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ECONOMICS OF COLLECTIVE BENCHMARKING – LEARNING IN RESEARCH AND INNOVATION POLICY

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ABSTRACT: Central concerns of research and innovation policies under uncertainty and systemic complexity are market and systemic failures, i.e. both market corrections as well as co-ordination and coherence are essential elements of policy making. Therefore, policy making cannot be based on the notions of equilibrium and optimisation but on adaptive policy making with central focus on search for and identification of policy alternatives and with creation of new policy understanding about functions, underlying mechanisms and conditions of successful policies. For this purpose, collective benchmarking of research and innovation policies provides "routines for exploiting various types learning sources". While benchmarking is a flexible instrument it nevertheless needs a rigorous benchmarking methodology that guides search for best practises and respects the systemic and country specific foundation. Collective benchmarking utilises different types of policy potentials which increase the effectiveness of research and innovation policies and, therefore, the performances of particular countries and the group as a whole.

JEL O3, O38

Content

1. INTRODUCTION

In dynamic, technology driven economies policy makers – like all other economic agents – are making decisions under uncertainty and systemic complexity implying that models of public choice theory are quite limited for practical policy making (Nelson/Winter 1982, H. Simon 1979, Metcalfe 1994, 1995). Rather, governments do not possess complete information about alternative policies, nor do they possess supranatural calculation skills nor endless time and resources. In spite of such fundamental deficits, practical policy making is permanently challenged to find adequate policy instruments and to design institutional settings and complementarities in innovation systems.

Consequently, optimisation and equilibrium approach needs to be replaced by adaptive policy making which deals with both market and systemic failures, i.e. also coordination and coherence issues are essential. Practical policy making cannot be based solely on the theoretical, general knowledge derived from abstract models - rather, policy making in research and innovation policies should utilise all available sources of information about successful policy alternatives and understand about their functions and conditions. For this purpose, the policy making requires "routines for policy learning".

Collective benchmarking of research and innovation policy is a policy instrument that helps to guide governments' search for information about and learning from successful policies. Potentials for policy learning arise due to the comparison of performance indicators with the best performers or with an explicit policy objective or target, due the analysis of the own situation and due to discovering and analysing the best practice policies and their specific conditions. By exploiting such learning sources benchmarking closes the knowledge gap that arises between the knowledge from abstract models and the real world experiences of successful policies. Finally, the (voluntary) application of the new policy understanding in research and innovation policies improve the performances of individual participants and of the group.

The collective benchmarking of research and innovation policies is quite a new praxis. This is so at least in comparison to the rich experiences of the firm's level benchmarking. Initially, firms have applied benchmarking instrument for learning from best practices for their strategies with the objective of increasing their performances.[1] The advantages of a collective benchmarking with potential competitors – in comparison to individual comparative analysis of performances and policies – arise due to interactions between participants (policy knowledge spill-overs). In an independent world, policy learning increases the efficiency of national research and innovation policies that contributes both to the performances of an individual participant country as well as of the group of countries.

Recently, both the OECD and the EU are applying the collective benchmarking for improving research and innovation policies and so increasing performances of their members. Although the benchmarking methodologies differ, the aim of both exercises is to facilitate policy learning of the participants that ultimately contributes to the performance of the group or to commonly agreed objectives. In particular, the EU exercise is unique as benchmarking is for first time used for supporting commonly agreed policy objectives as expressed in the Lisbon Council strategy (2000) and new European research policy (ERA).

In the academic discussion quite strong reservations exist towards these collective benchmarking exercises. In particular, – it is claimed – that adequate concepts for the knowledge-based economy are missing and the system approach and diversity across countries is not recognised (Lundvall 2000; Lundvall/Thompson 2001, Sanchez 2001). In particular, the ignorance of the systemic approach in benchmarking of research and innovation policies has been labelled as naïve benchmarking (Lundvall 2000). However, this critics oversees that exactly uncertainty and systemic complexity of the knowledge-based economy are the rationales for benchmarking in research and innovation policy, i.e. search for relevant policy information and understanding. Nevertheless, it is correct that the country specific context creates technical problems in comparing performances and in identifying "best practices".

The rationale of collective benchmarking is very simple and powerful but the organisation of search and utilisation of policy learning potentials is a complex process. The benchmarking exercises can collect various types of information and knowledge as well it can be organised in various ways. However, collective benchmarking of policies – in order to be a useful and cost efficient instrument for learning – needs to be based on a rigorous methodology that guides search for best practises and exploits learning sources. The benchmarking methodology involves decisions about the adequate indicators and data, identification of best practice instruments, methods of analysis as well as a system for collecting codified and tacit information. The ultimate goal of collective benchmarking is of course to induce voluntary policy changes in the participant countries.

2. RESEARCH AND INNOVATION POLICY UNDER UNCERTAINTY AND SYSTEMIC COMPLEXITY

2.1 Economics of research and innovation policies

Technology driven economies rely vitally on high investment in knowledge creation and absorption. They also are characterised by strong dynamics and systemic complexity. Traditionally, market forces are not expected to function perfectly in knowledge production (market failure) due to the public good characteristics of knowledge as well as certain specificities in knowledge generating activities. [2]In particular, certain types of knowledge cannot be produced due the market mechanisms but rather are produced in a specific institutional frame such as in public research institutions or in non-market institutions – for example in networks. Yet, the objectives of research and innovation policies do not only concern correction of market failures but also the design of the right mix between market and non-market activities in the knowledge production and innovation system (Nelson/Winter 1982, p. 385; Metcalfe 1995, p. 488). Additionally to systemic coherence - as fast dissemination of knowledge is not easy or costless across market and non-market institutions - research and innovation policies have also the task to support interactions and create connectivity between different knowledge producing institutions.

Uncertainty is a more fundamental problem of a dynamic technology driven economy than that in the knowledge production alone. In a dynamic context, preferences, resources and technical change are changing in an unpredictable way implying that mar-

kets cannot function in an optimal way. Therefore, the anatomy of market failure is also connected to the uncertainty due to dealing with and adjusting to (innovation-induced) changes (Nelson/Winter 1982, p. 366, 356ff.; Metcalfe 1995, p. 410-411).

In a systemic, technology driven economy "the market and systemic failures" are seen even in a broader – institutional context as also the existence and functioning of complementary markets and institutions co-determine the final outcome of the innovation processes (Nelson/Winter 1982, p. 385; Teubel 1997, p. 1185). The absence of or weakly developed complementary markets and institutions may underdetermine the overall performance (like competition, education and training, financial and labour markets, see OECD 1999b, p. 10-11; similarly Teubal 1997, p.1167-1168; Metcalfe 1995, p. 484 ff.). Therefore, the systemic approach of innovations implies that there are important dependencies of one policy with others and one policy impacts the efficiency of the others. This demands the creation of an efficient innovation system with structural coherence and flexibility based on comprehensive policy co-ordination and coherence (similarly Andersson 2000, p. 16-18; OECD 1999b, p. 10-11; Teubel 1997, p. 1185).

2.2. Research and innovation policy making

Essentially, same reasons - uncertainty and systemic complexity - that lead to the broader concepts of market and systemic failures in technology driven economies influence also government's policy making. Firstly, in dynamic and uncertain context, the policy maker (Metcalfe 1995, p. 419) – equally to the firm's decision making – does not posses complete information about the future developments of the knowledge based economy, about alternative strategies or policy instruments and their consequences. Neither do governments posses supranatural calculation skills nor endless time and resources. Government's situation can be characterised by bounded rationality. This implies that the policy maker needs to search for more information that is costly, optimisation is replaced by targets and satisfying goals and mechanisms of learning and adapting are central elements (Simon 1979, p. 510).

Secondly, systemic complexity implies high costs of co-ordination and implementation in policy making. In such context, government's ability to understand is limited, it is difficult to set priorities and policy lessons and principles are difficult to generalise (see Metcalfe 1994, p. 940; Andersson 2000, p. 17-18). This implies strong consequences for research and innovation policies as policy actions or changes in institutional set-up in one part of the system require corresponding changes in complementary institutions or markets. Otherwise (not so short-period) transitory incompatibility costs may arise. The systemic complexity and complementarities complicates the policy making even further as not only a comprehensive policy co-ordination is needed but that all relevant stakeholders related to the complementary institutions and markets need to be involved.

The consequences of uncertainty and systemic complexity are far-reaching for research and innovation policy making as the outcomes of governments policies are uncertain as well as government failures are possible (for example Metcalfe 1995, p. 414; van Steen 2000, p. 6ff.; Metcalfe p. 418; Andersson 2000, p. 17ff.). In the traditional economics of government the reasons for government failures are seen in information asymmetries or in self interests of the bureaucrats. The possible government failures is seen either as a case not intervening at all or the market failure should not be corrected by government

interventions but by alternative, more incentive based mechanisms (see Kruger, A. 1990). This is in deep contrast to the understanding that policy making involves much more in an uncertain and systemic environment of process and change, i.e. the policy guideline cannot be simply "more market", nor is it just a problem of incomplete information alone (that could somehow be collected).

2.3. Adaptive policy making: Searching and learning

In dynamic and systemic context – consequently – the policy making problem cannot be simply one of arriving at a Pareto optimum of a given welfare function as applied in the traditional public choice approach (also Nelson/Winter 1982, p. 379ff). Rather, optimisation and equilibrium are replaced by adaptive policy making with central concern on knowledge production, on connectivity of knowledge producing institutions and availability of complementary factors, i.e. co-ordination and coherence are a central element (Metcalfe 1995, p. 448).

Practical policy making is permanently challenged to design the adequate institutional framework and to find right policy instruments. However, the policy maker does not know all alternatives but is also confronted with a list of options which on does not know how to rank (Metcalfe 1995, p. 489). This is why adaptive policy making relies strongly on search of information and policy understanding about instruments, role of country-specific conditions as well as institution and, therefore, requires a greater analytical effort than just optimal solutions derived from a constructed model of the (complex) situation. Rather, policy analysis is the basis for understanding and learning and becomes vital and central for policy making.

Apparently, adaptive policy making requires search process for finding information and knowledge about successful policies. Policy analysis in this context appears as a search process for gaining knowledge about alternatives, their function and necessary conditions. Under uncertainty, the acquisition of the information and learning about alternative solutions is costly. Consequently, the role of analysis in policy making shifts from creating models to find optimal solutions towards problem solving heuristics that recognise patterns for focusing quickly on one or small number of alternatives (Nelson/Winter 1982, p. 379-384).[3]

Uncertainty in policy making, however, does not result from incomplete information about future developments alone but is much more complicated in the systemic complexity implying limits in the ability to clearly understand the mechanisms of policy instruments and on the role of complementary markets and conditions. From the point of view of complexity, adaptive policy making needs comprehensive policy information and analysis for exploiting of existing policy experiences.

In this context, the own successive experiences in the implementation of policies generates new information about what works (Nelson/Winter 1982, p. 384). Yet, also failed experiments are valuable in policy making (Metcalfe 1995, p. 489). However, – as we will see later – the learning about research and innovation policies need not to be limited on the domestic experience alone but they should also learn from the policy experiences of other countries (see below 3.1).

Consequently, understanding and learning component needs to be integrated as a permanent element in policy making process that itself is institutionally embedded. When

research and innovation policy development is understood as a knowledge seeking process then the creation of a organised collective or networked policy learning becomes beneficial. The collective or networked learning does not only integrate the individual knowledge but also allows the exchange of experience and tacit knowledge that induces interactive learning (van Steen 2000, p. 9ff.; Teubel 1997, p. 1184). [4] Therefore, - last but not least - research and innovation policy is also about to design of an organisational structure capable of learning and adjusting behaviour in response to what is learned (Nelson/Winter 1982, p. 384).

3. COLLECTIVE BENCHMARKING OF RESEARCH AND INNOVATION POLICY

3.1. Rationales for benchmarking in research and innovation policy making

In uncertain and systemic context practical policy making cannot be based on the theoretical, general knowledge derived from abstract models alone because the "right" models are not known and because they cannot grasp the systemic complexity and seldom integrate country-specific conditions. The research and innovation policies do therefore not only focus on the production and distribution of scientific and technological knowledge and also on the functioning and conditions on complementary markets and institutions (labour markets, financial markets).

In this context, benchmarking of policies is an instrument that allows utilise the experiences of a great diversity of country-specific policies and instruments. Consequently, the costs and risks of policy failure can reduced as the experiences of other countries' policies indicate successful and non-successful policy actions (see also Bartzokas 2001, p.16). Utilisation of the knowledge pool on alternative policy experiences is more efficient than policy learning based on the own experiences alone for what works and what does not work, i.e. trial and error principal is very costly and time-consuming process to find out under uncertainty. Therefore, learning from the experiences of other governments increases the effectiveness of research and innovation policy and leads to improved performances.

Collective benchmarking of research and innovation policy aim to induce policy changes in the participant countries. It is a policy making instrument – a learning routine – that guides the search process for information on and understanding about alternative, successful policies. In benchmarking exercise, one assumes that best performers have successful instruments and strategies as well as institutional designs. Therefore, the best performer becomes the benchmark. Or, alternatively, the benchmarking target can be a shared policy objective that can eventually be quantitatively determined. In this case the best performer - with good policy practices - is that country which comes nearest to the policy objective. The most dynamic performer towards the policy objective can also be selected as the benchmark whose policies are worthwhile of analysing.

In benchmarking exercises the focus of policy analysis switches from abstract models towards search activities for best practice policy alternatives. In the uncertain and systemic context, the "best practice" does not present the best of all available ones - because we do not know them. The search for best practice policy alternatives normally

focus only on a small number of alternatives which are the “good” performers. Consequently, the academic criticisms that the benchmarking exercises are based on incomplete and intuitive models (see Lundvall/Thompson 2001, p. 6-7) is not well-based. It is exactly the uncertainty and complexity in an emerging knowledge-based economy that create the need of policy learning – and therefore the use of benchmarking instrument - to become a central element in research and innovation policy.

The goal of benchmarking to induce policy changes is achieved by gradual policy learning that is created at the various stages of benchmarking activities. Therefore, the function of the benchmarking indicators is to measure the distance of a particular country to the benchmark - the "best performer" or the shared policy objective - which indicates the learning potential. This information needs to be linked to an analysis about the underlying reasons for the distance which then guide the search the best practice policy instruments. After the identification of the policy issues an analysis of best practice instruments’ mechanisms and conditions will help to create new policy understanding about alternative, successful policies. All these activities and phases in the benchmarking process are bound with specific learning effects for policy making.

The fundamental advantage of the collective benchmarking of policies in comparison to an individual benchmarking is that collective actions allows collect both codified and tacit knowledge on successful policies whereby the interactive processes of analyses and dialogues create new policy understanding. However, the ultimate goal of benchmarking policies is to induce voluntary policy changes in the participant countries. The application of the new policy understanding in the own context involves additional internal learning effects. In order to links the activities from measuring performances with indicators to voluntary policy changes and to reduce search costs requires a methodology that facilitates searching and sharing information on successful policy experiences.

3.2. Advantages of collective benchmarking of research and innovation policies

Collective benchmarking of research and innovation policies is a relatively new praxis for achieving shared policy objectives of a group of countries through policy learning in national policy practices. Collective benchmarking of national research and innovation policies involves sharing information and generating knowledge jointly with other governments. As successful research and innovation policies also are one determinant of a country’s competitive position on the world market a country’s decision to participate in a collective benchmarking with partners who eventually are competitors on the world market must be based on clear advantages.[5] However, countries should not be treated just like competitive firms but rather as interdependent units of a world or European economy where the economic success of one country influences positively that of another country. Therefore, collective benchmarking of policies that increases the efficiency of policies contributes both to the performances of an individual participant (country) as well as to that of the group of countries.

The advantages of collective benchmarking are connected to learning through interactions between the participants which is absent in the individual, one-country benchmarking exercise. Exchanging and understanding of codified as well as tacit knowledge on policies profit the individual countries and also contribute to the shared policy objectives. In particular, sharing tacit knowledge on best practice policy experiences is beneficial as the interactions between the participants with specific knowledge create new

knowledge and knowledge spillovers about policy alternatives. Even though collective benchmarking is bound with such positive effects, such collective learning processes do usually not emerge automatically (analogously in Teubal 1997, p.1184) or by a single partner but a co-ordinator and institutional frame are needed for supporting the interactive analysis and creation of new policy understanding.

Collective benchmarking exercise can be organised in a co-operative or in a collaborative relationship between the participants. The co-operative collective benchmarking targets primarily codified information and its main advantage are the reduced information and search costs and learning by comparing. On the other hand, collaborative, interactive benchmarking aims to collect and to share both codified and tacit knowledge about best practice instruments and strategies. Tacit knowledge and better understanding about practical policy experiences have enormous additional advantages in research and innovation context because learning by understanding the mechanisms and conditions about the alternative policy experiences that is usually difficult and costly to acquire in the systemic context.

Collective benchmarking, therefore, has the potential of transforming a zero-sum game to a positive sum game (Cox et al. 1997, p. 289). Another important advantage is that participating in a collective benchmarking exercise saves search, information and communication costs in comparison nationally organised benchmarking[6], i.e. increases the effectiveness of the search process – provided that it is based on a clear methodology. The higher the number of participants and the more different they are, the higher the organisational and communication costs.

3.3 Benchmarking methodology: guidelines for search and learning

3.3.1 Stages of collective benchmarking and sources of learning

While the idea of benchmarking as a routine for guiding policy learning is powerful, its implementation is a complex process and time consuming exercise that involves substantial costs and efforts. Therefore, only a rigorous methodology of collective benchmarking which is in harmony with its objectives makes it to be a useful and cost efficient policy learning instrument. The methodology, i.e. the successive measurement and analysis activities, links the initial starting of measuring performances with indicators to the ultimate, voluntary policy changes in the participant countries.

Benchmarking of research and innovation policies can be understood as a series of activities which allows to utilise various types of learning sources connected to the specific activity. The following table 1 presents an overview on various possible stages and elements of benchmarking exercise including several analytical and measurement activities, decisions on the methods of information collection and identifies various sources of learning. The choice of activities and their organisation between the participants can be decided according to the objectives of the collective benchmarking exercise. In other words, the choice of the methodology depends on the political objectives. Therefore, in contrast to traditional comparative analyses of country performances, collective benchmarking of policies requires much higher involvement of the participants.

Table 1: Sources of learning due to collective benchmarking in research and innovation policy

Activity	Function	Issues	Sources of learning
Indicators for the measurement and comparison of performances References: - the best performer(s) (implicit benchmark) - policy objective/ target - Alternatively: the most dynamic performer	Measurement of performances Measurement of the distance: to policy objective and to best performer Measurement for closing the distance	Choice of indicators: policy objectives vs. performance Interpretation of the indicators in systemic context Collection of reliable data	Learning by comparing
(Collective) Analysis of the underlying factors/reasons that explain the distance to the best performer or to the objective	Guides the search to specific domains that explain the distance	Information collection Analysis systems across the countries	Learning by understanding/ finding weak domains
Identification of policies in targeted domains (resulting from analysis) performed by the best performer and links to the systemic environment	Search and identification of best practices Targeting codified or tacit knowledge	Information collection systems Identification of best practices in systemic and country specific context	Learning by discovering policy alternatives
Collective analysis of best practice functions, processes and conditions of best practice instruments in the targeted domains	Search of knowledge for the processes, functions and conditions of successful instruments and strategies	Organisational setting for collective and interactive analysis Establishment of a frame for allowing permanent interactions	Learning by understanding new policy alternatives Learning by interactive spill-overs
Analysis of own corresponding instruments and conditions and implementation of the new knowledge	Determination of implementation costs of new policy alternatives (systemic and country-specific context)	Institutional set-ups for continuous policy learning: analysing and comparing	Learning by analysing and comparing Learning by implementing and adjusting

Measuring performances in research and innovation policies: indicators

Benchmarking of national research and innovation policies needs to measure country performances – either in terms of technology driven growth performance or of the shared policy objective. The function of the performance indicators is to help to identify the best performer as well as a country's own relative performance in comparison to that of the benchmark. The distance to the best performer indicates the learning potential of the particular participant. A benchmarking exercise that stops at this level is often called performance benchmarking while the source of learning is learning by comparing (see Smith 2002, p. 268).

Measuring performances in context of research and innovation policies needs a set of performance indicators that reflect the theoretical understanding about the existence of complementary elements and dimensions. A general policy objective that aims to support growth and competitiveness in a knowledge-based economy is based on the very general theoretical understanding in the sense that more R&D expenditure is better, more human resources in S&T is better and so on. A particular policy objective can, on the other hand be measured by one targeted policy indicator. The systemic country-specific context of a knowledge-based economy complicates the choice and interpretation of the performance indicators (see 3.4.1).

In collective performance benchmarking, usually the co-ordinator sets up a data and information collection system. The indicators - for being useful in policy making- need data that are harmonised, valid and timeliness. In particular, the data should not be too old so that the indicators are useful for policy making process. However, very often the selection of indicators is limited by the restricted availability of timeliness and comparable, harmonised data.

Economic analysis of the performances: guiding the search for most relevant issues

The values of the benchmarking indicators just tell us where a particular country stands in relation to the best performer or a shared policy objective but not what are the underlying reasons for its performance distance and for the high values in the best performer country. Without this analysis one does not know in what domains particular policies are available or needed. However, understanding the reasons underlying the own "weaker" performance and those factors that explain the best performer's success is essential for guiding the search on the most relevant policy instrument in economic, political or institutional domains. In a systemic context the analysis should not, however, deal only with one partial indicator but it should consider how the values of the whole set of indicators depend on each other. For example, a constellation with low R&D expenditure and high supply of human resources in S&T indicate a surplus production of human resources. Alternatively, policies to increase R&D expenditure (increase the demand) or to reduce number of graduate (decrease supply) could be considered in the next step. In analysing the underlying reasons all types of methods and information sources and data can be relevant, also the abstract models in economic analysis.

Identification and targeted analysis of best practice policies

The performance indicators are useful in searching for the existing "best practice" instruments as they are assumed to indicate where – in which country - best practice policies most probably can be found. Together with the results of analysis about the reasons for the performances the specific domains for the issues and indicators can be identified.

The search process can utilise all sources of knowledge on policy experiences as it combines both theoretical knowledge as well as practical knowledge on best practice instruments. Yet, the search process does not pretend to find an optimal, "true" best practice (as it is not known and a model cannot identify it) but the identification for further analysis helps to focus on specific policies and their conditions. Information collection on successful policy alternatives in the specific domain needs to be organised.

Yet, it is important to be aware of that excellence or best practices are context-related implying that the outcome of an instrument cannot be isolated from the overall systemic and country specific setting. When the context changes, then the best practice must also be reviewed. In this sense, several competing good practices co-exist as good practices are valid under specific circumstances (see below 3.5).

Interactive analysis of best practice policies: policy understanding

The most important and powerful learning effects arise due to active and interactive participation in collective analysing and understanding of policy experiences (similarly Peneder 1999). Analysis of alternative, successful instruments, their functioning and underlying mechanisms as well as their conditions are essential elements for creating better policy understanding. The co-ordinator needs to set up a frame of conducting analysis that can take various, more or less formalised forms (networks, seminars, workshops, exchange of documents among others). Ultimately, the special advantage of collective benchmarking is the interactive understanding process and the sharing and exchanging of such results that create knowledge spill-overs on policies within the benchmarking group.

Implementation of new policy understanding in country specific contexts

Implementation and policy learning at the country level do not belong to the collective benchmarking process but are rather a country-specific voluntary exercise. However, the voluntary implementation is the final stage in linking performance indicators to policy changes which is the final purpose of benchmarking. In addition, the implementation of new policy understanding has strong learning effects and increases the efficiency of national research and innovation policies. However, the implementation costs in the national context can be very high and depend essentially, of the differences with the country where the best practice strategy or instrument is applied and of the learning capacity of domestic institutions (see below 3.4).

3.3.2 Overview: OECD and EU benchmarking efforts in research and innovation policies

Presently, one observes a number of benchmarking exercises in research and innovation policy making in Europe and around the world which, however, take very different shapes and approaches depending on their objectives. Among the most prominent collective benchmarking efforts in research and innovation policy are the OECD benchmarking exercises and those conducted by the European Commission for achieving the Lisbon Council policy objectives. Both exercises aim to improve the effectiveness of the research and innovation policy making in their member countries but take very different approaches because of the different political set-ups and goals.

The OECD collective benchmarking exercise in research and innovation policy (or for the emerging knowledge-based economy) targets to improve national policies without any explicit shared policy objective but rather orient to the best or good practices generally. It is based on the idea that the provision of internationally comparable analytical and statistical information (Scoreboards) induces policy debates and learning in its member states (see also Barzokas 2001, p. 16; Andersson 2000, p. 25). For this purpose the OECD collects and publishes indicators on the knowledge based economy (see OECD Scoreboards for Knowledge-based economy in 1999, 2000 and 2001). The work on the indicators is completed by complementary studies on best practice instruments but the principal source of learning are the comparison of performances and discovering new policy alternatives. The application of this knowledge in the country policies is strictly voluntary.

Recently, the Benchmarking Project of the OECD is more closely linked to follow-up the OECD growth project (see OECD 2002, p.2) to provide countries with policy recommendations for enhancing business performance to increase overall productivity (page 3). This benchmarking project will conduct analysis at the levels of growth drivers (based theoretical knowledge), policy domains and micro-policies. The benchmarking phases start with an agreement on objectives, collection of indicators and identification of best performers, analysis of the underlying reasons for differences and finally reporting to allow to extract information for policy making (p. 4-5).

In particular, since the European Council in Lisbon (2000) the European Commission has launched several complementary benchmarking exercises in research and innovation policies. The Lisbon Council set for Europe the objective of becoming the most competitive knowledge-based economy and strengthening social cohesion in 2010 by using the open method of co-ordination. The open method of co-ordination involves the establishment of “where appropriate, quantitative and qualitative indicators and benchmarks against the best in the world…” (Ludlow 2002, p. 19 on the Lisbon Conclusions (paragrh. 37))[7] Since Lisbon the European Council in Barcelona 2002 even became more concrete by setting a quantitative target of 3% for the R&D intensity to achieved by 2010 in the EU. Two thirds of the R&D efforts should come from the private sector – in comparison to a share of 55% today (Ludlow 2002, p. 57).

In particular, "Benchmarking of national research policies" by DG Research and "European Innovation Scoreboard" by DG Enterprise[89] both focus directly on the research and innovation policies for approaching the Lisbon Council policy objectives. They focus on different areas of a knowledge based economy as the European Innova-

tion Scoreboard focus on improving innovation policy (in domains human resources, creation of new knowledge, transmission and application of new knowledge and innovation finance, output and markets). On the other hand, the Benchmarking of National Research Policies focus more broadly on S&T resources, R&D investment, scientific performance and the impact of R&D on competitiveness.[10] Consequently, not only the sets of performance indicators are different in these EU benchmarking initiatives but they are also differently organised. The European Innovation Scoreboard is complemented by a comprehensive database of innovation policy measures and the peer reviews under the "European Trend Chart on Innovations". The indicators for benchmarking of national research policies is also complemented by experts reviews and analysis in the four above mentioned domains in the 1. cycle of benchmarking. In these benchmarking exercises the main sources of learning are comparisons of performances, analysis and expert groups' studies for better understanding of alternative successful policies. All the EU benchmarking exercises aim to improving the effectiveness of policies through voluntary policy changes in the Member states in order to achieve the shared policy objectives as determined by the European Councils.

Of course the real challenge and success in benchmarking of policies is to induce voluntary policy changes in the participant countries. The examples of the OECD and the European Commission collective benchmarking exercises show clearly that their b benchmarking exercises differ but contain some, when not all of the elements as in table 1. Indeed, theoretically there is a great degree of freedom - and this is a great advantage - in choosing the benchmarking methodology. The choice of the benchmarking methodology, i.e. which elements and stages are applied depends on the type of (codified or tacit) knowledge that is collected, on the number of participants or on the duration of the benchmarking exercise and may include only a selection of the activities (like performance benchmarking). This, on the other hand, depends on the shared policy objectives and/or quantitative targets of the collective benchmarking of research and innovation policies. The most important difference, however, is the political set-up of these two collective benchmarking exercises as the European Commission is implying shared policy objectives for the EU agreed by Heads of Governments. The European Commission benchmarking exercises also respect and imply the open method of co-ordination as decided in the Lisbon Council 2000.

3.4. Benchmarking of policies under systemic and country specific conditions

3.4.1. Measuring performances: indicators in systemic, country-specific context

The academic discussion[11] has reacted with quite strong reservations towards present collective benchmarking exercises in research and innovation policies (especially towards the efforts of the EU). In particular, – it is claimed – that adequate concepts for the knowledge-based economy are missing and the system approach and diversity across countries is not recognised (Lundvall 2000; Lundvall/Thompson 2001, Sanchez 2001). These problems question the comparability of indicators, the identification of best practices and, finally, the transferability of the knowledge about best practices to a different economic and institutional context. These important issues are of course not valid only in the benchmarking context but concern all types of compara-

tive analysis and measurement. Yet, it is true that they are even more serious when policy evaluations are done.

This is why a serious benchmarking of research and innovation policies need to choose the performance indicators which adequately the systemic characteristics of knowledge-based economies. A general understanding prevails about what main components and dimension constitute an evolving knowledge-based economy. However, a more serious problem is the need to recognise that the national innovation systems are differently organised and, therefore, the differences of systemic foundations are considerable. Such differences influence importantly the value of an indicator and – if the differences are not recognised – can lead to false interpretation of performances. In particular, performances are context-specific, i.e. the systemic initial conditions of innovation systems, the size of the country, or the specialisation patterns vary across countries. Therefore, the diversity of country-specific context needs to be treated in the comparison process (K. Smith 2001, Lundvall 2001; Peneder, p.8).

Consequently, whether the value of an indicator should be seen high or low - successful or problematic – depends importantly on the context, i.e. what are possibilities for the values and within what time periods and what resources are needed for changing them. Finally, even though rather good theoretical understanding about the construction of performance indicators exist, the choice of indicators is often determined by the restricted availability of timeliness and comparable, harmonised data.

3.4.2 Best practice policies: identification and analysis in systemic context

Identification of a best practice instrument involves certain complications. The reason for this is – as in comparing performance indicators - that the country specific context of a policy alternative co-determines its performance and effectiveness.[12] As already described (see Chapter 2.2.) in the systemic approach the existence of complementary markets and institutions co-determine the success of a policy instrument and the overall effectiveness of the system. The same "best practice" instrument in another country-specific systemic context may fail to bring good results in another context if the complementary environment does not exist or is radically different.

Consequently, it has been argued that the systemic approach imply that it is difficult to draw lessons from the experience of others (Andersson 2000, p. 19). However, the systemic context does not really limit the learning potential but rather creates the (well-known) analytical problem that the isolation of the impact of one single instrument is difficult. Therefore – as already pointed out by Nelson/Winter 1982 (p. 385) – serious policy analysis requires the understanding of the institutions, mechanisms, interests and values at issue (similarly Andersson 2000, p. 18). This is how the application of the shared knowledge and new understanding in the specific country contexts creates additional knowledge.

Also the effectiveness of the same policy instrument may differ across countries. Therefore, a best practice policy instrument may already exist (like R&D subsidies) but its performance is weak. Such constellation indicates that changes might be needed in complementary policies and conditions, for example in training and human resources may weaken or even prevent the successful outcome of R&D policy. Also

systemic conditions can - at least theoretically - be changed by policies. However, systemic changes are difficult and costly requiring to respect the coherence of institutions in the innovation system (see for example Amable 2000). Consequently, changing of systemic foundations may create (not so short-period) transitory incompatibility costs.

However, also differences in economic structures and levels, in resources and size, and different cultural and historical backgrounds that can be understood as structural parameters some of which cannot be changed.[13] Large differences in such structural parameters imply very high or even indefinite transfer and implementation costs. Eventually - as it is the policy understanding rather than the transfer of a specific instrument that accounts - it might be a better strategy to create another instrument that is compatible with the existing structural parameters. In this situation, an alternative to a "best practice" of a certain type of countries could be the most dynamic performer (catching-up) in the class of certain country type with similar structural parameters which would require lower application and implementation costs. The orientation of countries can be facilitated with a typology of countries according to their similarities and differences.

4. CONCLUSIONS

The rationale of benchmarking in policy making results from uncertainty and systemic complexity of dynamic technology driven economies. Consequently, vital and central elements of policy making are searching for information about policy alternatives and the analysis and understanding their mechanisms and conditions. In particular, new policy understanding is created in the process of collective learning and collective benchmarking of policies can initiate learning by exploiting various knowledge pool about best practice instruments and strategies.

Collective benchmarking exercise has a great potential as a regular instrument of research and innovation policy at international and European level. However, collective benchmarking is also a time and resources intensive process and needs to be well organised. When well-organised and with adequate methodology, the shared new knowledge benefits all participants. In addition, benchmarking is a flexible policy instrument as its methodology and degree of co-operation can be designed according to the benchmarking objectives.

Even if theoretically beneficial for all, one cannot expect that one country organises a collective benchmarking exercise that goes further than just a normal comparative analysis. Rather collective benchmarking exercises on policy experiences needs to be organised by a supranational organisation or institution that implements the collective goal on improved performances of its members. This is why the co-ordinator needs to create appropriate institutional frame for carrying out the collective benchmarking such as for example a policy experience network (Teubel 1997; van Steen 2000; Peneder). Alternatively, a knowledge pool can be created by founding of an institution for experience based policy (similar to Resource Centre for Evidence Based Policy by ESRC in the UK, see Amann, R. 2001). The form of the frame needs to be decided by case to case what is important is that the benchmarking takes place in a more or less

formal organised framework as in a dynamic world research and innovation policies need to be continuously reviewed and adjusted.

The final goal of collective benchmarking is to induce voluntary policy changes at country level. This is the most critical and difficult issue in collective benchmarking exercises that are voluntary. The new policy knowledge always requires changes and further learning when applied in country specific context, it can never involve just a simple imitation. Therefore, the ultimate benefits of collective benchmarking depend on a country's capability to implement the new knowledge in its research and innovation policy. The implementation in national context may require additional resources for changing instruments and/or conditions. In particular, an implementation or learning capability of the national administration needs to be organised in the systemic framework of research and innovation policies involve many different institutional stakeholders.

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Footnotes

[1] A huge literature exists on the types of firm's benchmarking and the connected issues of learning organisations. For an useful overview of firm's benchmarking and different types of benchmarking, see Cox et al. 1997. This article will focus alone on the collective benchmarking exercises in research and innovation policies.

[2] The reasons for market failures in knowledge production are seen as result from weak appropriability of knowledge outputs, uncertainties and indivisibilities in the knowledge production (Arrow 1962, p. 170; Nelson 1959, p. 162).

[3] Nelson/Winter 1982 (p. 382-385) provide 5 guidelines for good policy analysis.

[4] Three types of policy learning occur: Information processing, institutional borrowing and interactive knowledge creation that reflects three modes of policy learning "imitation, borrowing and innovation"; see van Steen 2000, p. 12).

[5] Traditionally, benchmarking has been understood as a competitive instrument of a firm but recently the collective approach is more widely acknowledged (see Cox et al. 1997).

[6] Several countries have already practiced benchmarking for improving their own policy performances or made comparisons with other countries. They all are based on of different approaches depending on the objective and specific policy area of the benchmarking exercise. However, as they are so numerous and heterogenious they cannot be reviewed in this article which concerns with collective benchmarking in research and innovation policies.

[7] Already before Lisbon Council resolution the Commission has been active in supporting Member States (voluntary) policy making, i.e. in improving performances. For example DG Employment develops European employment guidelines and National Employment Action Plans since the Special European Council in Luxembourg 1997. Also DG Enterprise XXXX. his article focus mainly on the domain of collective benchmarking of research and innovation policies. Other important collective benchmarking initiatives resulting from the Lisbon Council such as encouraging Lifelong Learning or creating an information society for all (drafting a eEurope Action Plan) are not considered in this article even if they do also contribute to the innovative and economic performances of the Member states.

[8]

[9] DG Enterprise carries out also benchmarking in the area of competitiveness and of entrepreneurship policies that are closely related to innovation policies. Recently, DG Enterprise has developed a Enterprise Policy Scoreboard Quantitative targets for Enterprise policy which are the basis for a Communication on "Better Environment for Enterprises" (COMM xxxx).

[10] See, European Commission 2001, Key Figures 2001, Special edition Benchmarking of national research policies. DG Research. Luxembourg and European Commission 2000, European Trend Chart on Innovation. Innovation Policy in Europe 2000, Luxembourg

[11] Recently, the European Commission DG Research organised a conference "Contribution of socio-economic research to the benchmarking of RTD policies in Europe". The contributions of this conference have been published in Science and Public Policy, Vol. 28, no. 4, 2001

[12] The country specific contexts comprise both the systemic differences as well as differences in economic levels and structures (they probably are interrelated aspects). Differences in history and culture also matter as they influence the structure of institutions.

[13] Those circumstances which chancing needs considerable resources and time can also be considered as structural parameters. Therefore, also institutional structures can be parameters at a given point of time.

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