THE REGIONAL STRUCTURE AND DECENTRALISATION OF SCIENCE IN CENTRAL AND EASTERN EUROPEAN COUNTRIES

GYULA HORVÁTH

Introduction

Europe's further development depends on the way in which growth factors are spread across its regions, and one reason for the lower level of competitiveness is major regional differences in R&D. Weak regional cohesion and an exaggerated spatial concentration of modern regional development factors have a clearly negative effect on European competitiveness today. Activities with high value added are concentrated within the London–Paris–Milan–Berlin–Amsterdam pentagon, but the distribution of innovative industries differs even in the developed countries. The role of national core areas is vital to R&D capacity, high-technology industries and to developed services – but, again, the situation is very similar in the Central and Eastern European countries, where the level of concentration, in fact, increased after the change of regime.

The aim of this paper is to identify regional differences in the R&D structure of six large and medium-sized EU member states in Eastern and Central Europe. The basic hypothesis is that exaggerated intellectual polarisation hampers the strengthening of regional cohesion and that R&D must be given a priority role in economic development strategies.

The organisation of scientific institutions in Central and Eastern Europe, 1950–1990

The different levels of development of the two sides of Europe are particularly evident in relation to science, and the roots of this reach back several centuries. The university foundation period of the Middle Ages, in fact, had its influence on only a very small part of Eastern Europe. In this region were founded four universities (which play a prominent role until today). These are the universities of Prague (1347), Krakow (1364), Vienna (1365) and Pécs (1367). Higher education appeared in other parts of Europe only several centuries later. For example, Bulgaria's first university was founded in Sofia in 1888 (after many years of Turkish

rule) but newer universities in the country appeared only after 1970. The first universities of Romania were founded in Bucharest in the 1850s and in Iaşi (Moldavia) in the 1860s. In some major cities a university network – primarily in Transylvania – developed between the two World Wars, and in the communist era many new universities were founded in major cities or industrial centres, including the underdeveloped parts of the country.

Developments in many Eastern European countries were relatively uniform. The basis of higher education and research appeared only after the Great War and the number of institutions was very small. Only four universities were operating in Hungary between the two World Wars, the number of students being 14,000 out of a population of 9 million in 1938.

Due to regional development issues, and from the viewpoint of sectoral education, few adjustments were made after the Second World War. The University of Heavy Industry in Miskolc and the University of the Chemical Industry in Veszprém were founded in 1949, at the beginning of the communist era.

The foundation of national academies of sciences was crucial for the scientific systems of the countries of Eastern Europe, and all had organised their academies by the beginning of the 1950s. The academies were not only the coordinating institutions for science in their respective country, but had an extensive research network, typically embracing some 40–70 institutions. The consequence of centralised government was that these academic research institutions were, with few exceptions, organised in the capital cities.

The modest changes in over-centralisation introduced in some countries have some influence in the deconcentration of the institutions. For example, the government in Hungary issued a decree reforming science policy within the economic reform programme started in 1968, and a communist party document issued in 1969 also asserted the need for science to be decentralised. The decree declared the negative aspects of the excessive concentration of research in Budapest and proposed to decrease the differences between the disciplines and to develop the social sciences. The enactment of the decree, however, was only partially successful. At the beginning of the 1970s science developed noticeably in the regional centres, and the Hungarian Academy of Sciences organised a Biological Research Centre in Szeged, which was the most highly developed in Central Europe. The Faculty of Business and Economics began to operate at the University of Pécs – only the second institution of education in economics in the country – and the academic research institutions of Pécs acquired a new profile – that of regional science. However, the resettlement of research institutions or HE institution from Budapest was not successful. A decision had been made to move the Faculty of Veterinary Science from Budapest to Debrecen in the east of Hungary – the centre of Hungarian agriculture, but, due to obdurate opposition (for personal interests) by the leaders of the university, the plan failed.

Although the communist party's policy for science had different characteristics in individual countries – as in other spheres of the economy and society, we can detect some characteristics common to all:

1. Science enjoyed a privileged position in the socialist era – a typical feature of the Soviet model. The favoured groups of people in the sciences (academicians, principal researchers) received higher incomes and enjoyed a variety of social benefits.

2. Intensive state intervention and government control were accompanied by continuous and adequate budgetary resources, although these varied in the different branches of science. Of the national income, 2– per cent was spent on R&D in the Eastern European countries in the 1970–80s. This high rate was due in part to research in the armaments industry, and a further explanation is that many industrial products (in telecommunications and computer technology) were produced on the basis of domestic research because of the boycott on exports of Western European technology.

3. The state established research institutes in technology and the natural sciences in the 1950s, a period of extensive development and promotion of science, but the social sciences remained in an inferior position for decades, due to the dominance of Marxist ideology. The new branches of science (sociology, political and regional sciences) developed relatively late, and they were only embedded in the HE system with difficulty. The ratio of researchers employed in the social sciences amounted to less than one-fifth of that in several countries.

4. Academic research networks, sectoral research institutes controlled by the ministries and corporate research units were dominant in the institutional structure of research. For example, in Hungary in 1985, corporate research units absorbed 48 per cent of all R&D expenditure. Universities were primarily institutions of education and research expenditure within universities was marginal. In Hungary, in 1985, HE institutions accounted for no more than 12 per cent.

The impact of the change of regime on the regional structure of Eastern and Central European R&D

The change of regime at the beginning of the 1990s produced a significant restructuring of the scientific potential of Eastern and Central European countries. One characteristic common to all was a considerable reduction in scientific capacity. Two fields of research capacity shrank dramatically, one of these being the sectoral research institute network. The majority of research institutes funded by national bodies (such as ministries) were closed and the number of employees in academic research institutes declined equally dramatically. As a direct conse-

quence, the percentage of GDP allocated to R&D was greatly reduced – to one-third or even one-fifth. In *Table 1* we show this in terms of GERD/GDP (Gross expenditure on research and development as a percentage of Gross domestic product).

After the change of regime R&D underwent a substantial restructuring. The re-organisation of the HE system was the starting-point of a range of positive changes. In Central and Eastern European countries the number of undergraduates doubled or tripled, new colleges and universities were established and R&D was given an important role. One part of the major, state-owned research institutes closed (apart from the academic networks) and the other part was privatised. Certain groups of companies started to increase their R&D activity, including several multinationals settled in the region. The structure of expenditure changed perceptibly, with spending on state- or community-financed research continuously decreasing and that on corporate research rising.

Table 1

Changes in R&D main indicators in Eastern and Central Europe, 1980–2005

Name	Bulgaria		Czechoslovakia		Poland		Hungary		Romania	
	1980	2005	1980	2005	1980	2005	1980	2005	1980	2005
GERD/GDP	2.5	0.5	3.9	1.4^1 0.5^2	2.2	0.6	3.2	1.0	No data	0.4
Number of researchers, '000s	31.6	21.6	39.6	37.5^1 17.5^2	96.3	55.0	31.4	23.0	71.1	33.4

Note: [1] Czech Republic, [2] Slovakia.
Source: Author's compilation based on national statistical database 1980, and Europe in Figures. Eurostat Yearbook 2008.

There are, however, considerable differences between the countries of Central and Eastern Europe. In the Czech Republic, expenditure in business research locations accounts for nearly two third of all GERD – data similar to the EU-27 average. The ratio of company-financed research is the lowest in Bulgaria where government finance is still of great importance. In two countries, Hungary and Poland, the influence of HE institutions in financing research exceeds the EU average, and in all countries government-supported research institutes have a notably higher share of GERD than the EU average due to the maintenance of a network of Academies of Sciences (*Table 2*).

Table 2

Distribution of GERD by sectors, 2005, per cent

Name	Business sector	Budgetary institutions	Higher education
Bulgaria	22.2	67.3	10.5
Czech Republic	64.7	19.0	16.3
Hungary	45.0	28.6	26.4
Poland	31.6	36.8	31.6
Romania	48.0	34.1	17.9
Slovakia	50.0	30.0	20.0
EU-27	64.0	13.4	22.6

Sources: Europe in Figures. Eurostat Yearbook, 2008; Statistical Yearbook Romania, 2007.

The sectoral transformation of research institutions was followed in none of the countries by a positive change in regional structure, and it remained typical of the spatial structure of research centres that they were still mainly concentrated in the capitals. In the 1990s, however, the spatial structure of R&D changed in several countries. The central or core areas declined in importance, and the major results of decentralisation are evident in the regionalised and federalised countries. The relative weight of Vienna in Austria decreased by 15 percentage points and, in Spain, that of Madrid by 12. There was a slight decrease – or even no movement at all – in the unitary states of Hungary and Greece. In the latter, the Attica region even increased its share in the GERD of the country (*Figure 1*).

In Central and Eastern Europe the capitals and metropolitan regions are the bastions of research and science, the weight of the metropolitan region being greatest in Bulgaria. Four-fifths of the country's research potential is concentrated in Sofia and its vicinity, and two-thirds of Hungary's GERD is found in the Central Hungarian (NUTS2) region which consists of Budapest and Pest county. The research capacities of the Czech Republic, Poland, and Slovakia reveal a slightly more balanced picture – the metropolitan proportion in these countries being under 50 per cent (*Table 3*).

Most of the important R&D indicators in the core areas of CEE countries are below the EU average, and in no more than 2 (Czech) regions of the 49 NUTS2 regions of the 6 do CEE countries exceed the EU average for the GERD/GDP ratio. In 8 regions the GERD/GDP level is between 1.0 and 1.9 per cent, and in 39 the level does not reach 1 per cent. In 20 regions it is even below 0.3 per cent (*Figure 2*).

Figure 1

Share of the core areas in GERD, 1994–2005, per cent
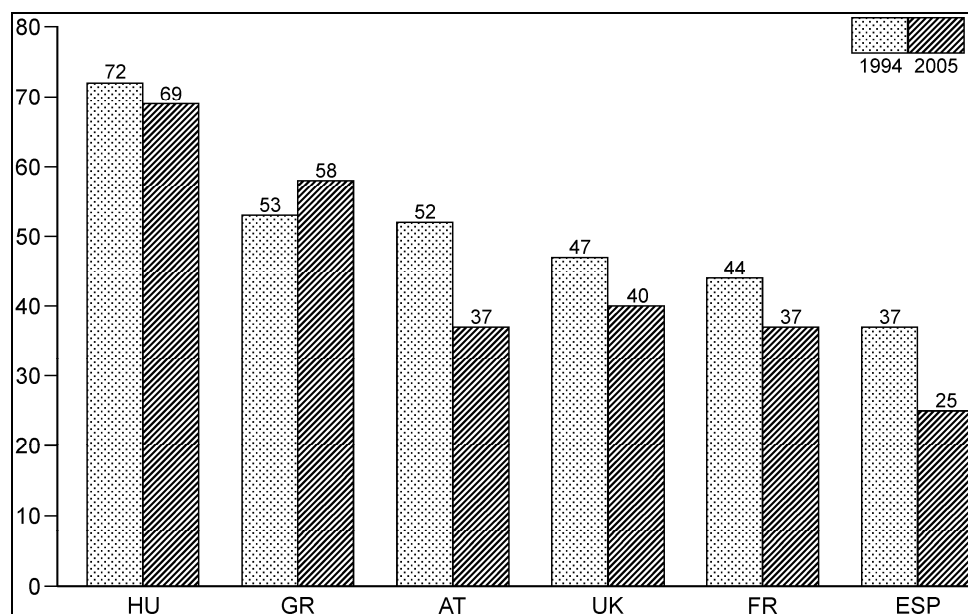
Source: Author, based on Europe in Figures. Eurostat Yearbook, 2003, 2008.
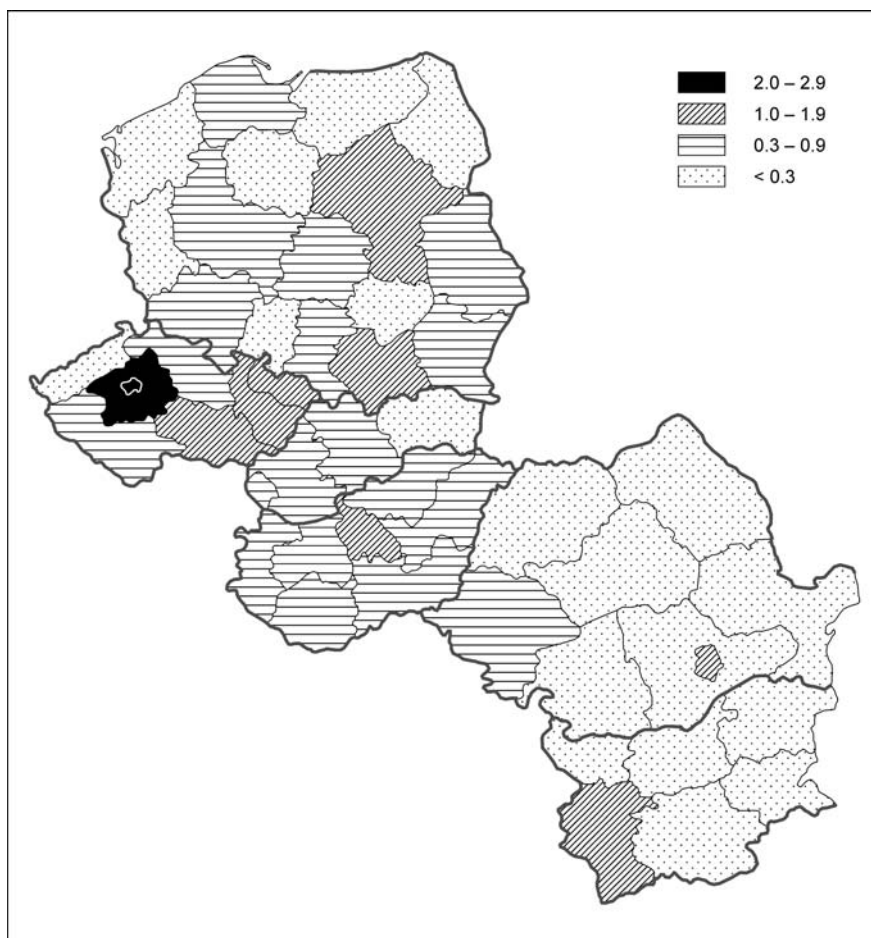
Table 3

Weight of capital regions in national R&D

Country	Region	Percentage share in R&D expenditure	Percentage share in R&D employees
Bulgaria	South-west	83.4	71.6
Czech Republic	Praha	37.5	40.4
Hungary	Central Hungary	68.8	63.4
Poland	Mazowieckie	42.5	32.6
Romania	Bucureşti–Ilfov	59.3	60.9
Slovakia	Bratislavský kraj	47.6	49.8

Source: Compiled by the author on the basis of http://epp.eurostat.ec.europa.eu.

Figure 2

GERD as per cent of GDP in CEE regions, 2005

Source: Compiled and edited by the author based on http://epp.eurostat.ec.europa.eu.

If we look at the regional spread of R&D activity, we would draw a similar conclusion. In most countries the most highly concentrated R&D activity is corporate-financed, and foreign joint ventures' target locations for establishing R&D units in CEECs were almost solely capital cities.

The location of the academic institutions, the leading basic researchers, is no more positive. Most of the institutes of academies of sciences are located in national capitals and no more than 7 (19 per cent) of the 37 research institutes of the Hungarian Academy of Sciences operate outside Budapest. This means that only

15 per cent of the Academy's employees, some 4,000 in number, work in these institutes. By contrast, thirty-eight percent of the Polish Academy's employees work in institutes outside Warsaw. It is important to emphasise that, in federal states, the spread of Academy institutions is very different from the above. There are a remarkable number of research centres in the federal states of Austria and Germany (*Figure 3*).

Figure 3

Employers of state institutes of science outside capital city
in specific European countries, 2007
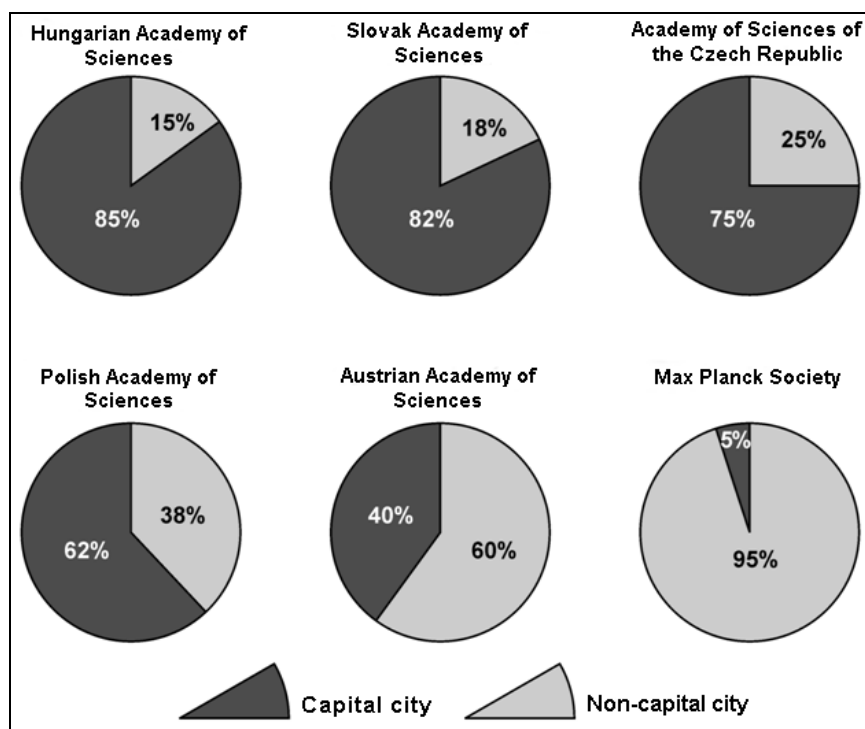
Source: Compiled and edited by the author.

Great expectations followed the change of regime in terms of the modernisation of the regional structure of higher education. In almost every country the total number of students tripled or quadrupled, although this increase was spatially unbalanced. The dynamic of HE in the capital is as strong as the increase in the number of students outside the capital. The developments were discursive in that no regional policy concepts were applied and, moreover, spatial development planning

was undeveloped. The unfavourable spatial structure of HE was preserved, with some 30–40 per cent of students still concentrated in the capital (*Table 4*). A further characteristic of rapid change was the significant increase in the incidence of the social sciences in the HE system of most countries – important in terms of establishing the economic bases of regional development. The weight of social sciences in HE is higher in CEE countries than in other member states of the EU, but at the same time the importance of natural sciences and technology in HE is lower (*Table 5*).

Table 4

The distribution of students in HE in central areas, 2006

Country	Number of students, '000s	As national per cent
Bulgaria	114	47.1
Czech Republic	125	37.0
Poland	445	20.7
Hungary	187	42.6
Romania	294	35.2
Slovakia	65	32.8

Source: Compiled by the author based on http://epp.eurostat.ec.europa.eu data.

Table 5

Students in HE by field, 2006, per cent

Country	Students, '000s	Social sciences[1]	Technology and natural sciences[2]	Other fields [3]
Bulgaria	243	43.5	35.2	21.3
Czech Republic	337	27.6	38.7	33.7
Poland	2,145	40.9	30.1	29.0
Hungary	439	41.5	28.6	29.9
Romania	835	50.0	31.5	18.5
Slovakia	198	28.3	43.9	28.3
Austria	253	34.9	35.1	30.0
Finland	309	22.4	52.8	24.8
Netherlands	572	38.0	32.1	29.9
Ireland	186	23.1	36.0	40.9

Note: [1]Business, behaviour, law and other social sciences; [2]Biological and physical natural sciences; [3]Teacher training, liberal arts, personal and security services, environmental protection.
Source: Compiled by the author based on http://epp.eurostat.ec.europa.eu data.

In Hungary, at the beginning of the 1990s faculties of social sciences were founded in many cities by the former political elite. The establishment of university faculties or colleges in regional public administration centres was a result of political change, and the, now unused, official buildings and education centres of the communist party offered an adequate infrastructure for HE. The Ministry of Education accepted implicitly the relatively cheap and extensive developments in social science education. As a result of the demand for specialists required to work in the market economy, the growth in numbers in economics education can be understood.

The slight decrease in the regional distribution of R&D was generated by the fact that research and development was given an important role in university functions. In the analysis of the R&D investment structure, we have already mentioned the different distribution of HE in different CEE countries, and we saw that in Poland and Hungary HE represents a higher weight than the EU average in terms of R&D expenditure, There is no other type of research organisation outside higher education to be seen in any CEE country: the role of corporate research is well-nigh invisible and the number of regional development planning institutions and research centres of many West European countries can rarely be found.

Conclusions

If we examine the spatial location of R&D activity, which should be one of the factors supporting the dynamic of European regional development, we can see that the change of regime and the transition have had the effect of preserving the "status quo" in the new member-states in Central and Eastern Europe. Major regional inequalities are still evident in the regional structure of developed innovation institutions, and the core areas and capital cities still have their privileged position. The regional and structural policies based on EU norms have not stimulated the development of R&D in the new member states, as the operational programmes for 2007–2013 demonstrate. There is no Central or Eastern European country with a regional or competitiveness-related operational programme targeting a comprehensive transformation of human resource development in respect of research.

Changes in the factors influencing regional development require the regional policy system of objectives, together with the related instruments and institutions, to be transformed. The long-term trends of European spatial development require the widest range of institutionalised forms of decentralisation to be established in the countries of Europe in the face of their different traditions. The new, Central and Eastern European member states can only meet EU cohesion requirements with the help of decentralised institutions. This is not only a public administration issue, but also a prerequisite for the success of R&D in helping to improve com-

petitiveness. If regionalism progresses, it can bring about the modernisation of regional structures and the need for multi-polar regional development may change the hierarchies of power in those countries still in transition quite profoundly. The sub-national level of the power structure, the region, is a territorial entity which supports the sustainable development of the economy and the modernisation of the spatial structure – with its own financial resources and having at its disposal an autonomous development policy based upon local governmental rights. The regions are becoming the stage for innovative development, and the degree of regional-level embeddedness among the fundamental institutions of innovation output is becoming stronger.

The decentralisation of science and R&D has a number of positive effects on the improvement of the regions. The formation of research-intensive sectors increases the number of quality jobs and the business development effects of setting up spin-off companies are clearly evident. Innovative business develops the region's export capacity and helps it integrate into the European and international research area. Companies which demand or rely on research contribute to the re-industrialisation of the region and to the spread of modern services. All of these improve the income-generating ability of the regions and contribute to the enhancement of territorial cohesion. The Lisbon criteria cannot be met without decentralisation.