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RELATIONSHIPS BETWEEN ECONOMIC RESTRUCTURING AND HIGHER EDUCATION IN THE DRAVA–TISA TRANSNATIONAL DEVELOPMENT ARC

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ABSTRACT - The development of the new economy in Eastern and Central Europe involves a complexity of economic and social processes. The sectoral structures and territorial location of the industry and the higher education show significant inequalities. Capital city concentration, low level of research orientation and insufficient linkages with industries are the most important barriers to the development of higher education and reindustrialization. The regional and cohesion policies need strong relations between economic restructuring and higher education development. The paper focuses on demonstrating the regional differences in these fields and proposes the development of environmental industry and a disciplinary reform in the university training and R&D.

Keywords: regional development, cohesion policy, R&D and innovation, university restructuring, transnational and interregional cooperation

INTRODUCTION

One reason for Europe's diminishing role in the world economy is the fact that the development of research capacity and of the human factor lags behind that of their US counterparts. A programme aiming to correct these deficiencies was drawn up in the European Union's Lisbon Strategy.

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 advanced services – but, again, the situation is very similar in the Eastern and Central European countries, where the level of concentration, in fact, has increased after the change of regime in 1989–1990.

One of the main priorities of post-2014 joint European strategy is to improve Europe's efficiency in terms of its use of resources, with the aim of achieving both sustainable growth and the transition to a resource-efficient and low-carbon economy (Communication from the Commission, 2011).

Natural resources provide the basis for the functioning of the economy and determine the living standards of the population, and we no longer exploit them as in the past. Therefore, improving the efficiency of their use plays a key role in ensuring growth and employment in Europe; it offers outstanding economic opportunities, improves productivity, reduces costs, and enhances competitiveness.

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The European initiative in this direction provides a long-term framework for action in several policy areas and fosters the elaboration of policy agendas on climate change, energy, transportation, industry, raw materials, agriculture, fisheries, biodiversity, and regional development. One significant objective is to improve predictability in the investment and innovation environment and to ensure that each policy is given an appropriate, balanced role to play in achieving resource efficiency. To fulfil these requirements, systematic knowledge and the creation of still stronger synergies are required. A fundamental monitoring of regional conditions needed for economic restructuring is also likely and several countries have already started the process. The new challenges need substantial changes in various driving forces of regional development, including R&D capacities and university training. The relationship between economic growth and university functions in the regions has been examined in many research projects in the countries of EU (Amin and Thrift, 1995; Brugnoli, 2010; Cooke and Piccaluga, 2007; Gál and Ptaček, 2011; Goddard, Etzkowitz, Puukka and Virtanen, 2006; Sterlacchini, 2008).

Deepening the interactions between higher education and regional economies represents the basic interest of both sectors. The EU legislation on the creation of university rankings which is being elaborated points towards this direction as well. The new 'multi-dimensional' listing marks a departure from traditional approaches to ranking university performance, most of which focus disproportionately on research excellence. Instead, it will rate universities according to a broader range of factors, in five separate areas: reputation for research, quality of teaching and learning, international orientation, success in knowledge transfer (such as partnerships with business and start-ups), and contribution to regional growth (Europa Press Releases, 2013).

The aim of this paper is to identify regional differences in the human potential and the university disciplinary structure of eleven NUTS2 regions in cross-border areas of six Central European countries. This area, dominantly composed of the peripheral regions of these countries, is called by the author as "*Drava–Tisa development arc*". The large area includes territories located in the south, in a band ranging from the Drava Valley to the Eastern Slovakia via Northern Croatia and Serbia, South and Eastern Hungary and Western Transylvania in Romania.

The basic hypothesis is that exaggerated human resource polarisation hampers the strengthening of regional cohesion and that R&D must be given a priority role in economic development strategies. In addition, in order to improve the economy of this large cross-border area the university disciplinary specialisations and R&D structures should be re-qualified.

DEFICIENCIES OF REGIONAL ECONOMIES AND DEMANDS FOR REINDUSTRIALIZATION

The population of the eleven NUTS2 regions was 17.2 million in 2010, although their economic potential falls well short of their population weight. These regions are generally characterised by a weak economic structure, a high proportion of underdeveloped and rural areas and they significantly lag behind the average level of national development in the fields of economic performance, infrastructure and living conditions (Table 1). Due to the weak industrial performances, sustainable economic growth attaining the European average cannot be considered as a mid-term objective. Traditional industrial centres, including several industrial sector concentrations, are very few in the region, and the numbers employed in the industrial sector, except for two regions, is below 30%. Industry's share of GDP exceeds this latter proportion in only three regions. Following the change of regime, industrial production values declined substantially and a clear deindustrialisation process has taken place.

The leading cities of the urban system of this transnational macro-region (Košice, Miskolc, Oradea, Cluj-Napoca, Baia Mare, Timișoara, Arad, Szeged, Novi Sad, Subotica, Osijek, Pécs and Maribor) are to be considered as among the essential keys to development. The evolution of the space organising role of regional centres in the market economy system is hindered by several structural factors.

Peripheral regions of Central and Eastern Europe suffered from transformation effects after the change of regime at the beginning of the 1990s. They have to find a new growth path after

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recovering from the economic crisis at the end of the 2000s. The post-socialist economic structure simply does not meet the requirements of the new development paradigm. The traditional industrial sectors of the regions have been drastically downsized and it is unlikely that any inflow of foreign direct investment (FDI) will contribute to their revitalisation. The absence of the dynamically developing new economic sectors from the domestic scene is also highly unsatisfactory. The majority of the population cannot find profitable business opportunities, there are hardly any new enterprises with a high growth potential and the majority of companies are trying to sell traditional products in a highly competitive environment, mostly producing them by using old technologies.

Fundamental transformation is required in the major supply systems as well as in industry, economic policy and education, and one has to avoid looking backwards to create the appropriate conditions for transition to an entrepreneurial society. The stimulation of economic growth in the lagging regions is fundamentally a question of economic structure. Structural modernisation must be based, on the one hand, on the internal assets and opportunities of the regions, whilst, on the other hand, it must satisfy the requirements of long-term competitiveness on the world market. This involves operating on a suitable scale (market visibility), a profile shaped by comparative advantage and increasing added value based on the level of productivity.

Similarly to several Eastern and Central European and South-East European regions, the transnational region offers limited possibilities today for the domestication of modern space-shaping forces (Table 2).

At the same time, abundant factors are available which may be converted into development forces through the implementation of a consciously elaborated strategy, reindustrialisation and the closely related developed business services may play a determining role in the transformation of the economic structure. In order to count this region among those capable of development in the European Union, a closely interrelated development of higher education, research and development and the economy is necessary in these five areas under the influence of different national development philosophies.

Table 1. *The economic potential of the Drava–Tisa arc*

Region	Area, '000 km²	Population, '000 persons 2010	GDP per capita, '000 euros, PPP, 2010	GDP per capita, PPP EU27=100 2010	Employment in industry as a percentage of the total, %
Eastern Slovakia (SK)	15.7	1,585	12.1	49	24.0
West (RO)	32.0	1,919	12.9	53	35.3
North-West (RO)	34.1	2,729	10.2	42	25.9
Vojvodina (SRB)	21.5	1,916	6.2	25	23.0
Northern Great Plain (H)	17.7	1,525	10.1	41	23.8
Southern Great Plain (H)	18.3	1,325	10.4	42	23.9
Southern Transdanubia (H)	14.2	953	10.8	44	23.9
Northern Hungary (H)	13.4	1,223	9.7	40	28.4
Central and Eastern Croatia (HR)	23.2	1,351	10.4	42	19.1
North-West Croatia (HR)	8.7	1,659	18.4	75	43.8
Eastern Slovenia (SLO)	12.2	1,084	17.0	69	24.0
Total	219.0	17,269	–	–	–

Source: Eurostat and national statistical yearbooks

Table 2. *Main indices of the transnational region*

Region	Proportion of the age group between 25-64 years with a degree within the population, %, 2011	The share of R&D in the GDP, %, 2010	Flats connected to wastewater collection and treatment systems, %, 2009
Eastern Slovakia (SK)	16.1	0,5	n.a.
West (RO)	14.3	0.2	63.3
North-West (RO)	13.1	0.4	61.8
Vojvodina (SRB)	10.8	0.2	n.a.
Northern Great Plain (HU)	16.1	1.2	90.6
Southern Great Plain (HU)	17.5	1.0	84.9
Northern Hungary	15.5	0.6	65.2
South Transdanubia (HU)	16.3	0.4	91.9
Central and Eastern Croatia (HR)	10.9	0.2	84.0
North-West Croatia (HR)	22.7	1.5	91.2
Eastern Slovenia (SLO)	19.5	1.2	100.0

Source: National statistical yearbooks

Reindustrialisation (or, to a certain extent, simply industrialisation) plays a key role in the acceleration of the economic growth of regions, although it cannot follow the pattern of the 1990s. Unfortunately, manufacturing industry has not been relocated to these regions during the transition period. The inflow of foreign capital as FDI (based on favourable capacity and resources) cannot be expected, even given radically improved accessibility, since the nature and competitiveness of the European space do not point in this direction.

The growth opportunities of the regions may be determined on the basis of a careful enumeration and reorganisation of internal factors, an increasingly coherent vision of the future concerning the European Economic Area and by contrasting these two with one another (Szerb and Ulbert, 2011).

a) The current industrial structure of the regions shows the increasing importance of lighting, food production and energy, the machinery industry as being solid and consistent. None of the four, however, can be seen as a structure-forming driving force in its region:

- The machinery sector is mostly made up of companies wholly integrated into an international group and whose functions and profile are decided by a multinational parent company. The sector's development to date demonstrates that these companies have limited ability to stimulate growth in their region as a whole.
- Energy generation is integrated into a national system, with a (presumably) stable position and the needs of regional growth may play only a secondary role.
- The lighting and food industries produce goods for domestic markets or operate as subcontractors and the product structure and technology of companies in these fields is designed accordingly. This means that, given the present structure, no significant breakout can be foreseen on the basis of market relations.

b) The industrial organisation of regions is slightly distorted in terms of competitiveness. The circle of SMEs is quite stable, but, due to its homogeneity, it seems unable to find a take-off point to the market without external aid, and integrative larger stakeholders are missing. There is only one or two relatively significant organisations scattered across each subsector in the underdeveloped regions and even these tend to be subcontractors in an international system

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and do not depend upon more intensive territorial collaborative linkages. This might well have been the case, of course, given the presence of some advanced final product or products – not to mention autonomous R&D activity.

c) The existing industry in lagging regions, with its current structure and organisational system, lacks the capacity both to attract capital and to absorb it. Consequently, there is no chance for capacities which are both small and less efficient in world market terms to generate competitively sized export-oriented performance in an integrative way in the form of industrial sectoral networks or clusters in their more advanced form.

d) Traditional economic development or support techniques do not offer the possibilities necessary for economic or manufacturing take-off. Financial aid linked to the realisation of an individual, autonomous or even complex business plan directed at SMEs may only support an individual market presence and so serve limited business aspirations aimed at the short-term satisfaction of some market niche. Against this background, specialisation, acquiring a durable market share and sustainable growth are out of the question.

Take-off, in terms of reindustrialisation, is only possible in the presence of a development strategy which has a wider perspective and is based on the doctrine of current and future competitiveness. The demand and opportunity for such a development was already articulated in the regional strategies and operational programmes of the 2007–2013 period. However, the diverging interests and possibilities of individual economic units – the system for funding spatial development with its soft requirements, limited resources and traditional nature, the lack of management expertise and of a rational organisation of the territorial economy, and the weakness of the regions due to the non-availability of engineering experts – have all contributed to a delay in implementation.

New industries are also needed in this area and the regions' universities must serve as a catalyst for development. The reform of the education system, the shaping of individual competencies according to the needs of the entrepreneurial society, the complex development of creativity, the capacity for individual thinking, the recognition and exploitation of opportunities, mathematical and technical skills, enterprise launching capacities and language skills are all essential. There are opportunities for sectors of the new economy in areas where successful experiments have already been carried out. These include the health care industry, laser technology, renewable energy and environment-related industries – all of which have been spoken of enthusiastically for a number of years. Progress is now overdue.

The EU Commission's document, 'Europe 2020' and the OECD's strategic initiative both assert that innovative environmental protection may be a very favourable area post-crisis for serious, long-term growth for the economy.

Instead of new central state initiatives, the funding of those actually in existence would be more beneficial. Universities should play a more active economic development role not only in education, but in launching research which may be valorised in the economy and in establishing active linkages with local SMEs. There is a need for providing general entrepreneurial and management training and special counselling according to each company's individual situation and life cycle – both for newly established and old enterprises.

THE ENVIRONMENTAL INDUSTRY

A wide array of international experience demonstrates that the environmental industry is one of the most promising directions of reindustrialisation (Baranyi and Fodor, 2009; Steinbach, 2006; Sinclair-Desgagné, Finus and Barbier, 2008). As a result of globalisation, technological progress and new political priorities, the "environmental products and services industry" has become a constantly expanding, autonomous economic factor in the developed countries on the basis of both the number of employees and of sales revenues.

In the strategic documents of Southern and Eastern Hungarian regions, from among the prospective branches, it is the environment industry which shows the most visible signs in connection with new energy development objectives ensuring the exploitation of renewable energy resources and safe energy supply (Fodor, 2009). The emergence of this industrial branch is connected to environmental protection, often related to the restructuring of old industrial districts and the recultivation of mining areas. Today, the branch includes activities producing competitive, high-demand products requiring know-how and providing the basis of modern industry in some regions. Currently, the eco-industry is only represented in waste processing in most regions, despite the broad spectrum of eco-industrial development opportunities (Table 3).

Environmental protection investment totalled, on average, 200 billion HUF per year during the last decade, some 5% of the total. More than 75% of the total environmental protection investment was made in the form of ‘end-of-pipe’ investment, of which 50% came from the public sector. Investment in the sector shows an annual average growth rate of 17%. Approximately 50% of investment went into wastewater treatment, 14% into atmospheric protection and a further 14% into soil and groundwater protection. Eleven percent of investment was aimed at waste treatment and 5% was devoted to nature and landscape protection. The turnover of the environmental industry in Hungary was HUF 450 billion in 2011.

The wider distribution of the environmental industry should be linked to the reindustrialisation of regions and a relevant strategic programme should be introduced (Baranyi and Fodor, 2009). This should target the strengthening of the income-generating capacity of the regions, produce many new jobs, offer potential for profile extension to the universities and in technological higher education in general in the regions and foster the creation of relevant training centres. Realising these objectives would also require the utilisation of the financial resources available during the new programming period of 2014 to 2020.

Table 3. *Environmental industrial sub-sectors and products*

ENVIRONMENTAL SUB-SECTOR	PRODUCT TYPE
Atmospheric protection	Air filters, devices to improve gas dispersal, incinerators, gas recycling systems
Wastewater treatment	Drainage facilities, containers, wastewater cleaning facilities, refrigerated systems, low-pollution technologies
Waste treatment	Waste collection, neutralisation and measurement facilities, recycling equipment, composting and waste deposit facilities, low-level radioactive waste disposal, treatment and isolation facilities, waste equipment and vehicles for waste transportation
Protection of soil and groundwater	Soil protection materials and measurement devices
Protection against noise and vibration	Measurement devices, noise protection devices, sound-proofing equipment, ceilings, walls, other sound-reducing equipment
Protection of landscape and nature	Instruments, materials and equipment for the rehabilitation of flora, fauna, natural habitats, natural and semi-natural landscape

Source: Environment Protection Expenditure and Environment Industry, Hungarian Central Statistical Office, Budapest, 2006.

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WEAK ELEMENTS IN THE COMPETITIVENESS OF UNIVERSITIES

In the earlier phases of the regime change there were high hopes concerning the transformation of the regional structure of higher education (HE) and R&D in all Eastern and Central European countries. The intellectual potential showed high concentration in capital metropolitan regions. European Union documents have continuously proposed decentralization of the knowledge production activities and creative skills (The territorial state and perspectives..., 2006). After 1990, the number of students enrolled in such institutions increased three- or fourfold. However, this growth was not evenly distributed, either geographically or in terms of disciplines. The dynamic growth of HE did not exceed the rate registered in provincial institutions and the major developments produced stronger growth in social science programmes, whilst the growth of student numbers at faculties of technology and natural sciences were more modest.

These developments were clearly spontaneous and regional policy was still not enforced at the end of the 1990s. In fact, EU-conforming spatial development was at a very low level in the potential member states. This may be the reason why the previous unfavourable spatial structure of higher education lasted. Some 20–70% of students enrolled in HE were concentrated in the capital cities (Table 4). Another essential feature of the rapid transformation from the perspective of creating the economic basis of regional development was that, as a result of growth, the weight of social sciences significantly increased in HE in most countries. Social sciences are generally more represented in the systems of Eastern and Central Europe than in the other EU member states, whilst natural and engineering sciences have a more insignificant role (Tables 4–5).

Table 4. *The higher education indices in the core regions of Eastern and Central Europe, 2011*

Country	Region	Number of students, '000s	As % of national total student numbers	Persons aged 25-64 with tertiary education attainment, %
Bulgaria	Southwestern	132	46.0	32.8
Czech Republic	Prague	162	37.2	37.6
Poland	Mazowieckie	445	20.7	32.5
Hungary	Central Hungary	185	47.6	31.4
Romania	București–Ilfov	352	35.2	31.4
Slovakia	Bratislavský kraj	65	32.8	38.0
Croatia	Continental Croatia ¹	59	39.4	17.4
Slovenia	Western Slovenia	77	69.6	29.5

¹ In 2012, the Northwestern region was joined with the Pannonian region and the newly founded region was named Continental Croatia.

The number of degrees in technological subjects as a percentage of the total in HE in ECE countries shows a gloomy picture. The universities award approximately one-third of those awarded by the leading Finnish institutions and so the basis for technological development is relatively weak. The problematic nature of this is clearly indicated by the timeframe.

The structure of technological HE is not monocentric in most countries, as large regional centres operate universities or faculties of technology with a significant research potential. In Hungary, 56% of students of technology are educated in Budapest, whilst the equivalent for Bucharest is only 25% and for Prague 42%. The regional disparities in the disciplinary structure of Czech and Hungarian HE are illustrated in Figures 2–3.

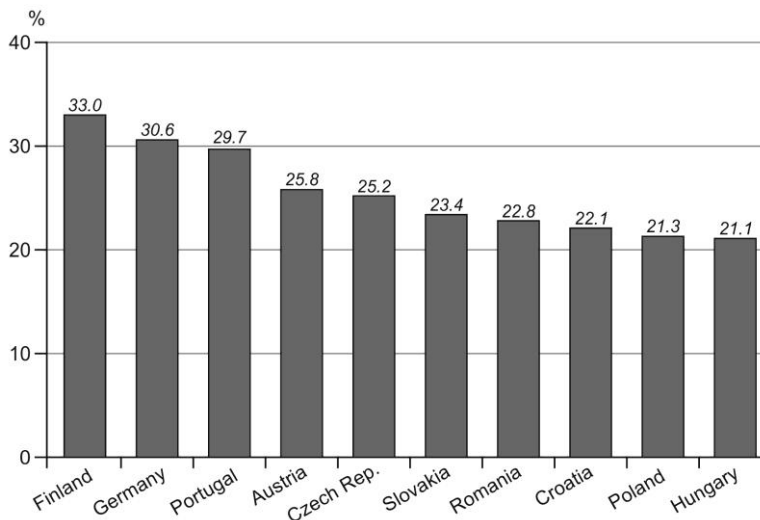
Table 5. Percentages of students enrolled in HE by field of training, 2011

Country	Social sciences ¹	Natural and engineering sciences ²	Other fields of training ³	Number of students in technology HE institutions, '000s
Bulgaria	45.0	28.9	26.1	51.7
Czech Republic	31.2	40.4	28.9	61.7
Poland	40.3	30.0	29.7	268.6
Hungary	40.9	30.8	28.3	46.0
Romania	56.0	30.6	13.4	174.4
Slovakia	29.3	43.6	27.1	34.5
Austria	36.2	36.4	27.4	39.6
Finland	22.9	52.3	24.8	77.3
Norway	32.3	36.7	31.0	16.0
Greece	31.4	45.6	23.0	108.0
Portugal	31.9	48.5	19.6	84.1

1. Business, behavioural, law and other social sciences; 2. Life and physical sciences; 3. Pedagogical training, humanities, personal and security services, environmental protection.

Source: Europe in Figures. Eurostat Yearbook 2011

The structurally weak technological HE and research in the three Hungarian macro regions (Northern Great Plain, Southern Great Plain, and South Transdanubia) pose an obstacle to economic growth in Hungary. Hungarian regional science had already drawn attention to the growth problems deriving from the asymmetric spatial location of basic *and applied research and the economy* in the 1980s (Enyedi, 1987). The modernisation of the economy was hindered by the fact that provincial R&D centres were located in less developed regions of the country, whilst industrialised areas

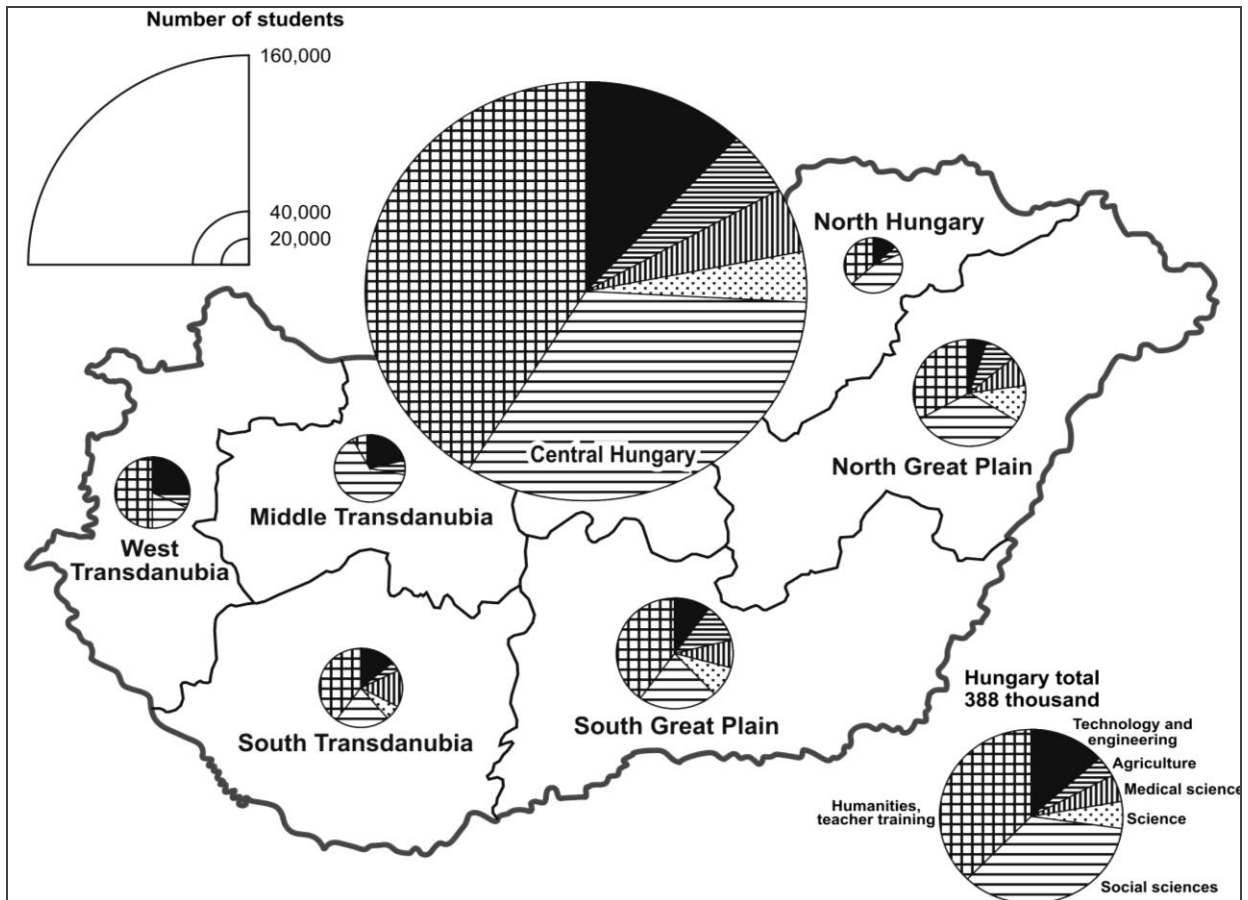


Source: Eurostat

Figure 1. Technology degrees in higher education as percentage of the total number of degrees, 2011

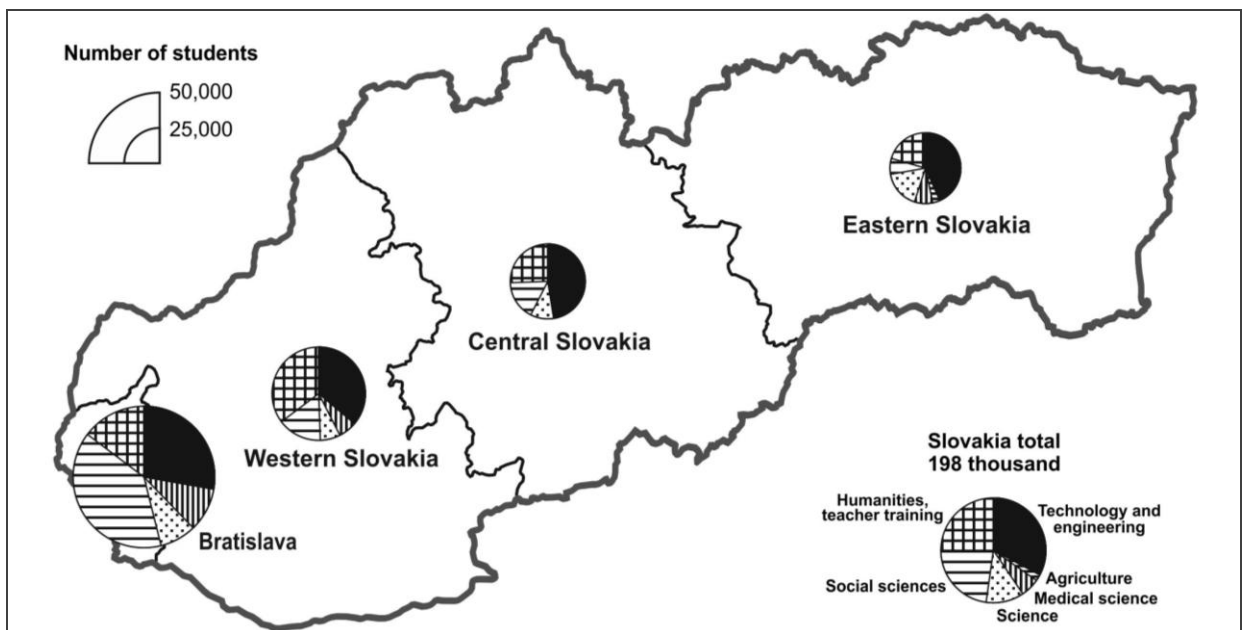
(Northern Transdanubia, Northern Hungary) were marked by weak research capacities. This contradiction has not changed during these last ten years of the market economy and in fact this continuing imbalance has created a phenomenon unparalleled in Europe – namely that Debrecen, the second largest national research centre in Hungary, lies in the most backward region of the country. The current situation, which runs totally counter to European development trends, is a result of the rigid separation of the various economic sectors, government deficiencies and gross errors in development policy (Horváth, 2010).

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Source: Based on data from regional statistical yearbooks

Figure 2. The regional and sectoral structure of HE in Hungary, 2009



Source: Based on the HE statistical database of Slovakia

Figure 3. The regional and sectoral structure of HE in Slovakia, 2009

The competitive structures for technological education required for the reindustrialisation of regions were not developed at the Technology Faculties of the three largest multifunctional provincial universities; their construction and food industrial profiles are largely based on the revised version of a forty-year old structure. The lack of industrial and technological professionals often posed an obstacle to multinational firms wishing to settle in the regions. Satisfying the demand for a professionally qualified industrial workforce must be regarded as basic to the future structural development of the regional economy and it must also be taken into account that, to build the market competitiveness of state owned enterprises, considerably more intellectual capacities than those currently available will be required. Both tasks can only be resolved by modern technical solutions.

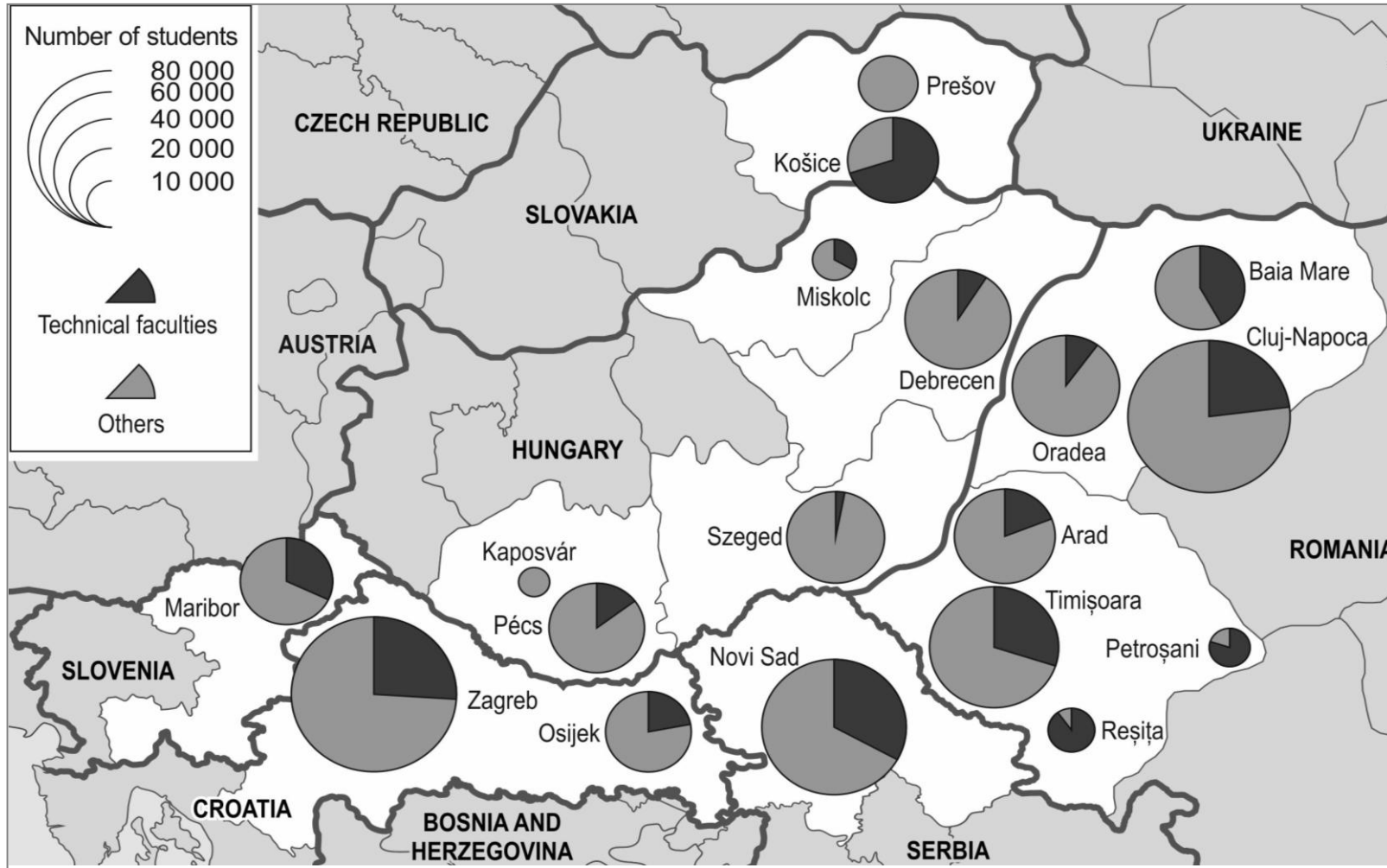
Professional education and training related to various elements of the green economy are available only randomly in the Hungarian HE network. A relatively higher concentration can be seen in HE in the capital, in Miskolc and in Veszprém. In the technical-technological educational centres – obviously – courses and research related to green activities are offered in traditional institutions and departments. The educational materials are fundamentally based on sectoral technological elements, whilst programmes, educational materials and research topics dealing with the special problems of the green economy are lacking. The larger organisational units created under the label of environmental sciences (hosted by a few domestic universities) for the most part integrate traditional natural and technical scientific disciplines.

In the current stage of economic development in the more developed parts of Europe, the basic factors are the presence of industry and related high-quality business, technical services, but also the availability of institutionalised partnerships in education and research. This concept has provided the basis for a sustainable path of economic growth during recent decades in several West and North European regions. The dynamic development of R&D cannot be envisaged where a modern regional economy is lacking, and neither can institutions without appropriate scientific results improve a region's innovative capacities and income. Regional development policies successfully apply various techniques and organisational solutions to realise this concept in several European countries.

Reindustrialisation does not yet constitute a comprehensive strategic objective in the regional development programmes of Central and Southeast European countries. There are visible signs indicating that the economic policies of neighbouring countries have recognised the importance of the implantation of new industrial branches in structurally weak or depressed areas (Popović, 2012; Serbia. Concept of Serbian Development, 2010). Demands for creating sound regional conditions for the emerging new economy also appear in planning the absorption of European Structural Funds (such as the modernisation of technological education). The technology-based development policies of certain regions (such as the Western part of Romania with Timișoara as its centre) are followed by marked attention on the part of professionals (Baga, 2007). As a result of the development of HE embedded in regional policy, certain ideas appeared which extended the market scope of technological education and development to cross-border areas as well.

The situation regarding HE institutions – considered as being dynamic actors in the development of the new economy – is replete with contradictions. In 2011, 485 thousand students studied at around 200 faculties of 24 state universities in the Drava–Tisa area (Figure 4), but their educational profiles show huge differences. Three-quarters of the faculties of the universities of the Romanian regions offer technical and natural science specialisations, and the distribution of these disciplines is very similar in the three former Yugoslavian regions. In the Hungarian universities, social and human sciences dominate. Most of universities were founded in the second half of the 20th century, but three universities started their operation in the 1990s on previous academic basis. The picture is completed by several colleges and private universities in the five countries.

The objective of university development strategies at the turn of the millennium was to modernise the education system, reinforce regional embeddedness and widen the competitive R&D potential. However, these benefits are not yet visible in the development of the region's performance indices. Besides the strategies' lack of results evident in the striking changes which add to the universities' general financing problems, another explanation is that neither long-term development concepts concerning HE nor regional economic and social development concepts have been harmonised.



Source: Based on national statistical sources

Figure 4. The number of students enrolled in the universities of the Drava–Tisa area

The harmonisation of sectoral and regional concepts has not been achieved even in the regions of the EU countries, and so there remains a high level of uncertainty regarding the transformation of the universities' education structures. Due to the lack of comprehensive economic development concepts and of competitive large and medium-sized enterprises, no demand is expressed on behalf of the economy to develop education in the directions necessary for structural changes. Modern education profiles focusing on the new economic development paradigm have been developed only within a narrow framework and they do not address the critical mass which is required to influence economic development, carry out competitive research programmes at international level and receive a large number of foreign students.

R&D capacities necessary for new types of development are also scarce. The level of R&D expenditure in GDP in 2010 exceeded 1% in four regions, whilst in others it was below 0.6%. The majority of R&D units are found in HE, and a high proportions of business-financed research was carried out exclusively in the East Slovenia region – which has considerable industrial capacities. The fact that the major centres of technological HE (those of Timișoara and Novi Sad) are unable to attract large-scale research demonstrates the weak role of R&D.

CONCLUSIONS

The requirements of competitiveness and sustainability represent the priority of post-crisis regional development. This necessitates a new combination of the factors of economic development. Boosting growth in lagging European regions is closely related to the economic structure. Structural modernisation must take the internal assets of the regions into consideration, and on the other hand, it has to satisfy the requirements of permanent world market competitiveness. Reindustrialisation is a key to boosting the economic growth of regions. The demands of the new industry towards the economic environment vary to a great extent from the former development path. The new economy is knowledge-intensive and cooperative. The functioning and development of a knowledge-intensive economy demand high-quality workforce. Changes are anticipated in the sectoral structure and forms of employee training as well. These new factors of economic development must be reflected in higher education and the organisational systems of regional governance.

The best universities as knowledge intensive business services play growing role in organisation value creation, organisations need to use their knowledge efficiently and to transfer their skills, knowledge and expertise, not only within the organisation, but also between them.

In Central Europe, neither the economy, nor higher education, nor regional policy is prepared for these changes. The situation is more or less similar in the countries. In the developed states of the EU, industrial innovation leads to permanent structural changes, growth in the sectors of higher education and research can be witnessed and new structures emerge in regional governance.

There are disparities in the professional structure of higher education in Central Europe. The competitiveness potential of cross-border regions in Hungary is enhanced by the presence of multi-functional technical universities and significant technical faculties with outstanding research results. Hungarian regions are unable to decrease their disadvantage with the present higher educational structure. The negative features of the unfavourable professional structure hinder economic development.

There is a need for the establishment of technical training courses which, through the training of professionals and their research and development results, may become active stakeholders of regional economic transformation. Peripheral regions were avoided or abandoned by foreign direct capital since the region's universities were unable to provide them high-level technical-technological services.

An important task is to transform the professional structure of universities and the profile of available technical faculties in such a way that may facilitate their advantageous market position in the macro-regional division of labour and their participation as active players in regional reindustrialisation. A possible way to meet these conditions is through establishing the organisational frameworks and educational programmes for training, research and development in the area of the green economy.

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Large university centres in the proximity of frontiers are or can be developed into dominant national knowledge centres. A severe problem in the neighbouring six countries is that their research potential does not attain the competitive size of organisations in the European knowledge market. The establishment of common research centres contributes to strengthening industrial linkages between research in natural sciences and engineering, promotes product development, the spread of knowledge-intensive small and medium-sized companies, and serves to raise the export potential of regions. The elaboration of the concept relies on the specialisation in research and development of a limited number of internationally marketable products and services.

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