Keynote Speech

Central and Eastern Europe in the EU Innovation System: Asset or Liability?

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Abstract

During the 1990s the new EU member and candidate countries have experienced deep structural changes. These ranged from transformation in sectoral and industrial structure to changes in economic system. The issue is whether these changes have been sufficient to ensure catch-up in a period in which growth increasingly depends on the generation, use and diffusion of knowledge? Also, for the enlarged EU the emerging concern is whether the new member states (NMS) from central and eastern Europe (CEE) will be asset or liability in its objective to increase rate of productivity growth and base it on intensification of knowledge based activities. In a knowledge-based economy, growth depends essentially on a strong S&T system or the 'narrow NSI' and how that system is embedded within the wider economy.[1] This chapter aims to give a broader introduction into the issues of S&T, innovation and growth in CEECs. In the next section, we briefly review the role of S&T and innovation in growth of the CEECs during the transition period and we assess the effects of transition on restructuring of R&D system. In second part, we assess current innovation policies of the CEECs. Finally, we highlight the key issues that are important in future role of S&T and innovation in the CEECs, especially in view of Europeanization of S&T in these countries. Our conclusion is that a) we will see differentiation in the role of S&T and innovation in growth of individual CEECs, b) this role will be strongly shaped by the way CEECc countries managed the process of Europeanization of their R&D and innovation systems.

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[1] *The NSI in a narrow sense embraces those institutions which are directly involved in R&D and the dissemination of the results of R&D. The NSI in a broad sense points out that the way in which enterprises conduct innovation is not simply a matter of R&D but is also dependent on the way in which markets operate and production is organised as well as on the legal and cultural norms of society (Freeman, 2005).*

1 S&T and Innovation in Growth of the CEECs During the Transition Period: Outcomes

Technology was not the major force driving recovery and growth in the CEECs during the 1990s (Havrylyshyn, 2001). First, research shows that recovery and growth have been unrelated to domestic technology and R&D. The sources of growth in CEECs have not so far been directly linked to R&D but to the acquisition of knowledge in the production process and through different forms of firm-based learning (Dyker and Radošević, 1999). The main capability acquired during this period has been production capability or the capability to produce in accordance with the standards of efficiency and quality required in export markets. The technology capability or the ability to generate change seems to be much less significant in explaining growth of these economies. Secondly, there has been significant productivity growth but little technological development, except in sectors with high levels of FDI. Given the abundance of idle capacity and the considerable potential for efficiency gains, the expansion of output during the transformation has been based mainly on non-investment sources of growth. As the Polish case shows, early expansion coupled with structural shifts and a decline in employment is likely to have been caused by unprecedented efficiency gains (Zukowski, 1998).

As Freeman (2005) points out, the crucial weakness of the narrow NSI under socialism was the failure to develop R&D at enterprise level. The post-socialist transformation of industry has not rectified this inherited problem. Examination of the restructuring process in six industrial sectors in CEECs shows that this restructuring did not involve domestic R&D (Bitzer and Hirschhausen, 1998). Big increases in productivity have not led to increased demand for local R&D. As innovation surveys shows imported technology, primary equipment, was the key mechanism of technology accumulation. In-house R&D departments were drastically cut back while the industrial institutes were not integrated into large enterprises. The 1990s were years of stagnation and the erosion of R&D capacities.

The major effects of transition on restructuring of R&D systems have been:

- Initially very strong downsizing of R&D funding and employment which was followed by stabilization since mid-1990s and then by recovery of R&D by the end of the 1990s and early 2000 (see evidence in this Report). During the 2000s there is emerging differentiation across countries in terms of relative R&D expenditures and employment.

- The overall reduction of gross expenditures for R&D has been accompanied by limited structural changes in R&D system in terms of shares of business, government and university R&D. Nevertheless, there have been gradual and varying increases in shares of university R&D and decreased role of Academy of Sciences.
- Among institutional sectors the sharpest decline in funding has been in sector of industrial R&D. Higher Education Sector experienced the lowest cutback while sector of industrial R&D has experienced the biggest. Industrial R&D has suffered the greatest absolute and in most countries also relative losses. Enterprise R&D has declined with break up of large enterprises, except in Hungary and Slovenia.
- There has been limited integration of industrial R&D organisations into manufacturing enterprises. There has been decline in revenues from contracts with industry and the shift towards academic research and relative share of applied research on average has declined.
- At levels of independent research institutes there has been reorientation towards non-R&D activities including standardization, testing, measurement, etc. This led to hybridisation of industrial R&D organisations. By this we mean that they operate as public funded R&D organisations as well as commercial organisations operating on market, especially in Romania and Poland. However, their R&D activities are too extensive for them to survive as private firm in a market economy without public subsidies and their commercial activities are now too significant for them to be considered solely as research centres (Kozlowski, 2004). In that respect, they are incoherent and transitory forms which do not further R&D capacity of economy;
- Introduction of competition principle in R&D systems varies across countries while diversification of funding has been driven by increasing sources from abroad. This has been accompanied by increasing internationalisation of R&D systems through increasing share of international co-publications.
- University education has expanded during the 1990s as returns to education have increased and unemployment of this category declined. However, all systems have difficulties to ensure quality and high education standards.
- Domestic and foreign patenting has significantly declined reflecting technology gap as well as changing focus of enterprises towards acquisition of imported technology. The structure of resident patenting has been changed reflecting past specialisation in mechanical technologies. Also, scientific specialisation has remained basically unchanged and highly specialised in areas around math, physics and chemistry. There has been modest shift towards life sciences.

- Structural analysis of manufacturing exports shows that Central European countries have become specialised in low value added segments of nominally high tech sectors while Eastern Europe (Romania and Bulgaria as well as Baltic states) are specialised around low tech sectors.

2 Assessing Current Innovation Polices of the CEECs

Although some of trends outlines in section 1 have not been very favourable, our comparative analysis of innovation capacities of the CEECs within the enlarged EU show that there is not 'East – West' division in terms of innovation capacities (see Radošević, 2004). Our analysis which is based on 25 indicators goes beyond R&D indicators and thus gives a broader picture of innovation capacities by focusing on indicators of absorptive capacity, knowledge generation, knowledge diffusion and demand for technology. Based on this broader conceptualisation of innovation we see the emergence of three-tier Europe. By this we mean that developed countries of central Europe (Slovenia, Estonia, Czech R., Hungary) are faring relatively well in terms of innovation capacities and are closer to the 'middle level' group of the EU than to the less developed CEECs (Romania, Bulgaria, Latvia, Lithuania, Slovakia). Also, EU15 is divergent in terms of innovation capacities so that we can distinguish between high tech Europe (Nordic countries, UK), medium level Europe (France, Germany, etc.) and less developed EU15 with Greece, Portugal and Spain. Less developed EU15 and less developed CEECs are closer to each to other than to other groups of countries.

However, innovation capacities do not necessarily translate into growth and productivity. Nevertheless, the level of development of innovation policy is an important ingredient of potential growth and it is essential to evaluate whether innovation policies of the NMS form the CEE are up to the challenge that these countries faced with.

Analysis of current innovation policies of the CEECs shows several common features[2]:

- All CEECs policies aim to increase R&D/GDP under the influence of so called Barcelona target. However, they differ with respect to the levels of 'back-up' i.e. instruments which could ensure this objective.

[2] *Based on author's participation in the EC Trendchart project.*

- All CEECs have made improvements though of very different degrees in their research policies. In particular, this applies to evaluation and selection mechanisms and administrative procedures.
- Since 1999, CEECs have 'discovered' of innovation policy be it in rhetorical terms (strategies) or in real policy instruments' terms. We can observe in all countries gradual process of awareness raising in this respect.
- None of the CEECs has in place systematic evaluation and monitoring practices in innovation policy. So, they all share strong 'evaluation gap' which is largely the result of low level of innovation management skills at academia and low level of administrative skills to run/monitor RTDI schemes in governmental agencies'.
- A current focus of these policies is on how to couple Structural Funds with objectives in innovation policy and how to improve coherence of innovation policies through implementation of Structural Funds.

However, there are also important differences across these countries' innovation policies. First, different countries face different challenges in terms of coherence and coordination with other policies. Hungary and Slovenia are the most aware of this challenge and are searching for their own solutions. In other countries, we observe improved R&D policy but there is further need to develop instruments of innovation policy (Czech R., Poland, Slovakia, Estonia). In other countries, there is a great need to develop both, R&D and innovation policy (Bulgaria, Romania, Latvia, Lithuania). Second, there are big differences across countries in terms of transnational learning i.e. actual schemes which are modelled or transferred from abroad. In this respect, we can distinguish between 'active learners' (Slovenia, Hungary, Estonia) and 'passive learners' (Romania, Bulgaria, Poland, Czech R., Slovakia, Latvia, Lithuania). Third, there is a gradual shift and big country differences in terms of the extent to which the innovation policy measures are focused on: promotion of R&D in the business sector or on research component (most of the CEECs). Only in Hungary and Slovenia we come across more direct innovation-focused measures. Finally, there are big differences among the CEECs in terms of maturity of innovation policy. Some CEECs are very often transferring mechanically 'the best practice' from abroad while only some of them (Hungary and Slovenia) have been spotting local deficiencies and have been adjusting the instruments accordingly.

3 Europeanization and Future of S&T in CEE[3]

The next 10-30 years of this century will be marked by increasing divergences in the S&T systems among CEECs, whose main driving forces will come from differences in 'broad NSI' but also from impacts on S&T systems in CEECs which we describe as the Europeanization of their S&T systems. Differences in 'broad NSI' will affect the main feature of their S&T system. In those CEECs that will see recovery and high growth rates, a revival of domestic demand for R&D and a strengthening of in-house R&D are to be expected. This may lead to substantial institutional transformation in S&T systems, which will be organized around enterprises' innovation activities. In countries with sluggish growth rates or stop–go growth, further marginalization of domestic R&D for domestic innovative activities is to be expected. This may be the case where additional EU funding may actually deepen the gaps between international pockets of excellence in R&D and domestic innovation activities.

In S&T, Europeanization means that the dynamics of EC research, technology and development (RTD) policy is likely to become part of the organizational logic of national S&T and innovation policies. CEECs have already become part of that dynamic as a result of pre-accession activities. In that respect, Europeanization can be seen as a major component of the forces driving the restructuring of their R&D systems. We assume that Europeanization will strengthen the restructuring component of their S&T systems and that, as a result, S&T systems in the CEECs may diverge further from each other. However, it is difficult to predict whether Europeanization by itself can solve the key weakness of their S&T system, which is the low level of demand for domestic R&D.

The studies carried out on innovation policy in the thirteen candidate countries concluded that none of the CCs could be considered to have a fully-fledged innovation policy (EC, 2002, 2003). EU accession is likely to push CEECs into developing innovation policy, including regional innovation policies, as one of the preconditions for the effective use of structural funds. Research and technology policy is likely to be expanded and modeled on EU arrangements and to be extended towards downstream activities such as knowledge diffusion, in particular through support for regional innovation policy. In R&D, EU support through Framework Programs will establish criteria of international excellence which will operate as reference points for the restructuring of domestic R&D groups and organizations. For example, EU support for

[3] *This section is based on Radošević (2004).*

centers of excellence, which is already being followed by domestic networking and selection, has this effect.

Europeanization can be expected to weaken the power of the central state in S&T policy and will enhance the power of regions in big CEECs like Poland and Romania. It will strengthen the innovation community, encourage new social associations and interest groups to participate in the process of developing RTD and structural policy to be supported by the EU. To judge from the Greek experience, it is likely that the policymaking process will become less bureaucratic and more transparent.

Whether all CEECs will exploit the opportunities created by Europeanization to modernize their S&T systems and integrate them into EU-wide S&T activities will depend on a variety of local factors. In some cases, Europeanization will elicit only passive responses or nominal conformance, with considerable derogation in practice. However, given the considerable opportunities that EU accession opens up for the CEECs, Europeanization can be expected to be the main instrument of modernization for CEECs. For this to be realized, Europeanization will have to involve not only top-down change but also bottom-up responses and strategies developed by firms, R&D organizations and regions. In S&T, Europeanization is already being perceived as modernization. S&T administrators from the CEE can now travel, exchange experiences and familiarize themselves with current developments in S&T and innovation policy in the EU. The domestic S&T policy community, like their counterparts in the southern EU countries, is likely to internalize the logic, norms, behavior and culture associated with integration (Featherstone and Kazamais, 2001, p. 17). However, whether we will see real or surrogate modernization of S&T systems through Europeanization will depend to a great extent on the structure and the role of national political elites as well as on the involvement of civil society in Europeanization.

We must be aware that Europeanization has limits and ambiguities. As the dynamic of EU RTD becomes part of the logic of national S&T policymaking, it is likely to impact strongly on the definition of policy priorities and may lead to the mechanical transfer of policy models that may not be the most relevant for the CEECs.

Experience of Europeanization in the southern EU countries shows that the strongest effects were on the definition of the relevant policy actions and mechanisms and of national priorities. In the case of the CEECs, this will be compounded by the great importance of funding streams from Framework Programs and, in future, structural

funds. This is likely to lead to a sort of myopia, in which the importance of local problems and the search for local solutions is downgraded. The autonomy of CEECs in S&T policy may remain a theoretical possibility only, since in practice the EU may exert considerable influence over goals, cost allocation and the resource mobilization.

The automatic transfer of EU policy mechanisms may often be irrelevant to local S&T or not constitute the most effective policy actions. For example, the transfer of the science park model without regard for local demand makes such programs highly dependent on foreign funding and barely sustainable. The transfer of policy models to support domestic clusters in conditions where there are no strong domestic organizations that can operate as 'network organizers' or in whose interest it is to develop linkages usually has limited effects, if any at all. While Europeanization will enhance and legitimize the innovation community, this may at the same time become just one more layer of bureaucracy or civil society without domestic roots, which are than perceived as alien to the domestic S&T community. Although we are quite optimistic regarding the positive effects of Europeanization on S&T in CEECs, this by itself is no panacea but rather a great opportunity for CEE CCs to modernize their S&T systems and integrate them into the emerging EU-wide innovation system.

4 Conclusions

The 'narrow' NSIs in CEECs are undergoing extensive functional, organizational and financial restructuring (see Meske, 2004 for evidence). However, despite these changes, the key weakness of the CEEC's S&T systems remains the failure to develop enterprise R&D. The weaknesses in 'narrow' NSI will become visible through inadequate in-house R&D, weak university - industry links and a lack of technological co-operation among enterprises. In order to grow, these economies will have to generate their own innovation dynamics in order to complement imported technologies. These innovation dynamics will have to be driven by local enterprises committed to R&D and innovation.

'Narrow' NSI cannot be ignored if CEECs are to continue to grow and restructure. It may be possible for a limited period, as was the case during the transformational crisis of the 1990s. However, it is unlikely that CEECs can continue their industrial upgrading without restructuring their 'narrow' NSI, which plays a very important role in the development of technological capability in any economy. Its role cannot be reduced to the direct provision of technical information to industry. Research systems have several

functions that are important for industrial upgrading, of which the provision of new and useful information is only one. Other functions include the creation of new instrumentation and methodologies, the provision of skills developed by engaging in research, participation in research networks, the resolution of complex technological problems and the establishment of spin-offs (Martin and Salter, 1996).

It is not yet clear what national systems of innovation are emerging in the CEECs. These systems are far from being fully formed and it would be more appropriate to search first for signs of the emergence of sectoral innovation systems. Sectoral innovation systems are groupings of enterprises and their related networks of public and private institutions that are involved in the development, diffusion and utilization of innovation. These systems will strongly shape the character of NSIs in CEE. Based on the current patterns of production networks in CEECs it seems that these systems will be very heterogeneous. In some countries, such as Hungary, NSI may be based more on foreign enterprises.. In countries like Estonia, they may be formed around small enterprises. In other countries, the NSI could be dualistic in character, with subsectors of small and large firms being unrelated to each other or with weak links between domestic and foreign firms. In some cases, they may be based on a few strong regions which are the drivers of growth. In these cases, the NSI could be strongly shaped by a few regional systems of innovation. Alternatively, NSIs could be formed around one or two sectors in which the innovation process is developed on a collective basis, while in the rest of the economy the innovation links are very weak. For the time being, the innovation dynamic is strongest among foreign enterprises. Our conclusion is that this is the greatest strength but also, potentially, the greatest long-term weakness of the CEECs that have attracted large volumes of FDI. The way CEECs integrate into international production and innovation networks will strongly shape their NSI.

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