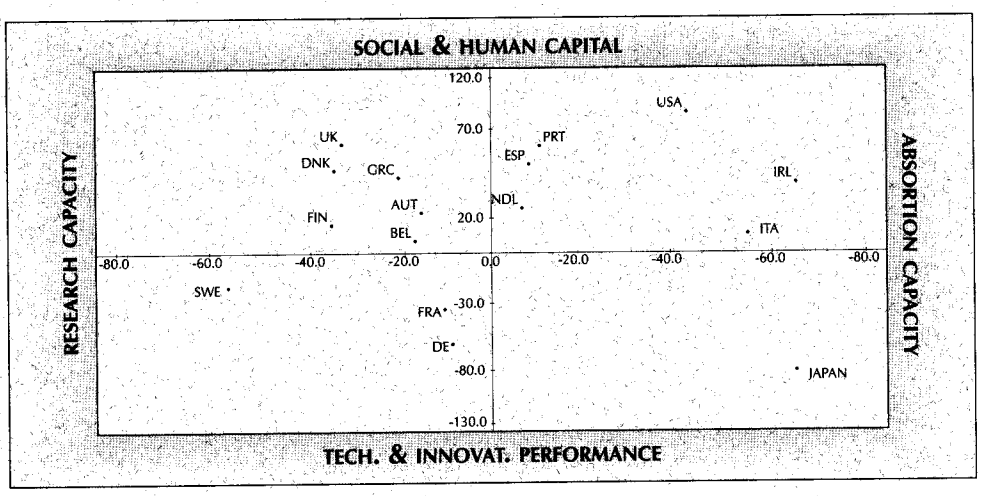


Figure 2. Performance Bias in EU National Innovation Systems



innovation heavily biased towards the diffusion of the results of its technological and innovative endeavours.

The evidence gathered and the insights gained from its analysis lends support to a benchmarking vision which goes beyond a focus on individual RTD indicators and concentrates instead on an approach which takes the systemic interactions between the various parts of a country's national system of innovation fully into account.

Benchmarking STI policies

Given that benchmarking exercises are meant to improve policy-making, it is important to move beyond comparisons of innovation system performance and forward to a more critical look at the policies which are designed, in the long run, to improve overall performance. In theory, benchmarking policy performance and impact requires:

- An adequate understanding of the different types of policies and policy instruments in use and the contexts in which they are applicable;
- Indicators of relative performance which can be used to compare the efficiency and effectiveness of individual instruments with others of a similar type;
- An understanding of the ways in which individual instruments are combined into effective policy mixes within national innovation systems;
- Estimates of the aggregate impact of the whole spectrum of instruments in use in different innovation system settings.

In practice, for all the reasons noted previously, we currently lack the ability to make adequate estimates of aggregate impact. It is possible to make crude correlations at the macro-level between indicators such as government expenditure on R&D and any of the innovation system performance indicators we have discussed so far, but these calculations tell us little useful about the causal links between policy and impact. Critically, they also tell us very little about the efficacy of particular policy mixes or individual instruments, or about the specific policy levers which need to be pulled if overall system performance is to be improved. The attention of policy-makers and policy analysts has therefore tended to focus more on evaluations of individual instruments and, recently, on improving our understanding of how these can be effectively combined. Innovation systems theory, too, has many implications for policy practice.

convergence of labour market practices and education. The life experience of people is what determines how they learn, communicate and interact in the knowledge society. The most appropriate method to achieve this at this stage of development of European collaboration might well be the Open Method of Coordination introduced at the Lisbon Summit (Rodrigues, 2002).

The third level refers to the regional level. As we have seen, there are several examples of successful policy initiatives at this level. Also there is a need to counter the built-in tendency of the knowledge society to reinforce regional inequality. In light of the efforts required to build the European Research Area, with its emphasis on European wide networks of excellence, this policy level will call for special attention. It is at this level too that policies supporting the absorptive capacity of small and medium-sized firms will be needed to strengthen and anchor local RTD and innovation clusters.

At each of these three levels, RTD-policy has both a responsibility to promote 'science' as one element of a common culture and a socio-economic obligation to promote well-being through innovation and competence building. When it is recognized that we are moving into a learning society and a knowledge based economy, there is a need to establish new strong public and private institutions that give the necessary weight to this dimension. It is not obvious that policy coordination in this new type of society should be left to ministries of finance and national (or European) banks. The Finnish example of a National Science and Technology Council having the Prime Minister as its chairman points in the right direction.

There are several dimensions that need to be given stronger emphasis in RTD-policies, where existing practices are scarce but where we find emerging good practices in member countries. One issue has to do with moving the focus away from manufacturing industries toward private and public services. A second has to do with understanding and mapping how knowledge production, diffusion and use take place in different sectors. A third is to reconsider the traditional split between what is private and public responsibility in, for instance, higher education. A fourth is the need to monitor, define good practice and support diffusion of organizational change in terms of management and work organization in both the public and the private sector.

When it comes to the use of benchmarking as the basis for policy learning, we propose that benchmarking be complemented with experience of the specific policy field and with insights into the systemic context for the specific policy field involved. Good practices need to be assessed in terms of how far they are 'generic', 'transferable' and 'durable'. Generic, robust and transferable practices are often procedural and institutional rather than associated with very specific forms of government intervention. From this perspective, the IRCE Group strongly endorsed the notion of intelligent benchmarking. A pre-requisite for such intelligent benchmarking would be that governments have established:

- institutions/mechanisms that help to sort out what are generic and robust trends rather than policy fads and fashion;
- institutions/mechanisms that help to define the specialization and institutional set up of national innovation systems as well as their strengths and weaknesses from a comparative perspective.

Conclusions

Rather than providing a detailed list of 'best-practice policies' in the area of the impact of RTD on competitiveness and employment, the IRCE Expert Group opted for a number of key messages

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Luc Soete is Director of MERIT and Professor of International Economics at the Faculty of Economics and Business Administration, Maastricht University, the Netherlands. Before coming to Maastricht in 1986, he worked at the Department of Economics of the University of Antwerp (UFSIA), the Institute of Development Studies and the Science Policy Research Unit both at the University of Sussex, and the Department of Economics at Stanford University. His research interests cover the broad range of theoretical and empirical studies of the impact of technological change, in particular new information and communication technologies on employment, economic growth, and international trade and investment, as well as the related policy and measurement issues. With respect to the latter he is currently one of the strong proponents of the 'new economy' phenomenon. Luc Soete is also director of the International Institute of Infonomics (IIoI).

This Editorial draws heavily from the work of the IRCE STRATA-ETAN Expert Working Group, set-up by the European Commission, DG Research, to conduct the Benchmarking exercise of National RTD policies with regard to their impact on Competitiveness and Employment. The Editors are grateful to all of them for their outstanding contributions and hard work.

The full IRCE Report as well as all the other 4 Expert Group reports belonging to the same exercise are available online at the CORDIS Website (**http://www.cordis.lu/rtd2002/era-developments/benchmarking.htm#frhlg**).

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The Potential of Benchmarking as a Tool for Policy Learning

Jan Fagerberg, *University of Oslo*

Issue: 'Benchmarking' is an idea which has been attracting a great deal of attention recently. Although its critics may write it off as just another concept from the management literature that from time to time succeeds in finding its way from the business schools to the policy discourse, taking a broad historical perspective, the practice nowadays referred to as 'benchmarking' is not at all new and is potentially a very useful exercise, as exemplified in a recent benchmarking exercise by the European Commission (European Commission 2001).

Relevance: Arguably, one of the reasons for the increasing popularity of 'benchmarking' lies in the failure of much theory in this area to address real policy issues.

Introduction

'Benchmarking' is currently attracting a lot of attention in policy-making circles. However, some would write it off as just another concept from the management literature that from time to time succeeds in finding its way from the business schools to the offices of the commission and related places within the member countries. A similar case might be that of Michael Porter's 'diamond' a decade ago (Porter 1990): At the time it attracted a lot of interest but in the end the value for policy-makers was more limited. In one sense it is probably correct to say that benchmarking is a bit of the same. But as we shall see, although the concept may be new in this particular context, the practice it describes is not new at all. The reasons for this, it is argued, have to do with the failure of much theory in this area to address real policy issues. Finally, this article considers recent benchmarking exercises of the Commission (European Commission 2001), to see what lessons might be drawn from these for further work in this area.

A steamer from Yokohama

In December 1871 a steamer left Yokohama for the United States. On board were around fifty Japanese officials, including some very high-ranking people, and a number of students that were to be deployed in various Western universities. The officials, however, were on a mission to seek recognition for the new Japanese regime and to examine those aspects of Western civilization

Although it might be easy to write off benchmarking as another fashionable idea from the management literature, the underlying ideas are not new

In what is perhaps history's most ambitious benchmarking exercise, in the late 19th century the Meiji government of Japan sent out emissaries to examine aspects of western civilization and bring back a blueprint for the design of a modern state

The views expressed here are the author's and do not necessarily reflect those of the European Commission.