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**NATURE AND DETERMINANTS OF INNOVATION AND  
TECHNOLOGY UPGRADING IN INDUSTRY IN  
CENTRAL AND EASTERN EUROPE**

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**Dr. Slavo Radosevic**  
SSEES  
University College London

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## 1. INTRODUCTION

After 10 years of post-communist transformation, countries of Central and Eastern Europe (CEECs) have seen very divergent outcomes to what can be considered as broadly similar transition policies<sup>1</sup>. While central European economies have embarked on a path of sustained recovery, others are still struggling with the 'transformational recession'. Economic divergence and increasing disparities in per capita incomes among CEE countries prevails whether measured over the whole period 1989-2000 or just for the period after 1993 (see UN ECE, 2000, chart 5..4.4, p. 186)<sup>1</sup>. Differences between different countries in growth rates and industry restructuring have increased to such an extent that they are reflected in their ability to generate the capabilities and institutions needed to import, use, and diffuse technologies and to improve upon them. While differences in growth rates may be attributed to a significant extent to differences in speed and scope of transition policies, the most important factors behind these differences are structural. Differences in the socialist legacy, inherited levels of development, extent of integration into global production networks, proximity to the EU, and differences in the role of the state are some of the most important structural factors that underlie divergent patterns of growth in CEE. Differences in transition policies do matter but i) not to the extent that their proponents believe, ii) their effects cannot be understood without taking into account differences in initial conditions and structural factors that we mentioned.

In this report, we analyze factors that underlie differences in technology and industry upgrading between different CEE economies as well as between different industrial sectors in these economies. Our point of departure, which, hopefully, should be clear by the end of the paper, is that the central issue in the transformation of national industrial systems in CEE is the reconstruction of enterprises and the way these economies have inserted themselves into world economy. It is important to bear in mind that these two factors are also the major causes of the dynamic inefficiency of socialist economies. During the socialism, enterprises were reduced to production units while innovation process was governed through government and party hierarchies. Closed character of these economies, though of varying degrees in different countries, only reinforced their technological stagnation. Differences in the degrees to which enterprises were constituted as business units and the degree to which economies were open have, in our view, overwhelming influence on the way different CEE countries have modernized their industrial systems during the 1990s. In addition, differences in interaction between national industrial systems and international value chains that took place during the 1990s across different CEE countries can explain to great extent differences in depth and breadth of industry restructuring. These differences are leading to very diverse outcomes in terms of growth, type of market economy that is emerging in different countries as well as in terms of innovation and technological capability.

A first part of the paper looks at the relationship between innovation and technology upgrading of East European economies and growth. Second part describes the transformation processes across several dimensions of national industrial systems in Eastern Europe (enterprises, R&D and innovation activities, international value chains and industry sectors). Third part analyzes the role of the state in transformation of national industrial

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<sup>1</sup> However, within individual central and east European sub-regions convergence rather than divergence has been the prevailing trend, especially in the period 1993-2000 (ibid.).

systems and evaluates policy activities. Fourth part draws conclusions and summarizes key findings.

## **2. GROWTH, INDUSTRIAL TRANSFORMATION AND COMPETITIVENESS**

The relationship between technology and growth is highly nationally specific and is inseparable from country specific institutional context. In this respect, the CEE 'transformational recession', which in some countries is followed by recovery, shows two specific features.

First, differences in factor endowments in labor, capital and knowledge, or other variables, which are usually used in growth accounting exercises, cannot explain differences in the economic growth during the 1990s between CEE countries. Factor expansion is not significantly linked to growth in transition period. The potential for growth is quite large based on removing distortions and introducing organizational innovations<sup>2</sup>. This may be expected given the scale of reallocations and restructuring that had to take place in these economies during the 1990s. In this period, reallocations and restructuring have been much more important for growth than factor accumulation. On the other hand, there is not consensus on factors that can explain recovery and growth. Economists consider initial conditions, macroeconomic policies, and structural reforms in transition period as the major determinants of recovery. Indeed, each of these factors individually positively influences growth but the major problem is how they are mutually related. For example, policy choices are influenced by different initial conditions and, hence, cannot be considered as independent factors. Many institutional factors are omitted due to data problems. It is certain that in a long-term, growth in CEE will increasingly depend on the expansion in physical and human capital.

Second, industrial upgrading is a function of general factors like education, science, general purpose physical investments like telecomm, diversified knowledge base, as well as of specific factors, like firm-specific skills, know-how; training, sector specific equipment. CEE growth during the 1990s shows that general factors of production, like educated labor force, are not sufficient for growth. The gap between potential in terms of educated population and outcomes is in some countries, particularly in Russia, remarkable. The sources of growth in CEE have not been so far 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 Radosevic, 2000). This led to marginalisation of public R&D systems through budget cuts and the lack of demand for R&D. There have been visible improvements in export competitiveness in several central European economies, which have been mainly driven by foreign direct investments (Hunya, 2000).

In this section we analyze the relationship between growth, technology and competitiveness in Eastern Europe. First, we analyze growth of industry, manufacturing productivity and their relationship to competitiveness. Second, we review the evidence on patterns of structural change in industry and highlight their effects on industrial and technological upgrading of CEE economies.

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<sup>2</sup> See McKinsey (1999) study for evidence on this in the case of Russia.

## 2.1. INDUSTRY, LABOR PRODUCTIVITY AND COMPETITIVENESS

The average level of industry production in 1999 was in CEE 62.1% of its 1989 level. After 10 years of post-socialist transformation the real gross industry output surpassed 1989 level only in Poland and Hungary (table 1). In three central European countries (Czech R, Slovakia and Slovenia) and Belarus industry output reached above three-quarters of the 1989 level. In all other CEE countries industry outputs are around half of the previous levels, except in Latvia, Moldova and Yugoslavia where industry is producing only 35% of their socialist output<sup>3</sup>.

**Table 1: Real gross industry output in 1999, 1989 = 100**

Poland	122.3
Hungary	114
Belarus	95.6
Czech Republic	76.9
Slovakia	76.4
Slovenia	75.6
Estonia	56.7
Croatia	56
Ukraine	51
Russian Federation	49.7
FYR of Macedonia	45.8
Latvia	45.3
Bulgaria	43.1
Romania	42.7
Lithuania	35.3
Yugoslavia	35.2
Republic of Moldova	33.7

Source: UN ECE, Economic Survey of Europe, 2000, No.2/3.

This decline of industry is partly result of the inherited 'oversized' industry sector, which served the needs of mostly closed socialist economies. Hence, industry decline should be seen in the context of a broad structural change that has taken place during the 1990s in CEE. Deindustrialization, tertiarization and deagraarization in some (mainly in central Europe), and re-agrariazation in other CEE countries (Bulgaria, Romania, CIS countries) are those processes within which the downsizing of industry took place<sup>4</sup>. However, the extent of downsizing of industry in CEE cannot be explained only by inevitable structural changes. That alone cannot explain huge differences in industrial decline among individual countries. We think that these differences are also the result of different national patterns of transformation of their industrial systems.

Despite sharp de-industrialization, CEE countries are likely to continue to be economies with the high shares of industry. Industrial employment as a share of the total employment had stabilised by the mid-1990s at a level above that in comparable market

<sup>3</sup> We have excluded war thorn Bosnia and Herzegovina whose 1999 level of industry reached only 9% of its 1989 output.

<sup>4</sup> For an extensive account on these processes see Landesmann (2000) and EBRD (1999).

economies (EBRD, 1999, p. 89, chart 4.2.). Given their current levels of GDP per capita CEE countries are still ‘overindustrialized’ (see EBRD, 1999, and Landesmann, 2000). However, the current shares of industry are mainly due to low levels of GDP per capita rather than the result of ‘overindustrialization’. In fact, the problem can be interpreted as the problem of low GDP per capita given the scale of industry capacities in Eastern Europe. This raises the problem of competitiveness of CEE industry, as essential for their long-term growth. In support of this, we observe in many CEE economies the limits of tertiarization unless further improvements in industry take place.

Once growth in CEE economies resumed, it has been accompanied by rising labour productivity in industry (see Table 2). In the early stages of transition, developments in productivity throughout the region were dominated by the decline in output, as many firms initially avoided large-scale layoffs even though demand for their products has collapsed. Firms often hoarded labour and financed current production through inter-industry credit. This decline in measured productivity began to be reversed in most countries after 2-3 years, primarily as a result of labour shedding. However, strong fluctuations in rates of labour productivity growth in most of CEE countries suggests that improvements are being driven more by uneven paths of layoffs, closure of unproductive lines of businesses and reactive restructuring than by continuous technological improvements.

**Table 2: Labour productivity in manufacturing, annual changes**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bulgaria	-11.3	-4.2	-0.9	5.4	14.6	-3.3	-10.1	-4.3	12.3	-2.8
Czech R.	0.6	-19.3	-0.2	-0.5	7.9	11.1	9.6	11.1	5.6	2.2
Hungary	-4	-8.3	4	16.3	14.7	9.8	3.3	13	10.1	0.2
Poland	-19.7	0	12.5	13.8	13	7	10	12.1	4.7	9.5
Romania	-19.2	-17.9	-13.5	1.4	13.3	24	14.8	-1.4	-15.9	9.8
Slovakia	-1.4	-10.6	1.6	-3	7.3	5.3	2.5	4.1	11.5	2
Slovenia	-7.9	-2	-3	6.7	11.4	8.3	6.7	4.5	5.4	1.8
Estonia		-3.2	-30.3	-5.1	0.9	3.8	7.8	2.6	11.4	-10.6

Bulgaria and Slovakia, figures are for industry.

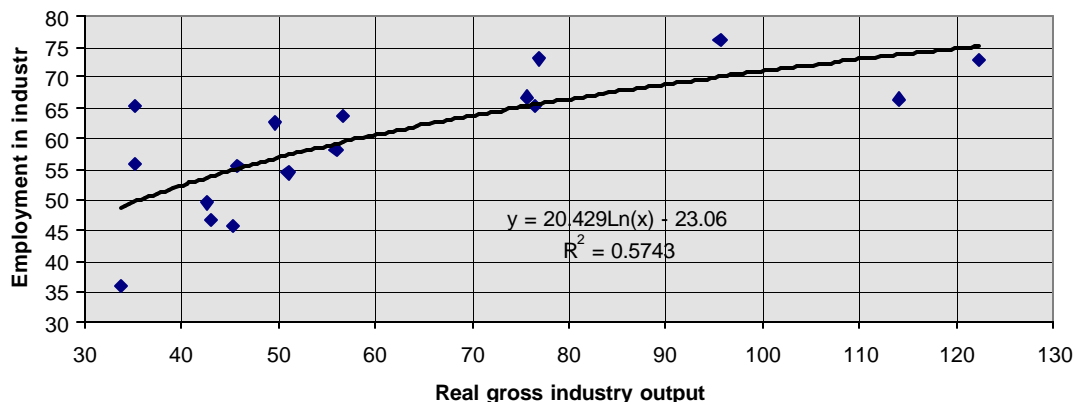
Source: EBRD, Transition Reports , 1995, 2000 and 1999

Moreover, like East Germany, all CEE economies have recently recorded a slowdown in rates of growth of labor productivity. For example, the average growth rate of labor productivity between 1993-95 of 7.7% slowed down to 5.5% in 1996-98 and to 1.5% in 1999. This might suggest that the initial sources of growth and productivity may be soon exhausted and that the issue of technical change as the major source of long-term and sustainable growth needs to be addressed.

In the initial years of the post-socialist transformation, differences among countries in employment policies have played a major role in explaining trends in manufacturing productivity. However, after 10 years trends in employment started to broadly follow trends in industry output across CEE (see figure 1). If it was not for the three countries with the biggest drop in output (Yugoslavia, Moldova and Lithuania) but which pursued very different employment policies this relationship would have been much stronger<sup>5</sup>.

<sup>5</sup> In regression without these three economies coefficient of determination rises to 0.72.

**Real gross industry output and employment in industry in 1999,  
1989=1000**



Source: UNECE, 2000

An increase in labour shedding is not reflected in relative wage rates, which vary much less than could be expected given differences in productivity across CEE. For example, wage shares in manufacturing output ranged from 0.25 in Czech Republic to 0.52 in Estonia (table 3). Landesmann (2000, p. 102) shows that this is also the case when wages are measured in absolute values. A much smaller dispersion of wages manifests itself in big differences in productivity, and then in even bigger differences in unit labor costs.

**Table 3: Changes in productivity, unit labor costs and wage shares in manufacturing**

	Productivity Change, 1995-99	Unit Labour Costs, 1995-99	Wage share in output, 1999	
Latvia	66.1	129	0.48	
Poland	51.2	12.3	0.34	
Russian Federation	50.4	-49.4		
Czech Republic	45.9	20	0.25	
Croatia	42.1	24.7	0.51	
Hungary	41.4	-15.4	0.29	
Lithuania	34.5	125	0.33	
Romania	29.6	0	0.28	
Slovenia	29.6	12.4	0.35	
Slovakia	27.7	18.8	0.29	
Estonia	14.1	102	0.52	
Bulgaria	-9.2		0.41	
<i>Coefficient of Variation*</i>	52.9	161	25.1	

\* Coefficient of variation is calculated as standard deviation divided by the average.

Source: EBRD, 2000

Increasing differences in unit labour costs shows increasing differences in competitiveness among CEE economies. A high rise in productivity in the 1995-99 period in Hungary and, surprisingly, in Russia led to actual decrease in unit labour costs or significantly improved competitiveness. A high increase in productivity in Latvia has not been transformed into competitive advantages due to exceptionally high rise in wages. Table 3 shows a range of changing competitive positions of the CEE economies, which are driven



more by differences in productivity rather than differences in wages. Table 4 by Landesmann (2000) shows in the case of central Europe, Bulgaria and Romania that the growth of wages is more uniform across different sectors than the growth in productivity. In this respect, the situation in the CEECs only confirms a stylized fact from growth theory which suggest that the wages tend to be relatively 'rigid', in the sense that they appear to adjust very slowly, if at all, to unbalances in the labour market. (Dosi et al, 1994, Jones, 1998).

**Table 4**  
**Average initial gaps and growth rates for**  
**industry groups, 1991-1997**  
*(Per cent)*

	<i>Low-tech</i>		<i>Resource-intensive</i>		<i>High-tech</i>	
	<i>Productivity</i>	<i>Wages</i>	<i>Productivity</i>	<i>Wages</i>	<i>Productivity</i>	<i>Wages</i>
Gap .....	38.2	33.7	44.6	29.2	34.3	27.4
Growth rate .....	3.5	4.9	7.0	7.8	16.1	7.9

**Source:** Calculated from the WIIW Industrial Database.

**Note:** The gap is defined as the level of a variable (productivity, wage rate) in the CEECs in 1991 x 100 divided by the level of that variable in Austria in 1991. Growth rates refer to the annual percentage rate of decline in the gap between 1991 and 1997.

*Source:* Landesmann, 2000, p. 106

In addition, these data suggest that catching-up is stronger and in some cases much stronger in the 'medium/high-tech' (machinery, electrical equipment, transport) industries than in the 'low-tech sectors. Landesmann (2000) also shows that the unit labour costs in most countries are rising much faster in the low tech than in the medium/high-tech industries.

This trend is partially compatible to trends in foreign trade, which also shows remarkable visible improvements in export unit prices and in technology structure of export. However, this improvement is far from uniform across countries. Trade data for all CEE economies show an increasing differentiation in export competitiveness. A review of trade analyses undertaken by Guerrieri (1999), Landesmann (1997)(2000), Kubiela (1999) and Radosevic and Hotopp (1999) suggest few broadly similar conclusions:

i) Until mid-1990s all CEE countries exhibited weaknesses in the production and export of R&D-intensive and capital goods. Their relative strengths were in products based on the traditional comparative advantages of cheap labour and abundant natural resources. When engineering exports to CMEA had to be abruptly abandoned, adjustment in the CEE countries took the form of *simplification of technological structure of trade or shift towards low-technology-content products*. A return to 'primary comparative advantage' in low-cost labour was a feature of all the CEE countries in the early years of trade liberalisation.

ii) Within this general pattern, we have seen increasing differentiation among eastern European countries in their overall trading performance, and in the degree to which they are improving their performance in scale- and R&D-intensive sectors, and in capital goods. The

countries of the former USSR, including Russia, have seen their share of trade remain constant, with an overwhelming and increasing reliance on natural resources and the primary processing thereof. Romania and Bulgaria have experienced an overall decline in their trade shares, with increasing reliance on traditional sectors like textiles and clothing and on commodities like steel and metals. By contrast, the Czech Republic, Hungary and Poland have increased their overall trade share, and - while continuing to be relatively competitive in traditional sectors - have increased their shares in R&D- intensive sectors or capital goods. In other words, trade statistics suggest that the three Central European countries are upgrading their technology more successfully than the other formerly centrally planned economies.

iii) The highly disaggregated data suggest the existence of three patterns of catching up, and accompanied learning processes at micro level. These are:

- strengthening of export patterns based on labour intensive industries like clothing and footwear in the majority of the Eastern European economies;
- the emergence of technology intensive export in transport machinery and the emergence of export of electronic and electric products especially in Hungary and Czech R;
- the maintenance of the previous strong orientation of export in commodities which still remains an important part of the export product spectrum but only in Bulgaria represents the most substantial share of export.

The technology intensive export has the highest share in Hungary followed by the Czech R, while its share in Romania and Bulgaria is the lowest. Poland represent an intermediate case.

This multiplicity of learning patterns suggests that the modes of involvement of the CEE into the global economy do not proceed in a linear manner, i.e. along one mode of adjustment but represent a combination of several patterns. This finding is confirmed by unsystematic but persuasive FDI evidence where we find a broad variety of factory types (see Radosevic, 1997). How can these patterns be explained?

Our opinion is that they are the result of the two groups of factors. On the one hand this process is shaped by inherited domestic structural features which are in inherited specialisation and in concentration/dispersion of the trade product structure. These supply side factors are coupled with features of EU demand, which is manifested through different forms of subcontracting (clothing) or FDI (cars and car parts), or market demand (commodities). This suggests that the emerging trade patterns, especially in central and eastern Europe, cannot be explained without taking into account their micro-basis and strategies of foreign companies which are strongly shaping FDI and subcontracting patterns.

There seems to be a significant difference between the 'capacities' of the CEECs in terms of measured R&D and human capital, and outcomes in terms of technology structure and unit prices of exports after 1989. The *gap between export structure and domestic human capital structure* is most striking in the case of Russia. Although this gap seems to be narrowing, with improvements in export unit prices, it is not clear whether in some countries, particularly the

eastern European (Bulgaria, Romania) and the European CIS countries it can be closed in the medium-term. In the trade of the former CMEA, engineering sectors had a strong presence. However, with the shift in trade from 'East' to 'West' the full extent of the uncompetitiveness of these sectors, *inter alia* in technological terms, has been revealed. This shift has been further reinforced by the sharp decline in demand in the CEE countries. It is only that in central European countries, mainly driven by FDI, we observe reversal in trends and visible expansion of engineering exports, and even the emergence of quite new exporting sectors like office machinery in the case of Hungary.

The increasing differentiation that is emerging among CEE economies in terms of growth suggests that trade tends to reinforce differences. Against a background of burgeoning FDI-based trade, subcontracting and different forms of production alliance, we may expect generation of 'virtuous' circles of interaction between domestic and foreign enterprises in some countries - but also vicious circles, in the form of low- technology-level specialization without much linkage or spillovers in others.

## **2.2. INDUSTRY SPECIALIZATION PATTERNS AND IMPLICATIONS FOR INDUSTRIAL AND TECHNOLOGICAL UPGRADING**

In order to understand the type of structural and technological adjustments faced by eastern European countries, some understanding of initial levels in these respects is needed. The following main features were found to be present in the industrial structure of the central and eastern European economies (CEECs) in 1989 (Urban (1999)<sup>6</sup>):

- A general excess of heavy industry, especially of the metallurgical industry and coke & refineries in the CEECs compared to EU-North as well as EU-South;
- A general structural deficit in the CEEC paper, printing and publishing industries, due to less advertising and packaging and perhaps, to some degree, to the limited freedom of the press in socialist countries;
- A relative excess in CEECs in food production and light industries such as textiles & clothing and leather & leather products, etc. compared to EU-North, but a deficit in these industries compared to EU-South; and
- On the other hand, a pronounced structural deficit of CEECs in sophisticated engineering industries, like electrical and mechanical engineering and transport-equipment, compared to EU-North, but a surplus in these industries compared to EU-South.

In general, Urban's (1999) analysis shows that "structural deficits" exist in sophisticated branches of engineering like mechanical and electrical engineering and transport equipment, compared to EU-North but "structural surpluses" in these branches versus EU-South. For the labour-intensive industries, the reverse seems true: structural surpluses versus EU-North but deficits versus EU-South exist. This suggests that in terms of industry structure

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<sup>6</sup> Urban (1999) used the share of each single industry in total manufacturing output of a CEEC to the share of the same industry in EU-North and EU-South. The resulting positive or negative deviations were interpreted as "structural surpluses" or "structural deficits" of the CEEC as compared to the group of Western countries under consideration.

economies of the central and Eastern Europe occupy intermediate position within the wider European economy. Here we do not analyze structural change in Russian economy primarily due to data compatibility problems. However, analysis of structural changes in Russia on its own show that there is not clear evidence of any structural change in the Russian economy at the level of output of main sectors. Within the industry the share of engineering sectors significantly shrank indicating a kind of structural regression (Dyker, 2000).

After 1989, changes of industrial profiles in central and eastern Europe took place in two phases, quite distinct from each other. Measured by the structural deviation indicator, CEECs' industrial profiles *diverged* from EU-North in the beginning of transition and started to *converge* later; towards EU-South, a tendency of convergence first and divergence later, could be observed (see Landesmann, 2000, p. 108). However, when compared to each other, the process of industrial change became more differentiated in the individual CEECs as well. Table 5 shows manufacturing branches with changes above +/- one percentage point in terms of relative employment.

Table 5: Manufacturing branches with the biggest changes in relative employment, 1993-1998, (in percentage points)

Table 5: Manufacturing branches with the biggest changes in relative employment, 1993-1998 (Percentage)							
Industry	Bulgaria	Slovenia	Slovakia	Romania	Poland	Hungary	Czech Republic
Machinery & equipment n.e.c	6.2		-3.4	-4.2	-2.0		-2.7
Food	5.9	1.6		1.4		-2.6	2.7
Textiles	5.8	-2.3		1.3	-1.1	1.0	-1.1
Pulp & paper	1.5					1.2	
Electrical & optical equipment	-2.2		1.7			4.9	1.5
Transport equipment	-3.5	-1.7				1.6	
Metals	-5.3	-1.0	3.4			-1.7	
Manufacturing n.e.c.	-10.6	1.0			1.6		
Rubber and plastics		1.1			1.0	1.2	1.5
Leather			-1.5				
Chemicals			-1.3				
Wood			1.8	1.1			1.2
Coke & Petroleum							-1.2

In all countries, except Romania, we observe a multiplicity of adjustment patterns. By this we mean that these economies simultaneously 'gain' or 'lose' relative employment in both traditional and capital or technology intensive sectors. Only on Romania, we observe relative increase in traditional industries (food, textiles and wood products) on the account of machinery and equipment. Given that the starting position of the central and eastern European economies was earlier described as intermediate within the wider Europe this may not be surprising. Industrial adjustment takes place in parallel in both traditional and in technology and capital intensive industries. Disaggregated export data also show this multiplicity of adjustment patterns. For example, Landesmann (1996, 1997, 1999) shows that in terms of trade structure the more advanced of the CEE economies occupy a middle position between the industrially more advanced 'Northern' EU and ex-EFTA countries on the one hand, and the South European economies, on the other. To a certain extent, this situation is also present after 1989 in terms of R&D personnel and patents (see Radosevic and Auriol, 1999; Radosevic and Kutlaca, 1998). Due to the closed character of these economies this extensiveness was perhaps even more pronounced in S&T than in trade, and

hence the scale of the R&D system was significantly above what the income levels of these countries would suggest.

The *intermediate structural position* of CEE within the wider Europe is very important in understanding what types of adjustment these countries are now faced with. As the starting position is intermediate, then a dual pattern of adjustment should develop. By a 'dual pattern' of adjustment, we mean a simultaneous downgrading of industrial and trade structure towards labour intensive and simpler products and an upgrading towards more advanced industries and products. This pattern has a built-in tendency towards polarisation in terms of industrial restructuring and productivity improvements between different industries. In terms of industrial structural and technical change, it implies simultaneous falling behind, catching-up and forging ahead.

The intensity of inter-sectoral structural changes does not seem to correlate with the recovery of industrial production (table 5). For example, the biggest shifts in relative employment between branches have taken place in Bulgaria, whose industry gross output is by 67% lower in 1999 compared to the 1989. This suggests that the source of growth should not be sought for in inter-sectoral allocations but it is more likely to be found in intra-sectoral and intra-firm sources. This seems logical given the longer period needed for inter-sectoral changes to make their way.

In addition, structural change in eastern Europe, apart from 'greenfield' FDI, is not yet driven by new investments in growing sectors. Given the absence of idle capacities and a large potential for efficiency gains, an output expansion during a transformational recovery is mostly based on non-investment sources of growth. As Polish case shows, an early expansion coupled with structural shifts and a decline in employment would be originated by unprecedented efficiency gains (Zukowski, 1998). The potential for efficiency gains without new investments are still large in some economies, in particular Russian (McKinsey, 1999). A slow decline in growth of productivity indicates that this 'mode of growth' is ending in central European economies. Any further productivity gains will require new investment in tangible and intangible assets. The ability to generate investments for a prolonged period of time is essential for the CEE to catch-up and grow. The structure of these investments will have to embody intangible assets (see section 3.2.). As the EU innovation surveys suggest, around half of the cost of innovation is related to physical investments or investments in embodied technology. A CEE innovation surveys suggests similar importance of both tangible and intangible investments (see Radosevic, 1999).

### **3. NATIONAL INDUSTRIAL SYSTEMS IN EASTERN EUROPE: TRANSFORMATION PROCESSES**

The broad quantitative aspects of structural transformation of Eastern Europe summarized in section 2 show external manifestations of the transformation process. However, in order to understand determinants of innovation and industrial upgrading in Eastern Europe we would need to understand the interaction between institutional changes and changes at micro- and mezzo-levels. In the core of this is the analysis of institutional transformation of their industrial systems. Given the large number of countries we cannot undertake country

specific analyses but will instead use country, sector or firm specific examples within an analysis, which tries to summarize the main transformation processes, in an increasingly heterogeneous or multi-layered CEE?

In this section we will review three main micro-level aspects of the transformation of national industrial systems in eastern Europe:

- the way enterprises develop their business functions;
- the way business functions between enterprises and related infrastructure are re-distributed;
- the ways in which insertion into world markets and production networks of Eastern European enterprises and sectors takes place.

These will be analyzed through sections 3.1. – 3.3. The importance of these three aspects of the transformation of industrial systems in CEE stems from the structural and institutional weaknesses of the socialist economies, which have been inherited, with the introduction of market relationships and economic opening. Changes in these three aspects will largely determine the pace of industry upgrading in CEE. In section 3.4., we summarize the major issues from industry studies in CEE. Section 3.5., analyses who are the main restructuring agents in CEE and discuss the main issues on local innovation networks. We illustrate discussion with several cases presented in boxes.

### **3. 1. RECONSTITUTION AND RESTRUCTURING OF ENTERPRISES**

During the communist period the State and party hierarchies managed the national industrial systems in Eastern Europe. As Yudanov (1997) points out Soviet enterprises never had a say in deciding on the strategic parameters of their production, i.e. on scope and range of production, prices, investments, wages and salaries and suppliers and purchasers. They were detached from the marketing networks, and their main task was to ensure current production. Enterprises were primarily production units with ‘dislocated’ business functions. R&D function was undertaken by industrial R&D institutes, exporting was the task for foreign trade organizations, domestic sales and marketing were tasks of ministries while finance function was rudimentary. Although differences in this respect were big between different sectors, between countries and over time (see Radosevic, 1999b) they convey the major inherited problem at a micro level.

With the introduction of market relationship, the enterprises that were reduced to production units have been faced with tasks to strengthen and to fuse previously ‘dislocated’ business functions. The inherited differences between different Eastern European countries in the degree to which their enterprises had developed these functions during the communist period could explain much of micro-level problems today between central Europe, eastern Europe (Romania, Bulgaria) and the ex-USSR area<sup>7</sup>. During the last 10 years enterprises in Eastern Europe have undergone transformation from socialist production units to business units. This process included strengthening and fusion of previously ‘dislocated’ business functions like marketing, R&D, and, finance, discarding of social functions and ‘de-verticalization’ of previously vertically integrated chains of production and supply.

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<sup>7</sup> For analysis of county differences in this respect based on patent data see Radosevic and Kutlaca (1999).

With the change of the economic system, particularly in the ex-USSR, enterprises, in fact, production units have found themselves in institutional vacuum. The coordination through plan collapsed, the major uncertainties regarding sales and markets have emerged, the old production linkages were broken, especially with the breakup of the USSR. In central Europe, where enterprise were more like business, rather than production, units the best of them managed to stand to challenge. For others, foreign takeovers or dependent subcontracting relationships were the solution. In Russia, the transitory solutions to these problems were: voluntary marketing associations to obtain inputs and secure sales on behalf of enterprises, commodity exchanges and holding companies or quasi associations (Buck et al, 1995). Subsequently these functions were taken over by industrial or financial - industrial groups, which internalized procurement, sales, marketing, and finance functions.

The reconstitution of enterprises and their links with domestic and establishment of direct links with foreign partners brought significant transformation of competencies. This also meant relocation of previously dislocated functions between from innovation infrastructure. (industrial institutes) and ministries (sales, procurement and financial management) to enterprises. A reconstitution of enterprises and their links with other firms has revealed:

- a lack of marketing skills, finance, organisation;
- a lack of product system integration capabilities;
- a lack of network building capabilities at firm level;

A lack of marketing, finance and organization skills was expected given that these skills were never in the mandate of an individual enterprise during the socialism. As business' surveys had shown, enterprises of all types of ownership had undertaken restructuring activities in these three areas. Financial discipline forced state-owned firms to slash their costs. However, that by itself had not improved their revenue performance.

From national industrial systems perspective the biggest problem that enterprises have faced are system integration at product level and process integration at firm level. *System integration at product level* means that production and continuous improvement require integration of different functions (finance, R&D, engineering, procurement, production, and sale) whose integration is essential to innovation dynamics. *Process integration at firm level* means that production and innovation have to be organized across several tiers of suppliers that are all involved to different degrees, not only in production, but also in innovation.

In market economy producers or users carry out these integrative functions. In the socialist period it was officially government administration or, in practice, central or design institutes that were taking on some of the functions of a network organiser. There was some system integration capability in institutes, but only for products not for processes. Design institutes also had much better international links and a better understanding of technological trends, of opportunities and capabilities of domestic industry and market potential. Customers or users were not strong initiators of change. Even when they had the money to make their own contracts in R&D, especially during the 1980s, they were not very concerned about the results. System integrators at the process level were ministries. Organization of processes that involved multi-technology products was especially difficult as this could involve several ministries. Sometimes this led to several parallel developments that resulted in a sort of rivalry.

As business press evidence shows, presently the biggest problem for foreign companies is to find network organisers at firm level and system integrators at product level. Companies that are able to integrate the system at product level (combining

foreign with domestic solutions, customisation, etc.), and organise networks at firm level (manage domestic subcontractors) are in a much better position when entering into alliances. Those able to acquire strategic assets like distribution systems and supplier networks will basically shape the industrial structure in the future.

### ***Incentives for enterprise restructuring***

A fundamental theory underlying discussion of privatization effects on restructuring in the CEE is agency theory, which predicts that privatization will lead to greater efficiency by improving monitoring systems and providing managers with better incentives to perform. The importance of management incentives and private owners for innovation and structural change has been best confirmed throughout the socialist period. However, the overwhelming focus on ownership aspects of restructuring and on management incentives simplifies and distorts the picture of restructuring challenges. Ownership is an endogenous variable in restructuring process. There is a lack of unambiguous evidence of ownership and governance effects on firm restructuring and performance (EBRD, 1999; Estrin and Wright, 2000). In overall, there is mixed relationship between privatization and various types of restructuring activities. The one ownership that has proven to be consistently supportive of deep restructuring and growth is control by a foreign strategic investor (EBRD, 1999, Carlin et al, 1995) and *de novo* private enterprises (EBRD, 1999; Bilsen and Konings, 1997). However, the success of foreign enterprises may be ascribed to their finance, technology and market access capabilities rather than to their better corporate governance (strategic investor). In addition, *de novo* private firms are relieved of the burden of old organizational routines, surplus of employees and outdated product mix. They are typically smaller than the old enterprises, and have generally simpler structures (EC, 2000). State-owned and privatized firms both suffer from disorganization in the links of production while *de novo* firms do not face such a problem (Konings and Walsh, 1999). The differences between privatized and state-owned firms are not significant or are contradictory of what would be expected from agency theory (Carlyn et al, 1995; EBRD, 1999; Bilsen and Konings, 1997) . The transfer of formal ownership on its own, did not generate radical alterations in enterprise behavior and structures (Whitley and Czaban, 1998).. Restructuring of enterprises is a much more complex and multi-faceted activity where direct effects of the competitive and institutional environments and managerial characteristics play important role. A simplified approach to restructuring which is derived from the principal agent problem as the decisive one abstracts from the complexities of the institutional environment of CEE.

Also, the effects of imposition of hard budget constraints on firm behavior have shown to be inconsistent with the expectations that hardening of financial discipline and competition will induce all necessary restructuring behavior at the firm level. Some results do indicate that the likelihood of restructuring a firm increases significantly if there are hard budget constraints. However, the degree of competition should be moderate rather than excessive (EBRD, 1999). Other results suggest that the financial discipline is not sufficient condition for revenue creation and entrepreneurship, but is sufficient condition for cost efficiency (Frydman et al, 2000).

In overall, from a conceptual perspective it seems that the corporate restructuring may be better understood and explained using a synthesis of principal – agency framework and strategic management perspective (Filatotchev, 2000). In reality, restructuring is much less amenable to generalizations. Even very successful cases of domestic-led restructuring of the CEE enterprises have come only as a result of a positive outcome on a series of highly



interconnected issues each of which was complex and fraught with potential for failure (Johnson et al, 1996).

### ***Building organizational capabilities***

Restructuring strategies of enterprises in the CEECs have been explored with the primary interest to its links with the corporate governance. Usually, these strategies are termed as active, passive and ambiguous, or 'deep' and 'reactive', or 'deep' and 'shallow'. There is little evidence of 'deep' restructuring. The most common type of action were those that were not threatening to the insiders in the enterprise and which did not require major investment (Carlin et al, 1995). Privatization has influenced restructuring clearly in the case of foreign ownership: there is a very close correlation between major capital investment programs and foreign ownership. Most firms made short-run adjustments to output and inputs use; fewer firms began to make strategic adjustments (Brada, 1998).

Institutional environment of transition economy has affected the scale and scope of enterprise restructuring. Any strategic choice that firms make is affected by the formal and informal constraints of their institutional framework. This led to a variety of adjustment paths like sustainable real adjustment or sophisticated rent-seeking (Kuznetsov, 1997). The inhibiting effect of institutional constraints in the immediate environment is particularly strong in Russia where enterprises operate in an environment where formal and informal economy are closely intertwined (Gaddy and Ickes, 1998; Polonsky and Aivazian, 2000). Despite this analysts see signs that Russian enterprises 'have made substantial progress in adjusting to the new market conditions, in a manner similar to enterprise in central and eastern Europe' (Fan and Schaffer, 1994, p. 182), or they have made restructuring moves that still remain fragile (Izymov et al, 2000).

Literature also suggests that the strategy of growth of enterprises in ex-centrally-planned economies is specific when compared to Western market economy model. There are serious constraints in some CEE economies for growth through internal expansion and/or acquisitions. Enterprises grow by forming networks of firms, a growth that can be characterized as networking or boundary blurring. (Peng, W. Mike and P. S. Heath, 1996). The institutional features of the Eastern European economies, which are partly similar to those of other emerging markets, lead to generation of diversified business groups. Russian financial - industrial groups (FIGs) (Popov, 1998; Freinkman, 1995; Petkoski, 1997; Perotti and Gelfer, 1999), '*recombinets*' in Hungary (Stark, 1996), bank - industry - privatisation funds networks in Czech R (Hayri and McDermott, 1999) and conglomerates in Poland (Radosevic, 2001). These are examples of organizational forms by which companies try to overcome institutional weaknesses in the economic environment or make use of them. In that respect, their emergence can be attributed to factors similar to those operating in other semi-industrialized economies (Khanna and Palepu, 1997, 1999; Amsden and Hikino, 1994). Whether these organizations will persist will depend on the progress in institutional transformation of these economies.

Historical analysis suggest that the creation and evolution of modern managerial enterprises and the organizational capabilities developed within these enterprises will be the major force in shaping economic growth and competitive strengths of CEE. (Chandler, 1993). The nature of organizational structures and differences in competencies in organizational coordination determine differential possibilities for growth not only of

individual firms but also of the economies where they operate (Dosi, 1997). Hence, we can expect that differences in growth of CEE economies will be increasingly based on national differences in organizational capabilities of their enterprises rather than on differences in transition policies. The reconstitution of the ex-socialist *combinates* into enterprises with the fully developed organizational capabilities and generation of new enterprises has substantially progressed in all CEE economies. Ranges of organizational capabilities that have been developed in this period vary greatly between different countries and differ substantially between domestic and foreign firms, *de novo* and old firms. Unfortunately, we know very little on the nature of organizational structures between different CEE countries and differences in their learning potential. The majority of research on the CEE has been so far focused on market relationships within the framework of 'transition' and has neglected factors that lead to differences in organizational capabilities. However, these factors are essential for understanding determinants and nature of industrial and innovation upgrading in CEE.

### **3. 2. RESTRUCTURING, EROSION AND ENHANCEMENT OF KNOWLEDGE BASE**

In the section 3.1., we briefly analyzed the transformation of the main carrier of innovation process – enterprise – from an organizational perspective. In this section, we analyze the various aspects of knowledge generation and diffusion in CEE countries. A central institution in this process is an enterprise, the only organization that transforms technology into products. In that respect, the enterprise plays an essential role in generation and diffusion of knowledge. However, in innovation and diffusion process enterprises do not operate isolated of the external sources of knowledge. They rely on other enterprises, on users and suppliers as well as on infrastructure institutions, like testing labs, R&D companies, universities, etc.

The importance of both firm-specific knowledge as well as broad and diversified knowledge base is important for structural change to take place. Industrial upgrading is non-linear process with different threshold levels in terms of knowledge base required. A recent example of the importance of broad knowledge base for development is the case of Korea (see Ernst, 1998) which has developed narrow knowledge base focused on mass manufacturing, accompanied by an insufficient critical mass of R&D and inefficiencies in the public innovation system. In order to upgrade, Korea needs to broaden its knowledge base to cover product design, market development, the design of key components, and the provision of high-end knowledge-intensive support services. From the CEE perspective, this example is quite illustrative as it shows that industrial upgrading and growth require both a diversified knowledge base as well as specialized and narrow manufacturing-specific skills. Quite opposite to Korea, the CEE economies have weak firm-specific organizational capabilities and relatively large capacities in public R&D or at least had until recently. Their top scientific competencies were in few areas around physics and chemistry (see Kozlowski, Radosevic and Ircha, 1999). The nature of production process in socialism forced enterprises to acquire quite extensive *ad hoc* skills in resolving bottlenecks, adjusting material and processes to shifting requirements. They also had large imitative skills in broad range of industries. In a new context, much of these capabilities have become obsolete while others represent a good basis for upgrading. Restructuring, erosion and building of a new knowledge base accompany restructuring of CEE. In this section, we discuss the

transformation of knowledge base in business as well as in public sector. The analysis is based on several indicators like ISO9000 quality certificates, innovation surveys, R&D and qualification level of labor force.

### **Quality management**

Central and eastern European enterprises (CEE) have inherited from the socialist period excess physical resources, but lack financial and managerial resources. In the last ten years, they had to learn and develop capabilities to use the available resources effectively. An indication of the mastery of organizational capabilities is the introduction of quality control systems and standards. Quality is of paramount importance for the exporters. Innovation surveys in CEE also show that the highest percentage of companies innovators consider improving product quality as very important objective of their innovation activities (see Radosevic, 1999). The improved quality depends on introduction and wide diffusion of technology management techniques. Among these, quality standards, industry specific and general standards, play an important role. ISO9000 is known as generic management standard. The definition of quality in ISO9000 refers to those features of a product or service that are required by the customer. The extent of its introduction in an economy indicates the degree to which companies are concerned with quality management. In turn, this should have positive effects on their export competitiveness and should lead to increased market shares.

Table 6 shows the relative penetration rates of ISO9000 certificates or the number of firms per 1mn population that have introduced them and the average rate in 1994-99 period, unless otherwise stated.

Table 6: Number of ISO9000 certificates per 1mn population and the average rates of growth, 1994-95 (unless otherwise stated)

	ISO9000/ 1mn pop	Average rate 1994-99
Slovenia	251.0	178.7%
Hungary	164.4	228.6%
Czech Rep	141.5	209.0%
Slovakia	115.0	219.6%
Croatia*	26.9	278.7%
Poland	19.8	316.9%
Estonia*	18.6	238.4%
Bulgaria**	11.6	285.4%
Lithuania**	10.8	259.7%
Macedonia**	10.5	260.4%
Romania*	9.5	214.0%
Latvia***	5.8	339.1%
Moldova****	2.3	152.8%
Belarus****	1.4	208.2%
Ukraine	1.1	208.4%
Russia	0.9	218.3%
Coefficient of variation	1.5	0.2

\*1995-99, \*\*1996-99, \*\*\*1997-99, \*\*\*\*1998-99,

Source: ISO9000 and ISO14000 in brief  
International Standards Organization, www.iso.ch

We observe big differences in the rate of penetration of quality management systems but relatively homogenous rates of growth, especially given different initial years when quality systems have been introduced. Economies of central Europe have significantly higher rates of penetration of quality management systems. These differences in per capita reflect differences in income levels per capita, in progress in transition and in trade openness<sup>8</sup>. However, trade openness explains the greatest part of variations among individual economies. This suggests that generic standards, like ISO9000, have become a prerequisite for successful exporting but also that export is important in developing organizational capabilities.

### ***Scale of innovative efforts***

Industrial upgrading of CEE depends on the scale and intensity of innovation activities of its enterprises. Here we use data from the large scale innovation surveys that have been undertaken in four CEE countries (Poland, Romania, Russia and Slovenia) in order to explore to which extent this process has taken place. However, we have to bear in mind that the international comparisons of innovation surveys are still flawed and have numerous methodological and interpretative problems<sup>9</sup>.

The proxy for the spread of innovative activities is the percentage of innovating firms over the total number of firms. Innovating firms are defined as those that have introduced at least one product or process innovation over the period analyzed. Table 7 shows the shares of innovative firms in the EU and CEE. Based on these data we can draw three conclusions. First, the shares of innovative firms in CEE are below the EU average of 53% of innovative firms. Moreover, they are at the bottom of the EU league. This conform to the overviews of enterprise case studies in CEE which suggests that the most common form of restructuring is passive adjustment, not deep restructuring (Carlyn *et al*, 1995).<sup>10</sup> The introduction of innovation by definition requires a deep organizational change and long-term horizon, two objectives, which are still difficult to meet in the current institutional environment of the most of CEE economies.

**Table 7: Shares of innovative firms in EU and CEECs**

<b>Ireland</b>	0.72
<b>Germany</b>	0.67
<b>Poland I<sup>a</sup></b>	<b>0.619</b>
<b>Belgium</b>	0.61
<b>Netherlands</b>	0.57
<b>Denmark</b>	0.56

<sup>8</sup>Trade openness measured as percent of trade in GDP explains 49% of variation in ISO900 certificates per capita in CEE in simple regression. When we exclude Estonia whose number of certificates is far below of what would be expected given its trade openness then a simple regression can explain 69% of variation.

<sup>9</sup> For an extensive analysis on this see Radosevic, 1999b.

<sup>10</sup>Passive adjustment are responses like accumulation of debt and arrears, non-payment of suppliers, accumulation of inventories, etc. Active or deep adjustment are responses like new organization, export orientation, cost control, quality development, altering product mix, etc. These latter activities involve innovation activities.

<b>Norway</b>	0.53
<b>EU</b>	0.5
<b>France</b>	0.39
<b>Poland II<sup>b</sup></b>	<b>0.376</b>
<b>Spain</b>	0.37
<b>Luxembourg</b>	0.37
<b>Italy</b>	0.34
<b>Slovenia</b>	<b>0.319</b>
<b>Romania</b>	<b>0.283</b>
<b>Russia I<sup>c</sup></b>	<b>0.224</b>
<b>Russia II<sup>d</sup></b>	<b>0.06</b>

*a* 1992, *b* 1994-96, *c* 1992-94, *d* 1995-96

Source: Radosevic (1999). Also, see source for methodology and data sources.

Second, ranking of the four Eastern European countries is very closely related to their growth rates.<sup>11</sup> When we correlate the shares of innovative firms of four Eastern European economies with their levels of GDP in 1997 compared to their 1989 levels we get a very high correlation coefficient of 0.96.<sup>12</sup> This may suggest that broadly perceived innovative dynamics or the share of firms that are involved in innovative activities is closely related to the dynamics of economic recovery.

Third, in both Poland and Russia the share of innovative enterprises between the beginning of the 1990s and the mid-1990s has fallen. In Poland the share of innovative enterprises dropped from 62% (1992) to 38% (1994-96) while in Russia the share fell from 22% (1992-94) to 6% (1995-96). How should we interpret this downward fall in the scale of innovation activities in two countries with such different economic situations? Does it contradict to a strong correlation between the rate of economic recovery and the scale of innovative activities mentioned before? We should bear in mind that the shares of innovative firms do not reflect the economic relevance of innovative activities, but indicate the extent of search efforts by enterprises. A high share of enterprises involved in innovation does not mean that the share of sales based on innovations will also be high. As we show in Radosevic (1999) the link between these two variables is far from direct.

A high share of enterprises that were innovating at the outset of transition then becomes quite plausible. These innovative activities did not result in business relevant innovations, ie, in a high share of sales based on innovative products and processes. As a part of their diversification efforts, enterprises are launching new products which then have to be withdrawn from the market due to their marketing, cost or quality problems. The pure technical novelty of the product for enterprise and domestic market very often turns out to be insufficient for commercialization. It seems that in both Poland and Russia a certain threshold has been reached whereby enterprises decreased the extent of their search efforts as innovation activities turned out to be not so profitable in new market conditions. Yet, at the same time, the difference in search efforts as expressed in the shares of innovative

<sup>11</sup>Here we compare only the results of the second Polish and Russian innovation surveys.

<sup>12</sup>Indexes of economic recovery 1997/1989 is for Poland 111.8, Slovenia 98.3, Romania 82.5 and for Russia 57.5.

enterprises in Poland and Russia reflects strongly the different economic situations of these two countries.

The general downward trend in the scale of search efforts of enterprises seemed to be accompanied by an increasing polarisation in the scale of innovative activities across individual sectors. In the case of Poland, in 1992 the most innovative sector had 80.1% of innovative enterprises while the least innovative had 49.5%. In the 1994-96 period the difference was 78% vs 8.3% respectively. So, the intersectoral difference in the scale of innovative activities has broadened from 30.6% to 70.3%. This polarisation in the scale of innovative activities suggests that at the outset of transition most enterprises, irrespective of the difficulties, were searching for new products and processes. However, the search process became highly differentiated across different sectors as some sectors have managed to transform innovations into sales while others did not.

In the last ten years, we have seen a fast growth of small firms in all Eastern European economies. While in this respect the industrial structure is becoming more heterogeneous, it is not yet clear what is the role of small firms in innovation dynamics of these countries. The role of small firms is substantial in terms of employment and income generation their role is much less obvious with regard to the generation of innovations in CEE.

Table 8 shows that the share of innovative firms is significantly larger in the group of large enterprises for Poland and Russia. A lower share of innovative large firms, when compared to medium sized firms in Slovenia probably reflects the scale of the restructuring problems in their several large companies.

Table 8: Share of innovative enterprises by size of enterprises \*, 1996-97

	Small	Medium	Large
Poland	2.1%	46.5%	51.4%
Russia	1.7%	16.6%	81.7%
Slovenia	12.4%	48.1%	39.5%

Source: R&D and innovation statistics in candidate countries and the Russian Federation, Data 1996-97, EC, Theme 9, R&D, 2000

\*Small (20-49), Medium (50-249), Large (250+)

In this respect the firm size - innovation relationship in Eastern Europe seems to be the same as in the EU economies. Despite expectations at the outset of transition that new innovation-oriented SMEs would replace large enterprises, large firms continue to undertake the majority of innovation activities in CEE. Innovation dynamics in the economy depends on the high share of innovative firms in all classes. From that perspective, the problem in the Eastern Europe seems to be much more (i) a low share of innovative firms in general rather than in a particular size group, (ii) the interaction between large and small firms.

### ***Factors of innovation***

A comparison of the innovation activities of EU and the CEE enterprises (see Radosevic, 1999b) shows **differences**, which stem from the different business environments and cost structures, but also convergence in the objectives of innovation activities. Eastern European

enterprises still operate in a different business environment, which influences the pattern of innovation activities. First, access to new markets is a more important objective for Eastern European than for EU enterprises. In view of the previous closeness of the Eastern European economies as well as the demand problems of their enterprises, this seems logical. Second, the reduction of material and energy consumption stands high as an objective of innovation, while in EU firms it is the reduction of the share of wage funds in costs which typically is high.

However, there are several features of innovation activities in Eastern Europe that have already become **similar** to those in EU industries. First, the most important objectives of innovation in both regions coincide: product quality, increase in or maintenance of market share and extension of the product range within the main field. Second, the sources of information for innovation are similar in both CEE and the EU. It is internal sources and customers rather than fairs and exhibitions, which are the most important sources of information for innovation in both the EU and CEE. These similarities show that the behavior of enterprises in CEE conform to a market incentive environment.

### ***Innovation expenditures***

The differences in the structure of innovation expenditures should indicate differences in the main types of innovation activities. Taking into account differences in developmental levels between the EU and the CEE we would expect that the structure of innovation expenditures should be significantly different. Countries that are behind the technology frontier should spent relatively more on embodied technologies and on downstream innovation activities like reverse engineering, product and process imitation than on R&D.

The analysis of the innovation expenditures by Evangelista *et al* (1996) shows that, first, the distribution of innovation costs is relatively coherent over all EU countries. If innovation costs reflect the scope of different innovation activities than the mix of innovative activities appears rather similar across EU. The second conclusion based on the EU innovation survey is that the industrial innovative process consists, first and foremost, of the purchase and use of 'embodied' technologies (innovative machinery and plants), which account for 50% of total expenditures on innovation (*ibid*). Third, among the 'intangible' innovation expenditures R&D activities are confirmed to be a central component of the technological activities of firms (see Evangelista *et al*, 1997, fig 2, p 529). Fourth, across all European countries expenditure-wise, the acquisition of 'disembodied' technology through patent and licences emerges as a secondary innovation component when compared to the technological sources (*ibid*).

Table 9: Innovation expenditures in manufacturing sector by economic activity, 1996-97

	Intramural R&D	Extramural R&D	Acquisition of machinery & equipment	Acquisition of other external technology	Industrial design & other production preparation	Training	Market introduction
Poland	9.3%	3.1%	<b>53.3%</b>	3.3%	<b>25.3%</b>	0.9%	4.9%
Romania	5.9%	2.7%	<b>88.4%</b>	1.7%	1.4%		

Slovenia	<b>49.8%</b>	6.2%	<b>24.3%</b>	6.6%	5.1%	1.5%	6.5%
Russia	16.8%	6.6%	<b>50.0%</b>	2.4%	<b>21.6%</b>	0.7%	1.8%

Source: R&D and innovation statistics in candidate countries and the Russian Federation  
Data 1996-97, EC, Theme 9, R&D, 2000

Table 9 shows the structure of innovation expenditures in four Eastern European economies. When compared to the EU data we can observe few differences. First, the structure of expenditures is not coherent across four countries reflecting differences in development levels (Slovenia vs. Romania) as well as differences in industry structures. Second, the share of embodied technology is higher in CEE, except in Slovenia, whose structure of innovation expenditures is not typical for the region. This conforms to our expectations that in economies that are lagging behind the share of embodied technology should be higher than in advanced economies. Third, among the 'intangible' innovation expenditures R&D activities are a central component of the technological activities of firm, as in the EU. Fourth, the share of external sources of 'intangible' technology is less important. This applies both to extramural R&D as well as to patents and licenses (acquisition of other external technology).

The data suggest that the role for extramural R&D (industrial) institutes that were the backbone of the socialist S&T systems has diminished. In the post-socialist period the enterprises are embodying innovation by building their own technological capabilities. However, this process differs considerably between countries and the innovation system in the CEE countries still carries strong features of the past. While intramural R&D activities are gaining importance there is still a strong dependence, in particular of the ex-Soviet Union countries on extramural sources of technology. For example, out of 3803 innovative enterprises in 1992-94 in Russia 47% have received unpatented licences, which includes R&D contracts and purchase of industrial know how, etc (Gokhberg and Kuznetsova, 1999).<sup>13</sup> These are mainly the R&D results of industrial institutes who often operate in quasi-arm's length relationships with enterprises. Analysis of the determinants of the innovative activities in the post-socialist period shows that both, extra- and intra-mural R&D activity, play a role in the innovative activities of enterprises<sup>14</sup>. First, the combination of extra-mural and intra-mural R&D activities explains 75% of variation in the share of innovative enterprises. Second, a coefficient for in-house R&D almost twice that for contract R&D suggests that the Russian innovation system is moving towards a situation where the in-house R&D activities of enterprises are playing a more important role than the extra-mural R&D activities. However, the role of extra-mural R&D activities still continues to be significant suggesting that some elements of the Soviet R&D model as described by

<sup>13</sup> According to Gokhberg and Kuznetsova (1999), only 5.8% of innovative Russian enterprises use patent licences and 10.3% patent rights.

<sup>14</sup> The best result we get is the following regression:

$$Y = 0.09X1 + 0.162X2$$

t-stat (4.91) (2.467)

Prob (0.00) (0.03)

R2 adj. = 0.75

Y = share of innovative enterprises

X1 = contract R&D

X2 = in house R&D

For a detailed account see Radosevic (1999b).

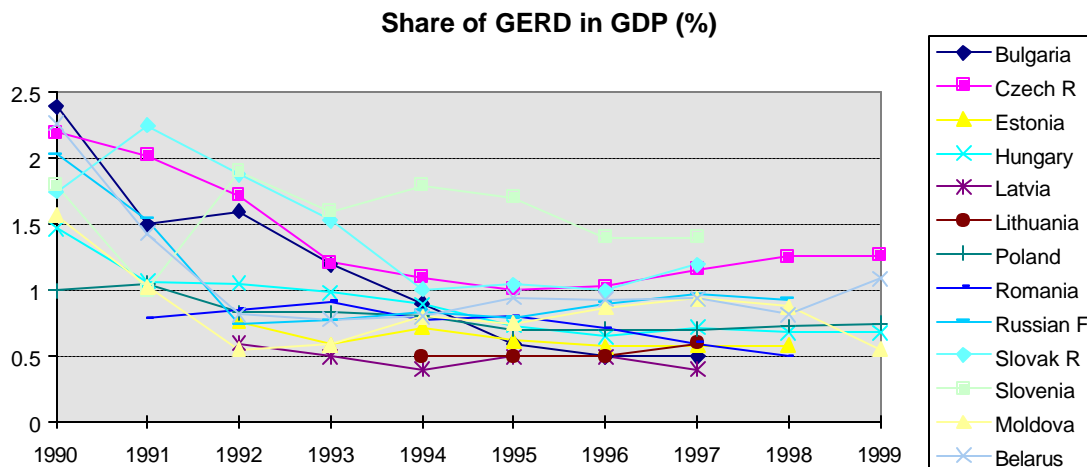


Gokhberg (1997) are still operating. This also conforms to our more descriptive accounts of R&D in the CEE (see Radosevic, 1999c).

R&D system plays a relatively small direct role in the current performance of the CEE economies. However, we should not ignore the importance of R&D system just based on its current role. The role of R&D is likely to increase with return to growth. In fact, restructuring of R&D is one of the key preconditions for further industrial upgrading. In addition, its role cannot be evaluated only through its direct contribution to innovation but also through its contribution to education and transfer of research methodologies and techniques (Pavitt).

Figure 1 shows the share of expenditures in R&D in GDP for Eastern European countries.

Figure 1

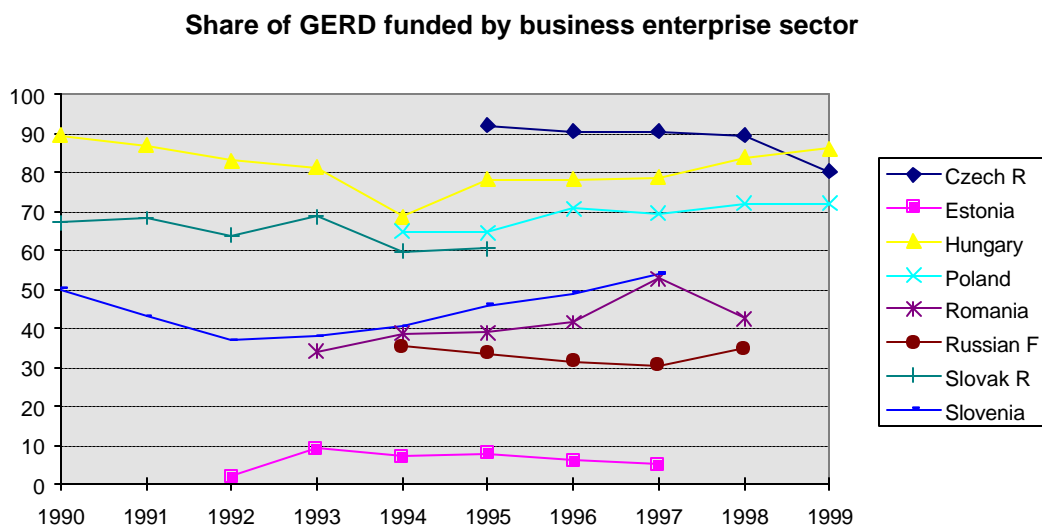


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From having very high shares of R&D expenditures at the end of the socialism, which ranged from 2.5% to 1% (1990) of GDP Eastern European economies investments in R&D fell to a range between 0.5% to 1.4% (1999) of GDP. This downfall can be disaggregated into three distinct periods. First, in the period between 1990 and 1993/94, with the falling GDPs the share of expenditures for R&D also declined sharply leading to a very high absolute declines in funding of large R&D systems. This was followed by the period of stabilisation (1993/94 to 1996) in which decline continued but at significantly lower rate. From 1996, signs of recovery in some economies, in both absolute and relative funding of R&D, have emerged. After average annual decrease of 13% in 1991-96 period, the relative share of R&D in average grows by 3.2% annually in 1997-1999 period. From industrial upgrading perspective, it is important what has happened to business enterprise sector R&D. Figure 2 shows that that the shares of R&D funded by business enterprise sector have remained relatively stable over the whole period. In other words, business enterprise sector has shared the destiny of the overall decline, absolute and relative, of R&D sector. In addition, national differences in the share of R&D funded by business have remained

suggesting that the transition could not change patterns of funding that seem to have strong structural features<sup>15</sup>.

Figure 2: Share of R&D financed by business enterprise sector



A simultaneous fall in government funding and weak demand for R&D from industry have blocked sectoral structural change within R&D systems which adjusted by shrinking. As we analyzed elsewhere, (Radosevic and Auriol, 1999) downsizing of the R&D systems in Eastern Europe was not systematically linked to a specific individual factor on the demand or supply side. Probably, it is the combination of demand side factors (annual changes in GDP and investments) and supply side policies (budgetary R&D policy) that in the end have shaped trends in R&D spending. Neither government nor market demand for R&D could buffer this fall. However, this does not mean that there was not change at micro-level in R&D system.

### ***Changing nature of R&D***

A comprehensive inter-country evidence on the transformation of S&T systems in Eastern Europe of Meske (1998) shows that the transformation process in R&D system was characterized by a few common phases, each characterised by different types of changes.

<sup>15</sup> A high shares of R&D funding by business sector in Czech Republic and very low in Estonia are the result of differences in industry structure, especially in terms of the role of large firms. A low share of R&D funding by industry in Russia and Romania has its counterpart in high share of government funding of business sector R&D. This situation is generally rare in market economies and can be taken as an indicator of the slow restructuring in R&D or legacy of the Soviet system.

The first step in the transformation process was the dissolution and fragmentation of the old S&T systems. This occurred due to the partial withdrawal of the state from its responsibilities for R&D by dispensing with state planning, dissolving ministries and other bodies, and by granting the universities and Academies autonomy. This withdrawal was accompanied by significant budget reductions, which in most countries far exceeded the general level of economic downturn as a reaction to the prior overestimation of science. The second phase is characterised by the consolidation of the “surviving” portions of the old S&T systems and their transformation into actors with a position and behavior adjusted to the new environment. In this phase, new organisational bodies in S&T policy were formed and new rules implemented. The changes in the institutional system encouraged a variety of micro-strategies to embrace new opportunities or cope with uncertainties in demand for R&D and reductions in funding. In the current (third) phase countries are faced with the challenge to further implement rules to fund R&D activities, and expand relationships with domestic and international organisations. This, in particular, relates to an appropriate quantitative balance of activities in S&T organisation and a balance of different types of organisations in S&T system. The classification of countries into different groups (see Meske, 1998) shows that there is a clear congruence between progress in economic recovery and institutional transformation, and the transformation of S&T systems. In other words, there is a broad compatibility between the general system transformation and restructuring of S&T systems.

S&T systems that had to undergo large funding reductions and face new political and economic system could not retain their old form. Thus the nature of S&T systems in the CEE, especially in central Europe, has changed significantly. The most important aspects are changes in terms of:

- *organisations* (higher education, Academies of Science, R&D institutes, design institutes, industrial or service enterprises);
- *functions* (basic and applied research, development, engineering, technical services, teaching, production, services);
- *modes of funding* (institutional, programme, project, and grant funding, co-funding).

An extensive analyses of these changes in Radosevic (1999d) and Meske (1998) shows that there is a lack of congruence between changes in organizations, functions and funding modes in R&D system. These changes have occurred at different pace in different S&T sub-sectors (university, industrial R&D, academy R&D) and in different countries. Industrial R&D are the biggest structural problem in transformation of S&T systems. Public R&D systems have either consolidated or still operate in survival mode, especially in ex-Soviet Union economies, Romania and Bulgaria. However, the biggest challenges still lay ahead: how to gear S&T much more towards the diffusion of knowledge rather than only generation of new knowledge.

The capability to absorb foreign-generated knowledge is an essential feature of successful catching-up countries. The S&T systems of CEECs have been geared in the past primary towards the generation of new knowledge, very often of ‘reinventing the wheel’ type. They now have to shift from R&D to diffusion-oriented S&T system. So far, their R&D systems are not yet geared to this task and remain in a kind of hybrid mode<sup>16</sup>.

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<sup>16</sup> See Radosevic, 1999d for detailed account.

### ***Absorptive capacities: education***

The capacity to diffuse knowledge throughout economy becomes essential for catching-up in knowledge based economy. This depends on whether R&D system is geared towards that objective. However, much more important factor for improved knowledge distribution capacity is the general and vocation specific level of education of population. In table 10 we show the educational structure of the economically active population for a selected CEE countries.

**Table 10 - Economically Active Population by the level of education, 1998**

	1st and less	2nd,1st stage	2nd,2st stage	3rd
CZR	0.6%	9.9%	79.0%	10.5%
EST	1.3%	11.5%	46.0%	41.2%
HUN	1.3%	22.7%	62.0%	14.0%
POL	17.6%	35.3%	31.8%	15.3%
SLO	3.1%	20.4%	62.2%	14.3%

*Source: Mickiewicz and Radosevic, 20001, based on ILO.*

Table 10 suggests that the structure of education in CEE is thin on the edges, with low shares of both least educated and people with high education. The share of the economically active population with secondary education, especially in Hungary, Czech Republic and Slovenia, is very high. When compared to EU economies, Eastern Europe, with exception of Poland, has a very low share of population with the 1<sup>st</sup> level of education and lower, ranging from 0.6% in the Czech Republic to 3.1% in Slovenia. With the exception of Estonia, Eastern Europe has a low share of population with the 3<sup>rd</sup> level education, which ranges from 10.5% to 15.3%. Estonia has the highest share amongst the countries analysed (41%), which, together with high share of secondary level education, gives it the best education structure.

This educational structure has few important implications for industrial upgrading of Eastern Europe. First, the low share of economically active population (with the exception of Estonia) with 3<sup>rd</sup> level education may represent difficulties in absorption and diffusion of new IT based technologies in services and industry, especially in adoption of IT but less in use. Second, the high share of population with secondary level education in Eastern Europe have undergone vocational education, i.e. their skills are relatively specialised which may present problems in economy-wide restructuring. Third, the favourable structure of the general level of education in Eastern Europe may present a problem if not accompanied by training and retraining programmes. On average, workers in CEE would need around 6 months of training to achieve the level of productivity in Western Europe. (EBRD, 2000b) They lack general adaptability and flexibility, which higher levels of education develop. Also, their technical and IT education is considered as insufficient (EBRD, *ibid.*). In contrast to foreign investors, domestic enterprises and public institutions have not been able so far to promote retraining activities to the extent required by the scale of restructuring challenges. This is one of the core policy issues for further industrial upgrading in Eastern Europe.

### 3. 3. OPENING AND MODES OF INSERTION INTO GLOBAL VALUE CHAINS

Eastern Europe is reintegrating into the international economy at a time when trade patterns are being strongly shaped by the complex integration strategies of MNCs involving the construction of international production networks across national boundaries. The issue is whether industrial upgrading in Eastern Europe is already taking place through participation in global value chains and, if not, under what conditions can policy, trade and production-based integration become vehicles for industrial upgrading.

Integration of Eastern Europe into international economy carries four specific features (Lemoine, 1998). First, there are already visible several tiers of Eastern European newcomers in the internationalization process. In rough terms, the scale and features of international integration differ significantly between central Europe, Balkans, and European CIS economies. Second, a high share of industry in Eastern Europe when compared to its income levels, even after significant downsizing during the 1990s (see EBRD, 1999), suggest that the scope for industry integration is high. Third, the institutional integration into the EU through accession process and trade openness of most of the Eastern European economies suggest that there are much more diverse 'pull' and 'push' factors operating towards the integration into global value chains than elsewhere. Finally, trade patterns of Eastern Europe, which show a multiplicity of adjustment patterns (see 2.1.), suggest that we will increasingly observe a multiplicity of patterns of integration in terms of different production and technological roles that specific sectors or countries in Eastern Europe will occupy.

Understanding the nature of international production networks in Eastern Europe should tell us more about their dynamic potential. The discussion and research on this has already started. For example, Ellingstadt (1997) argues that we are witnessing the emergence of technologically stagnant 'East' - 'West' networks which resemble *maquilladora* types of relationships. Along this line is also the thinking that Eastern Europe will be a case of 'dependent national capitalism, integrated into the capitalist world economy on the now standard liberal lines, yielding a tolerable living standard for most of their citizens, but with the permanent high unemployment and inequalities typical of the semi-periphery' (Radice, 1995, p. 307). In this version of the story CEE can operate only as a low cost skilled labour base with limited possibilities for technological integration.

In the alternative story, Eastern Europe could operate as a complement to Western production. As an argument in this direction Zysman and Schwartz (1998, p. 15) point to the example of German firms, which are drawing on the low cost skilled labour but to develop 'distinctive complementary, production'.

The testing of these two propositions requires more research that is empirical. (See Radosevic, 2001b, for an overview). Here, we will provide the available evidence and highlight the main issues from the perspective of industrial upgrading.

The very nature of the contemporary world economy is the existence of close interconnections between finance, trade, FDI, and different forms of subcontracting and alliances. In continuation, we review the role of each of these channels of integration of Eastern Europe.

#### ***Financial integration***

Financial integration is an essential element of economic integration of Eastern Europe. According to EBRD (1998) three-quarters of all private net inflows entered the region during 1996-98. FDI are making up an increasing share of these flows but they still

amounted to only one-third of the private capital inflows in 1997 and are attracted primarily to leading transition economies. The distribution of private equity issues has remained restricted to central Europe. Portfolio flows into the government securities markets have characterized a number of countries at less advanced stages in transition (ex. Russia, Romania) (EBRD, 1998, p. 77, 84). The most remarkable difference between the Eastern European countries are the terms of external borrowing, which are far more favorable for the more advanced transition economies (ibid. p.85).

However, the effects of financial integration of Eastern Europe are not confined to the level of financial aggregates. Financial globalization is also directly changing strategies of MNCs towards Eastern Europe as well as of their enterprises and in that way is influencing the patterns of production integration. For example, foreign acquisitions amount to about 50% of FDI in Eastern Europe (UNCTAD, 1997). Also, Eastern European enterprises increasingly rely on non-bank investors through bond issues and global depositary receipts (GDRs). These trends are driven by the opportunities offered by the liberalization of markets for corporate assets and opportunities to raise capital in quasi-equity forms, but also by underdeveloped capital markets in Eastern Europe.

### ***Trade integration***

Trade integration between Eastern Europe and the EU has developed quite extensively. For example, from 1988 to 1995 central Europe accounted for half of the increase in EU imports of industrial manufactured products from emerging regions outside the OECD. (Zysman and Schwartz, 1998). The trade structure has been significantly changed as well. For example, exports in 1996 were only 72%, similar to those in 1998 for the region as a whole (Eichengreen and Kohl, 1998, p. 21)

The emerging trade patterns of Eastern Europe cannot be explained without taking into account their micro-basis and the strategies of foreign companies, which are strongly shaping FDI and subcontracting patterns in the CEE (Radosevic and Hotopp, 1998). ECE (1994) also finds a clear link between FDI and trade developments as well as the strong contribution of FDI to export. Changes in FDI, not in relative prices, have been important in explaining trade performance (Eichengreen and Kohl, 1998) Also, the Association Agreements are unlikely to have played a dominant role in shaping Eastern European trade. The most important factors in shaping trade patterns are FDI and outward processing traffic (OPT). Their conclusion is that if trade policy mattered it did so via its effects on OPT and FDI (ibid., p. 33). This is confirmed also by data on foreign investment enterprises, which are much more trade intensive when compared to domestic enterprises (Hunya, 2000).

### ***Foreign direct investments***

International production integration of Eastern Europe is relatively the most researched from the FDI perspective. The general conclusion on direct effects of FDI is quite positive. For example, Eichengreen and Kohl (1998, p. 39) conclude that '(t)he correlation between FDI flows and increase in unit values, shifts in factor intensity and the other measures of trade performance .. strongly suggest that FDI is integrating the more advanced economies into multinational production networks, shifting these economies

towards R&D-intensive and human capital intensive products'. FDI bring capital but also transfer assets from less to owners that are more efficient. This latter aspect is very important in the Eastern Europe where foreign owners have advantages in terms of corporate governance as well as in terms of easier access to capital markets and technology. The result is a big difference in terms of productivity between domestic and foreign owned firms.

*Rate of presence.* Table 11-show the scale and intensity of FDI presence in Eastern Europe. Labour productivity (sales per employee) in foreign investment enterprises (FIEs) is from 1.5 (Estonia) to almost 3 times (Hungary) higher than in domestic enterprises. In that respect, FDI play a very positive direct role in these economies. For example, this led to higher productivity in foreign owned sector in Hungary than in Austria. In terms of capital productivity (sales per assets) differences between foreign and domestic enterprises are not high when compared to labour productivity<sup>17</sup>.

**Table 11: Penetration of FDI in Eastern European economies**

Foreign investment enterprises in percent of domestic enterprises, 1998

	Labour Productivity	Capital productivity	Exports per sales	Profits Per sales
Czech Republic	189	132.8	187.5	3200
Estonia	150.2	61.8	137.9	300
Hungary	286.7		259.9	333
Poland	194.4	110	161.8	277
Slovenia	197	129	152.1	103

Share of foreign investment enterprises in manufacturing, per cent, 1998

	Sales	Export	Profits	Investment outlays	Employment
Czech Republic	32.1	47	92.1	41.6	19.6
Estonia	28.2	35.2	59.2	32.9	20.8
Hungary	70	85.9	88.8	78.7	44.9
Poland	40.6	52.4	66	51	19.2
Slovenia	24.4	32.9	24.9	24.3	13.1

Source: Hunya, Gábor, *International Competitiveness Impacts of FDI in CEECs*, Paper presented at the 6<sup>th</sup> E.A.C.E.S Conference, Barcelona, 7-9 September 2000, (<http://eu-enlargement.org/>) and Mickiewicz, Radosevic and Varblane (2001)

The share of FDI as a percentage of GDP of central European countries is now similar to the EU at around 17%. Presence of FDI is very strong in Hungary with their shares in sales and export of 70% and 86% respectively. The relative importance of FDI in Hungary is higher than in Ireland. Also, given the size of its economy and the late surge in inflows of FDI foreign companies have managed to secure a strong presence in sales (40%) and export (52%) in Poland. Except in Slovenia, MNCs are generating from 60% to 92% of profits and their rates of profitability are from 2.8 to 32 times (!) higher than of domestic firms. This shows that the size of economy is not necessarily an indication of MNCs presence in CEE. Small economies (Slovenia and Estonia) have comparatively low degrees of FDI presence.

<sup>17</sup> A higher capital productivity of domestic firms than foreign in Estonia has to do with sectoral structure of FDI and the low share of FDI in industry.

In countries with the high share of FDI in sales (Czech R, Hungary, Poland) differences in performance between domestic and foreign enterprises are increasing (see Hunya, 2000). This in turn increases differences in profitability and then in investment. A strong presence of MNCs suggests that the industrial upgrading in these countries is foreign-led. Increasing differences in productivity between domestic and foreign firms, especially in Hungary, indicate the presence of dual economy. All this highlights the need to address the issue of interaction between domestic and foreign firms.

A penetration of FDI in Eastern Europe depends on industry-specific features and on the characteristics of the privatisation policies. The main features as described by Hunya (1998) are:

- FDI in Eastern European countries follow worldwide differences in the corporate integration of industries
- \* Technology intensive electrical machinery and car production are the main target
- \* Textiles, clothing, and leather are less internationalized by FDI than other branches;
- \* Foreign investors penetrate activities with relatively stable domestic markets, e.g. the food, beverages and tobacco industries
- Branches with low foreign penetration worldwide may have high foreign presence due to proximity (e.g. construction material)
- Privatisation by sales matters for FDI;

The foreign presence has been so far relatively small in branches with great structural difficulties, and oversized capacities, like petrochemicals and steel industry.

*Motives of FDI.* The areas of FDI in CEE reflect the interest of foreign investors in access to CEE markets (trade and services, partly industry), the low cost sourcing advantages of CEE (industry) as well as the areas of biggest investment stakes in non-tradable sectors (telecoms; energy). Surveys on FDI by Lankes and Venables (1997), Meyer, (1998) and others suggest the predominance of market seeking FDI. Factor cost considerations, as a single motivating factor is secondary. Only jointly with attractive markets do lower factor costs attract inward FDI (Meyer, 1998).

The initial investments are those that are domestic market oriented. This explains why horizontal types of FDI projects are entering Eastern Europe relatively early (Lankes and Venables, 1997). The progress in transformation will make more Eastern Europe hosts to vertical FDI bringing them into EU and world production networks.

*Modes of entry.* In the early stage of transition foreign investors concentrated on joint ventures (J-Vs) with state-owned enterprises (SOEs) where they had minority positions. In the second phase, majority FDI was preferred. For example, in Hungary 81% of nominal capital in foreign investment enterprises was with a minority share. In 1991, only 34% of foreign capital was in companies with a minority foreign share (Hunya, 1996). Joint ventures are the least preferred option when compared to FDI. It is likely that the EU enlargement will encourage mergers & acquisitions, rather than joint ventures. The reason for this is that joint ventures are acceptable only as a device to mitigate risk by allowing easier access to local actors, and for acquiring local knowledge (Lankes and Venables, 1997).

*Types of FDI.* The type of FDI varies significantly according to the host country's progress in transition (Lankes and Venables, 1997). Advanced economies in transition have a higher share of export oriented FDI projects, subsidiaries are more integrated into MNCs



and are more likely to be wholly owned. Also, countries which are further in transition have relatively few projects that have been abandoned or postponed, relatively more export supply oriented projects, and relatively more fully foreign owned projects (ibid, 1997). However, there is no evidence of a smooth functional relationship between FDI levels and transition level & risk (Lankes and Venables, 1997). The penetration of FDI is not a function of only country specific institutional features but of a larger set of factors, like industry structure, firm strategies and specific FDI policies.

*The effects of FDI.* The primary effects of FDI are in increasing the productivity and efficiency of acquired companies (Hunya, 1997)(Knell and Hunya, 1999)(Zemplerova, 1998). Their relatively higher share of investments and in R&D compared to domestic enterprises falls into this picture (Hunya, 1999; Inzelt, 1999; Farkas, 1997).

The effects of FDI are still localized to acquired or newly erected plants. The initial econometric evidence on FDI spillovers at industry level in CEE is negative (Knell, 1999)<sup>18</sup>. The 'enclave syndrome' has already become acute in the Hungarian economy and will probably follow in other countries as the size of foreign investments grows. Closer integration into the domestic economy will emerge as an important concern for those Eastern European governments where FDI have strong presence. However, the indirect effects of FDI should be seen within a time dimension. In many cases, the first investment phase (assembly activities) has been followed by further integration of local activities, adding the elements of procurement and logistics, supply and invoicing, product engineering, process and product development. Yet, this process is not automatic and will depend largely on the absorptive and innovative capacities of the host economy.

### **Non-equity production networks**

FDI are an important, but not the only, form of micro-level of integration of Eastern Europe into international economy'. Alliances, and among them different forms of subcontracting, are very often more important forms of integration than FDI. Given the high concentration of FDI in a few CEE countries (Poland, Hungary and Czech Republic) and on several sectors (cars, telecom, food, and trade) the overall impact of FDI on growth, with the exception of these three countries, seems slightly exaggerated. However, FDI is easier to monitor statistically and identify through business surveys or the business press. This also explains the stronger focus on them than on non-equity linkages. Contrary to FDI, non-equity links are far less defined; they are more heterogeneous and thus more difficult to compare. Also, the lack of systematic data opens up the danger of too hasty generalisation on a small sample.

In continuation, we discuss some of the research on alliances, subcontracting and 'outward processing traffic' (OPT) networks.

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<sup>18</sup> This is not surprising given the general conclusions of the literature on spillovers which suggest that there is not comprehensive evidence on the exact nature of magnitude of these effects. While earlier studies suggest that the effects are generally positive the increasing international division of labor within MNCs complicates the analysis (Blomstrom and Kokko, 1998, p. 247).

## **Alliances**

The FDI data obscure extra-MNCs or non-equity networks which are probably even more important in Eastern Europe than FDI based links. Research by Schmidt (1998), and Dalago, et al (1997) considers non-equity links, i.e. subcontracting and alliances. Their conclusions are that:

- Shallow modes of production co-operation, like arms' length transactions and contract work, dominate;
- Eastern European firms are integrated as sub-contractors in vertically structured networks conducted by 'Western' firms
- Low commitment of foreign firms
- Local firms are involved in labour intensive stages which generate low value-added but are also experiencing quality, delivery and co-ordination problems

Their research gives the impression that the 'East' - 'West' production networks are primarily contract manufacturing based at very low value added levels.

In Radosevic (2001c) we reviewed 26 alliances from Poland and the Czech Republic. Some of the main findings based on this sample are relevant to this discussion:

1. As a rule, firms grow either through foreign acquisition or networking (alliances), or through generic expansion, but one that relies heavily on networking. Generic expansion as a single strategy is rare.

2. Types of alliances or co-operative agreements in central Europe if judged on the basis of our sample are heterogeneous. Nevertheless, most alliances can be grouped into production alliances, or marketing alliances (in the software sector). The most widespread type of agreement is subcontracting.

3. Linkages generated by alliances are of vertical and horizontal types. However, vertical alliances were more common in our sample. This is to be expected given the frequent presence of subcontracting links. This also suggests that the alliances in central Europe are being driven more by unexploited market opportunities and cost differentials than by the wish to displace competition. A larger number of horizontal alliances would indicate a stronger presence of market share considerations. This seems to be much more of an issue in the case of FDI. Sadowski (1997), based on 4 digit SIC data concludes that the majority of mergers & acquisitions in central Europe have been horizontal acquisitions. This would suggest that in central Europe alliances are more prone to vertical relationships while FDI are more prone to horizontal links than alliances.

4. The comparison of cases suggests that the balance between generic expansion, alliances (networks), and mergers & acquisitions as modes of growth, reflects differences in firms' abilities to control technology, access to market and finance. If the enterprise is able to exert control over two of these three elements, it may ensure growth through alliances by trading them for the third, missing or weak element. However, the final outcome does not seem to be a direct function of the ability of enterprises to control access to technology, market and finance. It is not possible to fully understand alliances by only addressing their internal characteristics; how these mesh with their institutional context and with sectoral structural features must also be taken into account. The types and dynamics of alliances also reflect the political and legal situation of a country (privatisation, attitude towards FDI) as well as specific sectoral features in terms of technology, finance and markets. The profile of

alliances is shaped through the interaction between firm-specific factors and capabilities, and sector- and country-specific factors.

### ***Subcontracting***

Subcontracting is considered here to be a specific form of alliance. In the simplest terms, subcontracting is contracting that partly contributes to the execution of a major contract (Nishiguchi, 1994, p3). The firm awarding the contract to a subcontractor is the prime contractor, also termed the original equipment manufacturer (OEM), assembler, customer, purchaser, top firm, principal employer, or primary manufacturer. Although considered in statistics as ordinary trade, this seems currently to be the most important channel for technology transfer to Eastern Europe. Subcontracting involves a variety of relationships like contract manufacturing; OEM subcontracting; cost- and specialty-based subcontracting, etc. This diversity of types of subcontracting makes statistical analysis of this type of production network difficult. However, the importance of subcontracting in sectors such as metal products, machinery, and car parts in countries like Hungary and the Czech R, and its growing weight in most of the Eastern European countries, calls for a better understanding of this intra-industry type of trade. Subcontracting relationships enable the subcontracted enterprise to concentrate on production engineering, leaving marketing, and a proportion of the financial management, to the prime manufacturer. This is why for many Eastern European firms it is the only option if they are to survive and grow.

However, the problems involved in climbing the value-added ladder through subcontracting are not trivial. From a sample of 90 Hungarian subcontractors, Szalavetz (1997) showed that close cooperation with foreign partners brings considerable productivity improvements. In her sample, all processing firms received a transfer of technology or equipment and half the firms benefited from investment or working capital finance provided by the foreign partner. However, after the initial push the learning process gradually slowed and finally stopped completely. Szalavetz (1997, p. 5) points out that "Once the Hungarian company had undergone sufficient restructuring to ensure that cooperation can go smoothly, foreign partners abandon any further developmental effort". This occurred even in those cases where foreign partners had decided to increase their equity in the Hungarian company (*ibid.*, p. 53).

This example illustrates the difficulties involved in deepening production integration and points to the discontinuous character of technological integration and the emerging structural barriers for Eastern European firms after initial productivity improvements (see Radosevic, 1999e, chapter 5).

### ***Outward processing traffic***

Outward processing traffic (OPT) is a specific form of subcontracting. OPT takes place when the principal firm supplies the host firm with intermediate products for processing then returns them to the principal, which then markets the final output. This type of trade permits a relatively close relationship between the firms, and allows for quality control and detailed instructions to the host firm if necessary.

EU imports after OPT from Eastern Europe reached ECU5.74bn in 1994, and ECU6.3bn in 1998. (Naujoks and Schmidt, 1994; Pellegrin, 2000). OPT trade is highly industry-specific with textile and clothing making half of OPT trade with Eastern Europe and followed by electrical machinery. Very low unit value of import after OPT from the Eastern Europe indicates that the bulk of this trade is in labour-intensive sectors and is based on labour cost differentials, indicating a low level of technological integration (Sdogati, 1996).

However, wages are not the only factor that explains the spread of OPT subcontracting. Based on Asian OPT networks, Gereffi (1999) suggests that the determinants might be more numerous, and include wage exchange rates, trade policies (quotas, preferential tariffs) and social and cultural factors, such as ethnic ties, common language, and common historical legacy. Eichengreen and Kohl (1998) show that OPT has not promoted the movement into higher value added exports in the case of Visegrad 4 (Hungary, Poland, Czech and Slovak Republics) but that a case can be made for it in the second tier of CEEC economies (Bulgaria, Romania). Lemoine (1998) concludes that the sectors that were the most dependent on OPT (clothing, leather and shoes) ceased to be the engine of central European export performance in the EU market in recent years and as they have developed their export capacities independent from OPT. He points to the emergence of two tier structure of regional cooperation whereby Balkan countries may take an increasing share of OPT.

In contrast, Pellegrin (1999) is much more optimistic regarding the restructuring potential of OPT subcontracting. She argues that '(t)here is not evidence of the destruction of local export capabilities resulting from the cessation of OPT activities due to wage increases. It is rather the opposite trend which is observed: OPT activities go hand in hand with the strengthening of trade performance' (p. 11). She also notes that these outcomes are mostly due to the relocation activities of German medium sized firms 'which illustrates the important role the latter have in bringing about such transformations' (Pellegrin, 1999, p. 19).

### **3. 4. INDUSTRY RESTRUCTURING IN CENTRAL AND EASTERN EUROPE: STYLISTED FACTS**

Patterns of global industrial networks are largely, industry specific. Foreign equity investments are in car assembly, mixture of equity and subcontracting in car parts industry, subcontracting in clothing, co-operative agreements in software - these are typical sectoral modes of entry in Eastern Europe. They do not reflect the regional specificity alone but also the technological features of the sectors. Research on international political economy shows that 'there are striking variations across sectors in the nature and kind of authority and how much it, or they, intervene with the play of market forces. Compared with differences between national laws and institutions affecting the economy, the differences are apt to be much greater between sectors of the world market economy' (Strange, 1996, p. 187). However, as pointed out by Hall (1997) the principal problem is to specify precisely which variables in sectoral relationships (firm, national, sectoral, international) have the most impact on corporate strategy and economic outcomes.

In this section we review the main changes in several industrial sectors in Eastern Europe. We base this review on summary that has been already undertaken by Radosevic

(1999d) based on Richet and Bourrasa (1998), Bitzer and Hirschhausen (1998), Charpiot-Michaud (1998), Bitzer (1998), Mueller (1998) and Bitzer (1998b) and also use additional analyses by Egorov (2001), Ivanova (2000), Tunzelmann (2000), and Dagayev (2000), Dornisch (2000), Tulder (1999). Our review has revealed several essential features of industrial transformation from upgrading perspective. These can be considered as very tentative stylized facts which reflect the current state of industry transformation in CEE.

### **Vertical disintegration and changes in patterns of innovation activities**

Industrial transformation in CEE has changed not only the organisation of the innovation process but very often the entire production network that formed the basis of the sector. The main feature of socialist production networks was a deep vertical integration that was unsuitable in the new conditions of opened economies. Disintegration of vertical production networks and their reorganisation, very often led by foreign enterprises, also changed the nature of the innovation process.

The radical change in the industrial structure of individual sectors led to changes in supply and demand and to a complete change in the position of enterprises in Eastern Europe, which is very much sector-specific. For example, Eastern European telecom equipment producers have developed from being producers of outdated switching equipment to becoming dependent subsidiaries localising state-of-the-art technologies (Mueller, 1999). Computer producers had to completely abandon the idea of producing their own mini-computers, and were transformed into PC assemblers (Bitzer, 1998). New software firms have become customisers of generic solutions in close co-operation with foreign software providers (Bitzer, 1998b). Car complexes of the former socialist period have been transformed into networks led by foreign assemblers and reorganised with the help of first-tier foreign suppliers (Richet and Bourrasa, 1999). Domestic car part producers have become subcontractors serving foreign-controlled assemblers (Havas, 1999, 1999b). In electronics, central European countries, (Hungary and Czech R) have become connected to international electronics production networks through foreign investment (Linden, 1998). Hungary has moved the furthest along this path, positioning itself as a major low-cost supply base in the region (ibid, p. 27).

The focus of the technology effort has shifted from previous focus on R&D towards intra-firm technological improvements where R&D, especially of the imitative type, has become much less prevalent - if, indeed, it still exists at all. This has led to a drastic shrinking in the demand for domestic technology but has led to huge improvements in operations efficiency, especially in foreign controlled enterprises.

### **Truncated firm and network integration**

In our reinterpretation of the socialist production networks (see 3.1.), we concluded that the biggest problem was system integration at product level and process (network) integration at enterprise level. In transformation process enterprises had to develop previously 'externalised' functions like finance, marketing, and R&D. However, being simultaneously faced with technology and a funding gap, they were able to integrate into the world economy only in an incomplete (truncated) way by 'externalising' undeveloped functions to foreign enterprises. For example, subcontractors implicitly transfer their marketing and R&D functions to principals. In outward processing arrangements, they also dislocate financing as

foreign partners supply them with needed inputs and raw materials. Telecom equipment producers who have been taken over by MNCs practically remain production units with very limited marketing, finance, and R&D functions.

The fact that most critical functions are under the control of foreign enterprises is both a strength and weakness in the current stage of industrial transformation in CEE. As sectoral studies show, in sectors where technical modernisation was foreign-led, restructuring was fastest and productivity improvements were high. In the software sector, the link with foreign software enterprises through different forms of international co-operative agreements (value-added resellers, customisers, system providers, etc) is crucial for them to capture the domestic market. In PC assembly, good links with foreign components suppliers are essential. In telecommunications equipment, domestic enterprises have become an integral part of MNC networks. In the car industry, domestic subcontracting networks depend quite heavily on foreign assemblers or first-tier suppliers. In all these cases, because of foreign-takeover or close cooperation with foreign firms they have improved production efficiency. However, these increases in productivity have been paid by reduced strategic autonomy, especially in functions like finance, marketing and R&D that historically have never been strong in socialist enterprises,

### **Obsolescence and re-employment of old S&T capabilities**

Sectoral studies show that the public S&T systems in Eastern Europe did not play an important role in the restructuring of sectors and enterprises in CEE. The innovation process as organised in the socialist period has ceased to operate in all CEECs. The sources of innovation and patterns of technical change have changed in all the sectors that have been analysed. As in other market economies, enterprises have become one of the main, if not the most important, actors in the innovation process. The role of technology institutes in the innovation process has been significantly reduced.

Old model of innovation processes could not continue in new conditions to which the entire context of newly opened economies was not conducive. R&D organisations are trying to restructure their links with industry by offering new services while being at the same time on public funding. Links with ex-branch institutes have lost their previous content and the entire industry R&D sector seems redundant in its function as the main source of R&D. New links are indirect, through skilled graduates, professional networks, or direct through technological problem-solving activities, and the creation of new technology-based firms.

The devaluation of old technology assets has been different significantly from sector to sector. Domestic S&T is often not re-employed in its old organisational form, but capabilities embodied in networks of research scientists and engineers have often been successfully re-employed in another context. 'Human capital' as an economic input has two components: specialized skills that can become obsolete, and transferable skills that are problem solving. For example, in the software sector we could observe a devaluation of specialized skills related to programming in software languages developed in socialist times, but not of a transferable skill - how to program. Otherwise, it would be difficult to understand numerous cases of new software firms that have sprung up based on old electronics institutes.

However, competencies by themselves are insufficient for restructuring without the markets, finance, and management that would put all these factors to work. Hence, an understanding of whether the problems in restructuring are merely technology assets or

some other factor requires an understanding of factors like markets (demand) and finance in a specific sectoral context.

### **Market, technology and finance: factors that shape sectoral patterns of restructuring**

Sectoral studies show that the access to market, to technology and finance are important in shaping different outcomes of restructuring in different sectors in Eastern Europe. These three factors operate as structural factors in restructuring process. However, the emphasis on market, technology and finance does not mean that these factors are the only determinants of the restructuring. A variety of other factors operate which may not lead to modernization despite favorable structural preconditions.

In the *car industry*, Central European producers lacked the knowledge to upgrade their product and process engineering, and the financial resources to modernize and develop new models; moreover, they had inadequate organisational skills to expand subcontracting networks. However, the domestic market and the proximity of the EU market were factors that attracted foreign investors. The restructuring of enterprises was achieved mainly with foreign capital through FDI. For example, Volkswagen bought 'Skoda', Fiat bought FSM, Daewoo bought FSO, Renault bought Dacia. This was followed by a wave of acquisitions and alliances in the car parts sector. The lack of finance, technical knowledge, and restructuring that is involved not only in assembling firms, but also in the entire supply chain made it very difficult for domestic enterprises to restructure such networks. In the car industry, the lack of finance and technology is being traded for access to domestic and/or EU markets. The weakness of domestic producers in technology and the lack of domestic finance led governments to surrender control over the sector to strategic foreign investors. In Russia, a similar situation has not changed the attitudes of the State, which still tries to modernise the sector through domestic control. The result is a much slower pace of change and enterprises that are still 'muddling through'.

The presence of all three factors - access to markets, technology and finance- can help to understand why the Polish Szczecin **shipyard** is a case of very successful and fast modernisation. Bitzer and von Hirschhausen (1998) demonstrate that the common elements of this restructuring are:<sup>19</sup>

- *access to technology.*

Once generalists, the Polish shipyards sought to become competitive in the low-end segments, mainly container ships, general cargo vessels, and tankers. This move towards technologically simpler ships helped to ease access to technology. However, despite this improvements were needed in computerisation and process automatisisation and enhancing design capacities.

- *access to markets*

The key operation was winning a contract for a series of 20 container vessels in 1989 (Bitzer and von Hirschhausen, 1998,p 102). These enabled the shipyard to organise efficient

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<sup>19</sup> Naturally, the Polish success story cannot be explained entirely only by these three factors. We should not forget that this restructuring was enabled by significant labour shedding of half of labour force as well as a series of other complementary events. For detailed account see Johnson, S. , D. Kotchen, and G. W. Loveman (1996) Complementarities and the managerial challenges of state enterprise restructuring: evidence from two shipyards, *Economics of Transition*, Vol. 4 (1), 31-42.. However, the point is that three factors -finance, market, technology- have operated as structural determinants in addition to a variety of contingent factors. These other factors were essential in failure to restructure another Polish shipyard (Gdansk) despite similar structural preconditions.

production, cut building times, and reduce costs. Thus, market or effective demand was a crucial starting point for domestically led modernization.

- *access to finance*

Solving the issue of outstanding debts and credits was the third essential factor. The government took over debts and provided guarantees for credits. Also, the government granted financial support of \$600m for improving the productivity of shipyards.

In contrast to this, Russian shipyards are much slower in restructuring. In 1995, Russia had 35 shipyards, 150 suppliers, and a dozen R&D and design institutes. Large capacities are now used by 40 per cent, resulting in Russia's fall from 8th to 20th place in world ship production. A few successful examples of enterprise restructuring are linked to either

- a Russian company becoming a supplier in international networks or importing technology from it, or
- a Russian shipyard obtaining finance from a Russian or mainly foreign bank by using the ship as collateral.

In addition, Russian yards are blocked in their restructuring by the institutional framework (barter, labour market rigidity, unstable legal conditions), leading to high costs and low international competitiveness.

What distinguishes the Russian and Polish cases are not technological capabilities but the lack of finance, the lack of restructuring agents or organisations that would implement the finance, and the lack of that critical initial large order that would put into motion the process of restructuring. This is a kind of 'catch 22' situation, as unrestructuring is unlikely to occur unless there is a prospect of growing market demand. On the other hand, prospects of large orders are dim as long as problems in restructuring are so large and shipyards uncompetitive.

The CEE **software** markets are small by international standards. Market size is particularly a problem for the possible domestic development of standardised software. However, for customised software market size is not so important. In the area of customised software, the proximity to users and a better understanding of local conditions is more important than market size.

The development of software is a very labour-intensive process, in which capital intensities are very low. This reduces financial requirements for business and has allowed domestic software firms to operate based on retained earnings. Access to technology is enabled through international co-operative agreements. In fact, generic software solutions almost always need customisations, which leads to mutual interests and the co-operation of software providers and domestic software firms.

As a result of favourable market, technology, and finance factors, customised software segments are dominated by domestic enterprises. They have competitive advantages in higher flexibility, a lower break-even point in terms of the number of customers, personal contacts, knowledge of the language, mentality, culture, knowledge of laws and national procedures, etc. The new CEE software enterprises, the overwhelming part of which are greenfield creations, now dominate the market segments for low standardised software, adapted software and small-scale custom software projects.



However, in standardised software or in large complex applications these advantages are lost. Financial requirements increase and technology becomes proprietary, which allows foreign companies to invest in accessing domestic markets.

In some niche segments several CEE companies (Paragraph, GraphiSoft, Recognita, etc) have managed to enter foreign markets primarily based on the originality of their technical solutions. However, as pointed by Bitzer (1998), a few niche exporters do not constitute success for the sector as a whole.

In **telecommunications**, the technology gap between socialist economies and world state-of-the-art technology was at its relatively widest when seen across the industry spectrum. The second feature of the CEE situation in telecommunication is large financial requirements. Access to capital and long-term finance is crucial parameter to help service providers meet emerging demand. Domestic markets are the only factor in CEE that could be traded against a very unfavourable technology and finance situation. Moreover, in a liberalised competitive environment, the way in which access to networks and interconnections for competing networks is regulated is crucial. Given huge disadvantages in the first two factors, the art of strategy in this sector is using access to markets as a bargaining chip. The case of the Hungarian telecom sector and privatisation of the national service provider Matav as its key development show that this can be done successfully. It led to fast upgrading and to an expansion of network to the benefit of domestic customers. In addition, the state had quick access to large privatisation proceeds: \$2,600 per line, while in western Europe the average price is \$1,600 per line. The initial idea was to try to trade access to the domestic market for access to telecom equipment technology. However, it seems that the technology gap was so big that not much has been achieved in this respect (Toth, 1994).

A similar attempt in Latvia, where the domestic market is very small, ended similarly. Even if the government had tried to re-establish the S&T links of domestic R&D organisations with foreign suppliers (which it did not), the size of the domestically derived demand for S&T links is too small to allow for it.

Why then was the access to markets not used more effectively as a way to get access to technology and finance in a country like Russia with a large domestic market? Mueller (1998) points to regulatory problems and to a very low effective demand in Russia. Telephone income in Russia is less than \$100 per line per year compared to \$3,400 in Hungary or Poland. As a result, investment to upgrade the network continues is very low (0.3 per cent of GNP, or less than \$1bn). Growth in most regional Russian companies is difficult to finance internally. There is a lack of aggregate demand, which has serious effects on the derived demand for equipment and associated S&T links, especially as most of the equipment is imported. This is accompanied by difficulties for foreign investors in accessing markets due to fairly decentralised systems with large regional differences in infrastructure availability and tariffs and the lack of a clear macroeconomic and regulatory strategy. The difficulties to access markets led to a lack of FDI, which then leads to a much less derived demand for equipment and S&T links. The situation is characterised by a vicious circle, in which unregulated market access and low effective demand are coupled with large financing requirements and a huge technology gap. For the time being, the issue for Russia is how the local equipment manufacturers and services suppliers could access technology and the expertise of foreign manufacturers without their significant involvement. This seems impossible without regulating access to the market, especially given the lack of finance

investment, which is very much tilted towards overlay and backbone networks that rely heavily on foreign produce equipment and know-how.

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Table 12 summarizes the situation of several industries by outlining the impact of finance, technology and market access for the overall pattern of restructuring. The most common pattern of restructuring is a foreign-led modernization, especially in central Europe. This is due to the large gaps in finance and technology access as well as relatively small home markets. However, Russia and other European CIS countries do not conform fully to this pattern. The issues of domestic versus foreign control of modernization process come much strongly into play in these economies than in the central Europe.

Table 12: Determinants of systems of innovation at sectoral level in CEECs: markets, finance and technology

**Table 12: Determinants of systems of innovation at sectoral level in CEECs: markets, finance and technology**

	<b>Car industry</b>	<b>Shipbuilding</b>	<b>Food processing</b>	<b>Software</b>	<b>Telecoms</b>	<b>Computers</b>
Markets (demand)	Growing domestic demand Proximity to EU markets	Large scale orders are critical	Growing domestic demand for differentiated products; Problems in accessing foreign market	Growing domestic market;	Growing domestic market but with big differences in terms of effective investment demand	Growing domestic demand for PCs; Weak demand for workstations and mainframes
Finance	Lacking finance	Solving the issues of debts and external funding is critical; Financial restructuring required.	Relatively low finance requirements; Possibility to raise domestic finance.	No large finance required for customized SW; Finance as a problem in complex projects and standardized SW	Large finance requirement	Low finance requirements in PCs; Large finance requirements in higher segments
Technology	Lacking product engineering know-how; Weak organisational capabilities for restructuring supplier networks	Easier access to technology in low-end segments; ICA important for accessing technology	Technology is accessible; Integration of different technologies requires organisational capabilities	Technology accessible through ICA; Competitive advantages of domestic firms in customized SW; Technology gap in standardized SW	Huge technology gap in telecom equipment	Accessible technology and components in PC assembly; Huge technology gap in higher segments
Overall pattern	Lacking finance and product engineering gap accompanied by small domestic markets leads to restructuring by foreign assemblers in central Europe	Given the available external funding and easier access to technology the restructuring process depends on the large scale orders - foreign or domestic	Lower finance gaps and easier access to technology allowed domestic - led restructuring which is accompanied by foreign-led restructuring in differentiated products	Growing domestic market, low finance requirements and access to technology via ICAs enabled a visible presence of domestic firms in customized SW	Growing domestic market but huge finance and technology gap led to a strong presence of foreign network organisers	Growing domestic market, low finance requirements and access to components from world market enabled a visible presence of domestic PC assemblers

Note: ICA - international co-operative agreements; SW - software; Source: Based on Richet and Bourrasa (1998), Bitzer and Hirschhausen (1998), Charpiot-Michaud (1998), Bitzer (1998), Mueller (1998) and Bitzer (1998b).

Source: Radosevic, Slavo (1999) 'Transformation of S&T systems into systems of innovation in central and eastern Europe: the emerging patterns of recombination, path-dependency and change', *Structural Change and Economic Dynamics*, Vol. 10, 1999, issue 3-4, pp. 277-320

## **Foreign versus domestic –led modernization**

Restructuring and technical modernization depends largely on the main actor in the restructuring process and which elements of the process he controls (assets, labour process, supply, distribution, technology, or finance). The results of these differences are different patterns of modernization. The distinction becomes even more important when we take into account that the process of foreign investment privatisation in CEE, as in many other countries, is also a highly politicised process. A policy attempt to control it may produce costs and benefits that are different in the short and the long term.

In the CEE car industry, most often the big national car manufacturers were sold directly to foreign companies (examples are FSO, Dacia, Skoda, FSM). The dominant structure is the joint venture, which is controlled by a western partner through a majority share. The foreign investors are re-organizers of supplier networks through audits usually performed by the first-tier suppliers.

The exceptions to this process of foreign-led modernization are Tatra in the Czech Republic, Moskvitch, AvtoVAZ, GAZ, and UAZ in Russia. In the car industry, Russia followed a different path, with the state still holding majority control over three of the biggest car manufacturers. The heads of the Russian car industry fear that they may lose control of the industry by letting foreign capital in. Given the finance and technology gaps in this sector in Russia, despite large domestic demand, the modernisation is lagging far behind Polish and Czech car producers.

The modernisation process in the Polish shipbuilding industry has so far been controlled by domestic actors (banks, managers, the state). Given that the access to technology was not the major problem, and that banks and the government were willing to support restructuring, as there was a critical mass of foreign orders, the whole process remained under domestic control. A similar attempt to domestically control the modernisation process in Russia has not been so successful. There are government attempts to develop domestically-led modernisation through: yard restructuring and modernisation, reorientation of production, creation of holdings that would merge different shipyards, strengthening of the supplier networks, improvement of design for civil shipbuilding, and tariff protection of domestic producers. The results, for the time being, are very poor. Unwillingness to surrender control over the modernisation process has probably slowed the restructuring of Russian shipyards. This is especially important in view of the case studies that indicate that the co-operation with foreign enterprises is a major determinant of the success of enterprises.

A study by Michaud and von Tunzelmann (1999) suggest that there is three-way a segmentation of the food processing sector in Eastern Europe:

- medium to large enterprises, often with a foreign presence, whose level of production has significantly improved;
- medium-sized domestic firms, mostly co-operatives, which produce only for the domestic market, with a strategy of expanding the range and quality of products;

- small, often private, newly created firms that have difficulties to grow.

Except in agriculture and through privatisation, the state has withdrawn from this sector. The dominant actors in the 1990s are no longer the state and co-operative enterprises (as in the socialist period) but foreign investors and distributors, and new types of medium-sized co-operative and domestic distributors. This would suggest that the modernisation process is led by both foreign and domestic enterprises that are increasingly competing.

Trade and FDI openness of the Eastern European economies, combined with the opportunity for governments to influence to a different extent the forms and degrees of foreign involvement, creates numerous trade-offs and policy dilemmas that have strong effects on productivity improvements and technical modernization. In addition, domestic institutional or private owners and enterprises are often in conflict over different views on the restructuring process - which has strong implications on the pace and type of technical modernization. Foreign and domestic-led modernization are analytical distinctions that may often be found to be dichotomies but also combinations, where control over different key factors is distributed across domestic and foreign actors. Whether modernization is domestic or foreign-led depends on which key factors drive technical modernization and who controls them.

Sectoral studies suggest that there are situations in which any attempt to keep domestic control will only prolong the modernization process and increase restructuring costs. This is clearly the case in the telecom services and equipment sectors, in car assembly, in the higher-end segments of the computer industry and, probably, in some segments of the food processing industry. Given the need for large-scale restructuring and limited resources, technical modernization has been successful in sectors where structural factors enabled domestic actors to carry out this process on their own. More often, if these factors were unfavorable, governments would surrender control to foreign investors and enterprises. Foreign-led modernization has raised the productivity of newly acquired enterprises, streamlined them, and ensured their integration into international production networks. However, this does not resolve the problem of structural change and growth, and the role of government. Surrendering control does not release government of its responsibility for growth and industrial upgrading. In the medium and long term, more advanced Eastern European economies may face new structural barriers in specific sectors for which constraints are imminently domestic and should be addressed by today's policy.

### **Forthcoming structural barriers**

Industry studies show not only the extent of undertaken restructuring or the lack of it but have also pointed to emerging structural barriers in the industrial upgrading of individual sectors.

*Car industry.* Richet and Bourrassa (1998) have pointed to the successful restructuring of the car industry in the Czech Republic, Poland, Hungary, and Slovenia. In almost all countries of Eastern Europe, the turning around and restructuring of plants in the car industry have been realised through FDI by big MNCs looking for both new markets and to integrate local

plants into their world network. These companies have brought cash but also technology, know-how, and management skills.

However, they also point to uncertainty in this first group, which may arise regarding the behaviour of the first-tier foreign suppliers and the extent to which they will continue to develop sourcing networks in Eastern Europe. This will determine the depth of production clusters in the car industry. They point out that small firms in this sector in Eastern Europe are isolated and without infrastructural support. There is a need for support in training of technicians and engineers, providing technical knowledge to suppliers, most often SMEs. The essential issue for Eastern European car industry is enlarging the local sourcing base.

*Shipbuilding.* The example of Poland, which has emerged as the 5th largest shipbuilding country, shows that industrial upgrading can take place once effective demand is coupled with finance and technology. However, the current success is in low-end ships with a very shallow production cluster. Bitzer and von Hirschhausen (1998) point out that innovation policy should aim at strengthening the network integration of domestic shipyards and their suppliers' (p. 111). Also, the shipyards in CEE are moving from highly integrated to non-integrated shipyards. In order to support this shift, S&T policy should be less sectorally and more innovation-oriented. It has to be focused on technology networks and be less sector-specific as sectors like shipbuilding have been transformed into a bundle of different technologies.

*Food processing industry.* Based on the study on the food industry, we can discern three structural barriers for industrial upgrading in this sector in Eastern Europe.

### 1 *Agriculture*

In each country, future developments will be largely determined by restructuring in agriculture. It is unlikely that the industry will become internationally competitive on a large scale as long as agricultural problems remain unresolved, primarily as regards property rights. Restructuring is more or less complete in the downstream sub-sectors to which most of FDI was attracted in the first place. The product range has expanded significantly compared to the past, and marketing and packaging have improved beyond recognition. FDI have generated competition of domestic firms, which are learning and catching up through this process. The structural problems are in upstream sectors and serve as an important structural constraint to growth.

### 2 *Technology and marketing infrastructure as a barrier for upgrading*

The second important issue is whether new small enterprises will be able to grow. In sectors in which sources of innovation are only partly internal, it is essential to develop industry infrastructure (R&D, marketing, collective brands).

### 3 *Links with other industries*

Food processing is no longer a traditional industry, given that it combines several types of technologies. Therefore, the long-term growth of the industry will also depend on the restructuring of related industries. The industry will have to cultivate links with other industries, which are one of the main sources of innovation, as well as links with foreign suppliers and producers.

*Software.* A further development of software industry in CEE is hindered by the lack of infrastructure that is needed for software development (standardisation procedures, telecommunications, patent laws and their enforcement). If CEE enterprises are to develop into exporters, this cannot be achieved without improvements in the legal and technical infrastructure.

*Telecommunications, software and computers.* In Hungary, because of the successes of the initial round of investments in software and electronics, other companies, such as IBM, Motorola and Nokia, are following suit. These are not only investments in local demand but also in local competence. The next stage in this process is to link domestic enterprises more closely to foreign investments. For the time being, FDI still operate as 'islands,' reducing opportunities for spillovers and for industry upgrading of domestic enterprises.

Polish PC assemblers started as traders and have since managed to consolidate their domestic market position. However, the booming demand for home computers is pushing sales of sophisticated and customised PCs. This will require greater diversification and flexibility on the part of producers. Also, the real production of equipment is still very rare and a computer supplier industry does not exist. In view of the uncertainties - due to fast development of the computer sector - current successes may soon be a thing of a past. Their currently very narrow production specialisation may be far from sufficient to ensure their survival in changed conditions.

Forthcoming structural barriers are those that only advanced economies in eastern Europe have started to face. The majority of Eastern European economies are still struggling with their integration into international production networks. In their case, integration at any technological level is a solution for the time being. However, as the cases of some sectors suggest, industrial upgrading is a continuous process and today's specialisations may not be sustainable or economically profitable in the medium or long term. The case of the car industry, considered the most advanced in terms of restructuring in Eastern Europe because it integrated early and successfully, shows the type of emerging problems. These are no longer problems of intra-company character for which FDI were a sufficient and necessary answer. Any emerging problems may be of a systemic character, for which only FDI may not suffice.

### **3.5. NETWORK ORGANIZERS AND INNOVATIVE CLUSTERS IN EASTERN EUROPE**

In order to understand the transformation of industrial networks in Eastern Europe and their realignment with global networks requires also an understanding of who are the main potential or actual network organizers. Different - national, sectoral, market and firm - determinants of the emerging networks are, by themselves, only a conditional advantage which requires network organizers to be turned into a real advantages (Radosevic, 1999b). In this section we address two issues. First, who are the potential network organizers that could undertake the task of organizing production and technology networks. Second, we discuss the potential for regional networks to become a restructuring agent.

Network restructuring is strongly dependent on the (non)existence of a network organizer. At the core of this is the problem of co-ordination and complexity of production networks. As already emphasized this issue is of great relevance in the context of Eastern Europe because of the two biggest weaknesses of domestic firms: system integration at product level and network integration at firm level (see 3.1.). This has been further given importance through the globalization of world economy and expansion of global value chains. The prospects for rebuilding the Eastern European economies are not only conditioned by (dis)economies in production but also can result from the inability of actors in production networks to self-organize due to institutional uncertainty and co-ordination failures, which hinder the self-organization of industry. This process results in the emergence or non-emergence of network organizers - organizations that act as promoters of trade, production and/or innovation linkages.

In a different context but with similar concerns, this issue has been addressed through the notion of lead firms. Rugman (1997) points out that the *lead company* is at the heart of network. 'It ... provides ... strategic and organizational leadership .. beyond the resources that, from an accounting perspective, lie directly under ... (its) ... management control' (ibid, p.182)(my emphasis). The strategy of the lead company thus directly affects the competitive position of other network participants. Ernst (1999, p. 15, 16) points out that '(t)he lead company derives its strength from its control over critical resources and capabilities, and from its capacity to coordinate transactions between different network nodes. Both are the sources of its superior capacity for generating economic rents. The lead firm heavily determines growth and strategic direction of suppliers'. Similar to our concerns regarding the Eastern Europe, Gereffi (1999) points to the key question of who will be the main 'organizing agents' in modernizing commodity chains in Mexico due to NAFTA<sup>20</sup>.

Who is emerging as a network organizer in Eastern Europe? In principle, network organizers are any actors with the necessary capability and resources - a user or supplier firm, a bank, a holding company or a financial - industrial group, a foreign trade organization, a design institute, a foreign firm or, in some cases, even the state or state agency. Limited and unsystematic evidence shows that there is a wide diversity of network organizers in CEE. Given management, finance and technology gaps in CEE, foreign companies are, for the time being, the most active network organizers. However, they are not the only restructuring agents, as we will illustrate in continuation.

### ***Foreign multinationals***

Foreign firms in Eastern Europe operate as the most active organizers of supply or distribution networks. In countries where foreign investments are relatively large, such as Hungary, or in sectors where foreign presence is relatively strong (telecoms, car assembly), this opportunity is being fully exploited. For example, foreign companies that shape domestic supplier networks now dominate telecom equipment production in Eastern Europe. In addition, foreign car producers are transferring their supplier networks into the

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<sup>20</sup> Gereffi (1999) defines organizing agent as 'those firms, foreign and domestic that could enhance the competitiveness of the apparel commodity chains in Mexico through backward or forward linkages with major producers and retailers. (p. 67). The lead firms in manufacture centered and retailer centered networks in the North American apparel commodity chains are in a position to play a direct role in upgrading Mexican domestic industry. (Gereffi, 1999, p. 68). He predicts that 'sourcing intermediaries will emerge in Mexico to perform the same kind 'full package' services that trading companies and integrated manufacturers provided in 'East' Asia. (ibid., p. 68).



region (for example, Fiat, VW, GM, Audi) creating in that way a nucleus of local supply networks and potential local systems of innovation. Large MNCs like *ABB* have managed to set up a new supply network which involves almost all Eastern European countries and some of their subsidiaries, such as Zamech, Poland, are plugged into the *ABB* design network (Barham and Heimer, 1998). A question for foreign companies is whether Eastern Europe provides opportunities for cross-national production links and whether they are able to exploit these opportunities.

For example, Tulder (1998) shows that the shape of international production networks in the European car industry largely runs along the lines of four strategic groupings: frontrunners (Volkswagen, General Motors, Fiat and Renault), followers (PSA, Ford), peripheral (Suzuki, Daewoo) and (voluntary) lock out (BMW, Toyota, Nissan, Daimler Benz) networks. Tulder and Ruigrok (1998) conclusion is that '(e)ach group of firms share different strategic intentions for the region. Followers and lockout networks largely see the region as a still limited market. Peripheral firms primarily use the region as an entry into the Western-European market. Frontrunner firms adopted the most sophisticated (and also most difficult to manage) strategy: They aim at the region as a production site for cheap re-exports back into the home base, they see it as a source for lower-end world cars and components, and they see the region as a market.' (Tulder and Ruigrok 1998, p.46). This points to the role of individual firms in shaping patterns of industrial networks. Industrial networks, which individual firms are part of, have a significant impact on the nature of success of the strategies that firms pursue. Equally, individual firms are able to shape the patterns of adjustment to a large number of firms with whom they are in cooperation or competition.

In 2.1., we pointed that the export patterns from the region are diverse. This mirrors the diversity of the models of operations of foreign firms in CEE, which are also diverse. As industry studies show, they range from operations where Eastern Europe functions as a low cost base to those where it operates largely as a complementary production base. In the upper range of business models we find establishment of new production models as in the case of VW/Skoda (Dorr and Kessel, 1997)(Brezinski and Fluchter, 1998), or integrated affiliates like in the case of GE/Tungram and ABB(Barham and Heimer, 1998). However, the most widespread seems to be the position where CEE enterprises operate as extended workbenches or localizers (Lankes and Venables, 1997).

The extent to which foreign firms operate in Eastern Europe as network organizers of their upstream or downstream chains is still unknown. More detailed case studies would be needed to draw firm conclusions. The impression from sparse studies is that foreign firms have not yet progressed far in reorganizing their supply chains (see Box 1). Some of the first tier suppliers have accompanied their assemblers, especially in car industry. However, whether subcontracting chains will deepen will largely also depend on the capability of host economies to work jointly with foreign companies. This issue has been recognized as of policy relevance only recently in some central European economies, in particular Hungary and Czech Republic.

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**Box 1: TESCO (UK): Building supply driven chain in central Europe?**

Retailing market in central Europe has been an early target of large foreign retailers. These multinationals have changed traditional shopping customs by introducing a western shopping culture through product variety and modern store formats. Of these, Tesco is the UK retailer with distinctive advantages that it carries from the UK retail market to the central European markets. It is the

Britain's biggest retailer in terms of market share (15.2%) and the world's biggest e-grocer with annual sales of £125m. Within its strategy of globalization Tesco quickly expanded into central Europe where it could see big market potential (see table).

	Number of Stores	Year of entry
Hungary	39	1994
Poland	34	1995
Czech R.	10	1996
Slovakia	8	1996
<i>Central Europe</i>	91	
Thailand	17	1997
Korea, R	2	1996
Taiwan	0	2001
Ireland	75	
UK	659	
Total	844	

As part of its strategy Tesco has started not only distribution but also purchase of its own-branded products from central Europe. It called on some of its existing own-label suppliers to set up in central Europe to supply their new hypermarkets. The aim is to establish a local network of suppliers in order to reduce the costs of sourcing products from the UK. One of its suppliers, HL Food, has opened premises in Poland and others suppliers have plans to follow that strategy. By being at the core position in the distribution chain in central Europe Tesco has opportunity to reorganise and improve supply chains, in particular relationships with agricultural producers. By closely monitoring suppliers it may help them to improve their technical, marketing and hygiene standards. Whether it will be successful in this strategy remains to be seen.

Source: Yoruk, D. E. and S. Radosevic (2001) *International Expansion and Buyer-Driven Commodity Chain: The Case of Tesco*, University College London – School of Slavonic and East European Studies, Working Paper.

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### ***Domestic enterprises and business groups***

A possible network organiser in Eastern Europe can be any organisation with network organisational capabilities and resources. Large domestic companies that dominate national sectors are the most likely to play such role. For example, the behaviour of 'Skoda' - Plzen, or the Polish corporation, 'Elektrim', basically shapes sectoral systems of innovation in power equipment and related industries in these countries. The impact of the behavior of 'Gazprom', the Russian gas producer, that is organized as a single joint-stock company and represents 10% of Russian GDP, reaches beyond the Russian gas sector into several related industries (Krykov and More, 1996).

Cases of Hungarian electronic holding company Videoton and Polish conglomerate Elektrim represent cases of strong and weak restructuring agents (see Box 2 and 3). In addition, both cases show that Eastern European enterprises can grow only if they learn to cooperate through alliances, subcontracting and equity relationships. A scope for generic expansion is much reduced when compared to opportunities for growth based on networking through alliances.

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**Box 2: Elektrim: from potential network organizer to focused company**

Elektrim is one of seven Polish ex-foreign trade organisations (FTOs) that in the transition period transformed themselves into conglomerates. Out of more than 40 FTOs in 1989, around a dozen have managed to survive and grow in the market context. During the 1990s the management of Elektrim tried to model itself along the lines of companies like Mitsubishi, Sumitomo and Mitsui, Japanese industrial groups led by trading companies (former zaibatsu). However, the business history of Elektrim suggests that it has not been able to operate as a network organiser or the core of a new industrial group where individual diversified firms would find significant advantages in exploiting intra-group externalities in cheaper finance, secure demand and supply, etc. In many respects the frenzy of acquisitions from the early-1990s suggest that Elektrim behaved like the CEE tycoons who put the opportunity to 'build empires' over the profitability of individual operations or over exploitation of synergies among intra-group firms. While this assessment may have been correct for the very early years of transition, Elektrim has started to develop a more coherent group profile in the late 1990s. Instead of building diversified business group in 1999 the company entered a new (third) stage, which can be described as consolidation, and focusing. Its new Chief Executive Officer set the focus for Elektrim on three core business: telecommunications, power generating equipment and cables, with strong expansion in telecommunications as a starting point. This included take-overs of local operators and acquisitions of shares in telecom companies. This new strategy suggests that the days of frenzied acquisitions are now over and that Elektrim, like other ex-FTOs, faces consolidation. As part of this shift it is currently trying to dispose of 80 of its non-core subsidiaries. However, with the focus towards telecom Elektrim's growth is highly dependent on how good it is at raising sufficient amounts of cash to invest in order to exploit newly acquired operating licences in mobile and fixed telephony. Analysts question Elektrim's ability to finance its long list of projects, mainly those in telecoms and the power industry. The difficulties that Elektrim has to overcome to grow further independently have been confirmed through its conflicts with Deutsche Telecom and alliance with Vivendi as well as in new partnerships which it has to enter into if it is to play any important role in the Internet area. Also, its growth in energy and cables is dependent on building similar partnerships in these areas as well.

Source: Radosevic, S. and Yoruk, D. E. (2001) The Issues of Enterprise Growth in Transition and Post-Transition Period: The Case of Polish 'Elektrim', University College London – School of Slavonic and East European Studies, Working Paper, mimeo

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**Box 3: Videoton: domestic network organizer in contract manufacturing**

Videoton is ex-socialist electronics conglomerate that has become an important, if not the most important, contract manufacturer in electronics in Eastern Europe. The main change introduced by new management was to abandon the manufacture of complex end product and to become subcontractor in several areas, especially in electronic assembly.

The important factor that played the role in the emergence and then growth of Videoton is that the company was not broken up before privatisation. Videoton continued to operate as a holding that enabled it to develop the strategy based on building diverse production activities and synergies among them. As a part of holding the exposure of individual companies to exogenous circumstances is controlled by parent company.

During the socialism Videoton had developed imitative capabilities in product design and product engineering which was sufficient for being a product leader within COMECON market. The retreat into contract manufacturing led to abandonment of R&D. Videoton lost most of its R&D workforce in the period around 1989. From old products Videoton continued to produce loudspeaker systems, colour TVs and defence communication systems. Most of these products Videoton is selling under other companies name.

In 1993, the 26 Videoton companies have been reorganised into 18 profit centres, concentrating on four major areas of business: consumer electronics; subcontracting; defence manufacturing, and domestic and international sales and services. The Holding Company manages the profit centres until they become viable entities, then spins them off into independent companies. The long-term goal is for the holding company to act only as a financial controlling group, with independent companies responsible for their own management. The holding group will continue to co-ordinate the activities of companies in the conglomerate to seek out new markets and consolidate manufacturing processes.

Industrial parks are integral part of Videoton's strategy. Three of ten Videoton's locations in Hungary have status of industrial parks awarded by the state. Their successful integration into Videoton's strategy is based on synergies among Videoton units as well as between them and foreign operations.

Videoton case shows that subcontracting is a very good way to get access to market, technology and finance. Its strategic challenge is how to get out of subcontracting trap that creates dependence and low value added. So far, Videoton has been very successful in building strategy for a long-term future.

Source: Radosevic, S. and Yoruk, D. E. (2001b) *Videoton: The Growth Of Enterprise Through Entrepreneurship And Network Alignment*, University College London – School of Slavonic and East European Studies, Working Paper, mimeo

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### **Other organizers**

State agencies can in some circumstances operate as successful restructuring agents (see Box 4). Also, in several instances in Russia R&D institutes could operate as restructuring nodes of sectoral network. For example, Alange et al (1995) show in the case of the machine tools cluster in St. Petersburg, that design institute could acts as a system integrator, by fulfilling the engineering function which is still undeveloped in enterprises, compensates for the poor capabilities of the engineering function of enterprises, and function as a bridge between academia and industry. Also, Vorobjev (1995), in the case of the Russian aviation industry, argues that this network is led by a few leading design institutes.

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### **Box 4: ARIA (Moldova): State agency as a restructuring agent**

Simply applying tight bankruptcy procedure without opportunity to initiate restructuring has introduced in many Eastern European economies a bias against liquidation and delay. This has been recognized some time ago by analysts but has not been addressed as a policy issue (see van Wijnbergeben, 1993). The ARIA model of restructuring has succeeded in overcoming this problem by bringing together bankruptcy and liquidation (destruction) and entrepreneurship (creation), rather than handling them as two disconnected social processes. ARIA, the Moldovan Agency for Restructuring and Enterprise Assistance was created in 1995 as a nonprofit NGO funded by donors and the government. It was to serve alongside bankruptcy processes as a mechanism to use enterprise arrears as leverage to force out-of-court or in-court restructuring or liquidation. ARIA was also

intended to support managers and entrepreneurs through consulting services, technical assistance, and training; to assist enterprises with debt resolution and facilitate changes in ownership and management; and to help build new enterprises.

Today ARIA provides two main types of enterprise support. Enterprise restructuring services are financed under the first World Bank private sector development project (with donor cofinancing). And a range of supplemental business promotion, consulting, and training services are financed by other donors and the second World Bank private sector development project (see figure below). About 25 percent of ARIA's expenditures are recovered from the enterprises it assists, mostly for its supplemental services.

A key element in ARIA's approach is the industrial park strategy: breaking up old enterprises to rehabilitate industrial potential, recombine assets to improve their productivity in new enterprises, and match human resources and assets. ARIA mobilizes local resources and attracts small private investors when there is no possibility of attracting a strategic investor. New enterprises and jobs are created without any investment by the state. Historic debts of former loss-makers are repaid or rescheduled in the course of industrial park development. Firms assisted by ARIA outperformed all other firms in productivity, sales growth, exports, and tax payments (and by implication, financial discipline). In addition, ARIA-assisted firms were better able to find new markets, change suppliers and customers, attract foreign investment, and initiate changes in management. The data generally confirm the benefits of ARIA's assistance to Moldovan enterprises:

- ARIA assistance is associated with a 30 percent increase in the rate of productivity growth.
- ARIA firms' sales per employee rose 16 percent during 1995–99, while those of non-ARIA firms fell by 13 percent, measured in real terms.
- Exports per employee fell 78 percent for non-ARIA firms but 30 percent for ARIA firms.
- Restructured ARIA enterprises pay more taxes than other enterprises and have attracted about \$40 million in new foreign investment commitments.<sup>21</sup>

ARIA has developed a unique and socially accepted approach to the economic and political challenge of restructuring Soviet-style enterprises. ARIA works with existing capital and human resources to “bootstrap” and restructure enterprises and create new businesses, thus reducing the overall loss of employment that usually accompanies restructuring. Although ARIA does not have formal authority to co-opt or replace management to enable restructuring, its reputational authority often—but not always—makes this feasible. The reputational authority derives from ARIA's successful track record and its unique position as a nongovernmental agency with a strong and committed leadership and dedicated and skilled staff. ARIA has succeeded by deploying an effective institutional model and an innovative and carefully executed approach to strategic industrial restructuring. ARIA also demonstrates that publicly supported intervention at the enterprise level can be successful and may even be necessary in some circumstances to break a downward spiral of enterprise and economic decline.

**Source:** World Bank, 20001, *Liquidating Moldova's Old Enterprises and Creating New Ones*, Private and Financial Sectors Development sector Unit, January 26, Washington, mimeo

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<sup>21</sup> All dollar amounts are in U.S. dollars unless otherwise indicated.

### **Local networks**

A long-term growth of CEE economies will largely depend on whether the regions in these economies will become loci of innovation activities. For the time being there are only isolated cases of regional dynamics and relative success, most of which are confined to localities rather than the whole region.

The last 10 years have seen localized activities to foster regional innovation. Innovation centers, S&T parks, free economic zones, incubators, regional development agencies, and support to SMEs have been established in all Eastern European countries in at least a few places. Most of these institutions have been set up with international assistance. However, these initiatives suffer several weaknesses like short-term funding, their supply-push nature, and an emphasis on organizations rather than functions and programs. Policy has not yet been able to include into the regional innovation process other potential network organizers like foreign firms, large domestic firms in cooperation with small firms or networks of small firms.

The Eastern Europe entered the post-socialist period with very weak layer of regional institutions and competencies for independent decision making at regional level. These involved the formation of Regional Development Agencies as the mechanism to bring into partnership the range of other local and external agents. The development agency acts as a 'broker' or catalyst for a wider network of relations between local agents and government at central and at local level. While being important agents of change in the long term, the weaknesses of the enterprises and other organizations in the region undermine the role and potential of agencies for inter-regional networking.

The establishment of institutions for regional innovation support requires long-term funding and commitment. The 1-3 year time span of project cycles within which most of these initiatives in Eastern Europe are funded cannot ensure long-term viability of supported organizations. Once they are left on their own they are too weak to survive or to retain their initial strategic objectives. When faced with a cut in subsidies and with weak local demand they are forced to abandon their original networking functions. Organisations, which are basically supply driven, need much longer policy commitment to develop and embody themselves within the local economy.

These types of institutional transfer most often do not represent the response of the locality to their problems. They are no more than a transfer of institutions which does not resolve the main constraint – a lack of collective action, which is implicit in institutions like innovation centres. In bringing new institutions into an environment with scarce resources and organisations with their own vested interests and agendas it is not surprising that the innovation centres or S&T parks do not operate as sources of growth and network organizers in the regional context. Whether new organisations are successful or not in the end does depend so much on their own efforts as on whether local networks are *status quo* or pro change.

The emphasis is on the new institutions rather than on functions. This is partly due to the logic of international technical assistance where sponsors prefer to be in full control during the project by establishing 'greenfield' institutions rather than to deal with the messy and

complicated world of existing institutions. Networking or bridging functions are supported through new stand-alone organisations, like innovation centers, rather than as a part of the existing enterprises, universities, RTD organisations, and industrial associations (see Box 5). What is needed is support for the bridging or networking functions not as a stand-alone function but more as a complementary function of RTD institutions or enterprises..

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**Box 5: Russia: Attempts to nurture innovation at a local level**

In the early 1990s, the regional component of Russian S&T and innovation policy has started to develop by giving support to the establishment of technoparks. In 1998, there were 42 technoparks and 11 innovation-technology centres in Russian regions. In 1993, for the first time, the federal government started to co-fund regionally oriented programs (0.3% of federal R&D budget). Partly because of the government resolution No. 360/1995, regions have been encouraged to form their own institutions in the area of regional S&T and innovation policy. In 1997, in the subjects of the Russian Federation, there were 15 Scientific-Coordination Councils, and 10 Scientific and Scientific-Coordinative Centres.

These policy initiatives have been accompanied by introduction of diverse mechanisms of support, including innovation centers. In continuation, we briefly explain the reasons for failure of such initiatives. The analysis of demand for innovation services in Russia shows that: (1) the innovation services segment of the market is very limited and the market is mainly confined on business services, (2) there are signs of a gradual shift from services induced primarily by problems in the business environment (accounting and tax services) towards market and investment related services. On the other hand, innovation centres in Russia are expected to operate as poles of regional growth by assisting the growth of small firms, and, when set up on premises of large enterprises, as sources of their restructuring. TACIS-supported innovation centres show the first steps that have been taken in this direction, as well as the variety of problems, which hinder this realization.

First, founders of innovation centres usually overload innovation centers with conflicting objectives. The first is to support technology based regional firms by assisting them as public agencies for the support of regional innovation activities. The second is to be self-financed in short- or medium-term and to act as any other commercial organisations which has to satisfy only the current real demand. The duality of this position for all involved is obvious. For local administration, this requires it to be a guardian, promoter and co-funder but not to interfere into daily activities of innovation center. For employees of innovation centres, this means building an autonomous commercial organisation that has to survive on shallow and cash- stripped markets, and thus has to go wherever the demand is. However, it has as at the same time to fulfil its public role, as assigned by the founders. It is not surprise that in the cases where the understanding of the objectives was shared by all, the work of the innovation centre is more successful.

Second, if we take into account the current structure of demand for consultancy services in Russia, it is clear that the great bulk of demand is for general business consultancy activities. It is difficult to build an innovation centre focused on support of new technology based firms that also has to survive in the market for 'first aid' consultancy services.

The rationale for supporting innovation centres is the role that they can play in promoting innovation in the region. For the time being they are contributing to this aim like any other consultancy company; by offering a set of specified services of use to small firms. The demand for their services is largely dependent on the existence of favourable public sources of finance for small firms where innovation centres are assisting them in the application process. They are not the only intermediaries in this business.

The public functions of innovation centres may be significantly strengthened if they are made to be able to tap into both the current demand and the latent potential for consulting services. The support for these activities should be either based on a specified program of activities or as subsidised services.

**Source:** Radosevic and Dranev (1999).

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#### **4. STATE AND POLICY OPTIONS FOR SUPPORTING INDUSTRIAL UPGRADING**

The role of the state and state policy capability has been very much-neglected dimension of post-socialist transformation throughout the most of the 1990s. This may be understandable given the overall political drive towards minimalist state and disastrous experience with the Communist State. It is only recently that it has become clear that much of differences among East European countries, including the effectiveness of transition policies, have to do with the quality of State governance (EBRD, 1999).

An important lesson from the last 10 years is that even when State tried to dissociate itself from interference into processes like privatization and restructuring it was unable to do so. In Czech Republic, where State tried to insulate itself from privatization it eventually had to aid the resolution of existing intra-network conflicts over asset control and restructuring strategies. As Hayri and McDermot (1999) point out: that 'efforts by the Czech government to maintain autonomy via state-imposed restructuring and pure ownership solutions only encouraged stalemate' (p. 154). Government had to accept the role of mediator and partner to the banks and networks of producers. In Hungary, an increase of the formal independence and differentiation of enterprises from state agencies has often been counterbalanced by continued informal interdependence with state bodies and banks (Whitely and Czaban, 1998). EBRD (1999) survey on state governance concludes that 'The state no longer uses plans and commands to direct firms, but the links between the state and firms remain close' (...) the process of 'depoliticising' enterprises remain very incomplete in all transition economies. The reform process has been associated with a change in the form of state intervention, but not necessarily with a reduction in the overall level of intervention or in the informal tax imposed on firms in the form of bribes and times spend dealing with government officials.(p. 128,129)

In this section, we analyze how various policies of Eastern European states have affected modernization of their industrial systems. We review the effects of transition policies on knowledge based activities, and then evaluate current activities within industrial, S&T and innovation policies. However, before that we discuss what are the major factors that determine the context within which different policies are evaluated.



### ***Central and East European states, globalisation and industrial upgrading***

Eastern Europe has become increasingly integrated into the world economy at a time when the scope for domestic policies has been drastically reduced (Rodrik, 2000). Unlike east Asian economies from the 1960s to 1980s, which had to abide by few international constraints and pay few of the costs of integration into world economy, Eastern European economies have to pay high costs in terms of institutional adjustment, trade and finance openness. In addition, this transformation takes place at a time when they have accumulated huge restructuring problems, which would require much larger scope for domestic policy than it is possible today. They are squeezed between macroeconomic and political requirements for lean governments and the need for greater provision of social insurance, which comes from their increased trade integration. As the benefits of openness are uncertain and the costs of institutional adjustment to WTO and EU regimes are high Eastern European economies are seeking ways to reduce costs of exposure and risk involved through EU integration. It than comes as not surprise that the majority of Eastern European economies see the only solution in the acceleration of accession to the EU. Consequently, very often, accession requirements operate as a substitute for any industrial or other strategy. As State leverage now tends to be towards framework conditions, they have lost much of their leverage over MNCs. How to ensure favorable framework conditions but at the same time develop a new networking role in aligning different networks is a challenge for Eastern European governments. They have to learn how to align demand side (global) networks with supply side (national and regional) networks in globalised environment. In a way, they, as most of the other economies, have to find out how to pursue a controlled globalisation of their economies. To what degree can they effectively benefit from the proliferation of network linkages with foreign companies and manage this process<sup>22</sup>?

As Evans (1995) point out the new internationalisation places new demands on the state yet leaves it less politically able to pursue transformative ends. In particular, in Eastern Europe where restructuring needs are vast the problem of state involvement in supporting industrial upgrading but in cooperation with foreign capital remains a big challenge. It is very likely that the outcomes will be influenced by the quality of state governance, which differ significantly across CEE.

The state governance has affected the modernization of the CEE industrial systems (EBRD, 1999). The analysis shows that the type of policy *per se* was secondary if not considered in relation to the quality of State governance. Good governance brought less State capture. In addition, similar transition policies have different effects which depended on the quality of State governance (EBRD, 1999). The CEE situation has basically confirmed Evans (1993) proposition that 'the obstacles to an effective role for the state are not so much rooted in the propensity of the state to intervene as in the difficulty of constructing strategies of involvement commensurate with limited capacity to intervene'. While mainstream economists on transition have been emphasizing the dangers of government failures the real issues is how to design policies in conditions of simultaneous government failure and market failure. It seems that the only feasible policies in many CEE countries are those with the low costs that take into account bad State governance or weak policy capability. Yet, State governance does not operate in isolation from 'non-market

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<sup>22</sup> For discussion of these issues in the case of Hungary see Bailey (1995).

mechanisms of market articulation' (associations, forums, information sharing mechanisms, government organized contests) This 'civil business society' sphere is still undeveloped in Eastern Europe. Its development would shift a significant part of the burden of policy formulation, coordination and implementation from the State (see Radosevic, 1995, 1997).

In conclusion, Eastern European states are faced with the challenge of how to support industrial upgrading which today can be undertaken only in cooperation with foreign companies and in a liberalised economic environment. This is a challenge, which they share with other economies but what distinguish them is the sheer task of it. Last 10 years have shown that the policy outcomes and assessment of policy actions in Eastern Europe cannot be undertaken without taking into account the quality of State governance and how developed are mechanisms for articulation of interests of business and consumers.

### **Transition policies and industrial upgrading<sup>23</sup>**

It is hardly surprising that the dominant policies in the Eastern Europe so far have been transition policies. By this, we mean policies dealing with privatisation, price and foreign trade liberalisation, reforms of the banking and legal systems, and enterprise restructuring. Their aim has been to achieve institutional convergence towards the system of the market economy. It is beyond doubt that policies such as price and foreign trade liberalisation are essential to the transformation process. They ensure freedom of action for enterprises, and the freedom to pursue profitable opportunities, and thus may be considered necessary conditions for innovation and for building a knowledge-based economy. But clearly they do not suffice. For example, price and foreign trade liberalisation are *necessary* rather than *sufficient* conditions for restructuring.

Transition policies are geared to macroeconomic stabilisation and institutional convergence towards the market economy rather than towards growth and structural change. In the present context, we must, then, start from a position of scepticism as to how conducive transition policies have been to structural change towards innovation and a knowledge-based economy. Specifically, the rationale that forms the basis of transition policies and the rationale for policies to support learning are not the same. While the former are based on the market failure rationale, policies for learning have to be more broadly based, because of the specific features of knowledge as a 'commodity' with strong public good and network elements, in the context of pervasive strategic uncertainties in CEE. The medium- and long-term growth of the CEE countries will depend on their structural shift towards a knowledge-based economy and the embodiment of innovation in all industrial sectors. More specifically, this shift will depend on:

- *The diversity of enterprise types.* Socialism was characterised by a lack of enterprise types, not only in terms of ownership but also in terms of size, technological functions, and knowledge base. A liberalised economy provides the opportunity to create a variety of enterprise types, which is beneficial in terms of structural change and innovation.
- *The intensity of knowledge exchange and diffusion among enterprises.* Enterprises seldom operate as isolated units relying only on their own knowledge and innovation activities. Even when they do not have links in the innovation process, they exchange production know-how through informal networks either in a local context or with foreign partners.

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<sup>23</sup> A part of this section draws on Dyker and Radosevic (2000).

- *The role of public institutions in fostering intra-organisational and inter-firm learning.* Enterprises rely on a wide variety of infrastructural institutions and public networks that reduce strategic uncertainties through R&D programmes and academy-industry consortia, or reduce costs of specific activities like export promotion or innovation.

The experience of CEE suggests very weak synergy between transition policies in the narrow, macro-economic sense and the required shift towards an economy based on innovation and knowledge. Of all the main transition policies, privatisation has the biggest direct implications for the innovation and knowledge base of the countries concerned. The effects of privatisation programmes are manifold, and restructuring and enterprise growth do not always top the list. The basic criterion for assessing privatisation policies from an innovation and knowledge perspective is the extent to which they allow for the diversity of enterprise forms, sizes, and strategies, all of which is essential for knowledge diffusion and generation. Privatisation also strongly influences the pattern of development of inter-firm networks and the way in which public policy mediates the process of economic development. Privatisation is an indispensable condition for restructuring, but it does not restructure by itself. If pursued as the main objective through rapid, mass sell-offs, it may even inhibit restructuring (cf. the experience of the Czech Republic and Russia). In particular, the privatisation of banks is not sufficient to ensure that capital will be directed towards exports and industry, rather than towards real estate, securities, and imports. Improved corporate governance at the firm level and the break-up of large enterprises are seen as the ultimate objectives of enterprise restructuring. However, breaking up large enterprises does not necessarily lead to positive outcomes at branch level.

The East German experience shows that a policy of breaking up large enterprises can have a serious negative effect on demand for R&D. However, the core of the argument here is not about large enterprises as such, but rather about the lack of diversity of enterprise forms, that privatization may generate. A shortage of dynamic small firms is just as serious an obstacle to innovation dynamics and knowledge diffusion as a shortage of big firms, as is palpably obvious from the case of Russia. Furthermore, the number of small firms in a given economy is in itself no guarantee that diversity of role and strategy will develop among small firms. Too many small firms with low levels of technological competency, operating within the framework of a semi-formal economy, indicate a *dual* economy rather than a *diverse* one. The same point can be made in relation to corporate governance. Where rapid privatisation has resulted largely in *nomenklatura* privatisation, most notably in Russia, the 'new' owners tend to be generally uninterested in innovation; more insidiously, they tend as a group to operate in terms of the rules of thumb and mores of the old Soviet-type economy. There can be little doubt that this is one of the main elements in the structural crisis that hit the Russian economy in mid-1998 (see Dyker, 2000).

In the light of these problems, there is a clear need for better integration of structural and transition policies, to induce economic growth and to initiate structural change. However, this is easier said than done, as the (in) compatibility of objectives and instruments between the two is strong. For example, emphasis on good corporate governance clashes with the objective to ensure presence of large firms as the major generators of demand for R&D. A need to maintain macroeconomic balances clashes with the need to reduce real interest rates to a level which would ensure long-term investment. A need to ensure temporary monopoly rents to domestic producers' clashes with the need to ensure fair competition and trade openness. Equally, policy of market reserve for foreign telecom

operators clashes with the competition policy. Obviously, the issue is how to ensure a policy mix, which would balance disparate long- and short-term, transition and growth objectives.

Unfortunately, we cannot be much specific about the appropriate policy mixes for CEE economies. There is very little that can be said without going into specificity of an individual country. The policy mix will greatly depend on how far is country in transformation process. The further the economy is in systemic reform its problems are more likely to be problems of 'real' economy, i.e. the issues of structural change in industry and technology. In this case, policy mix will have to take into account the issues of structural adjustment towards knowledge based economy and how to cooperate with foreign companies towards industrial upgrading. Problems of economies, which are still in the transition stage, like Russia, Ukraine, Romania, etc., is mainly how to ensure level playing field and remove sector specific market distortions. A study by McKinsey (1999) on Russian industry provides quite extensive and revealing evidence on this. The conclusion of the study is that the main barriers to economic growth in Russia are unequal conditions of competition that tends to be industry-specific and thus have to be removed on a sector by sector basis. These are unequal levels of taxation, non-equal allocation of government procurement and land, non-equal level of energy payments, unequal enforcement of custom tariffs, and threat of red tape. Contrary to conventional thinking corporate governance, high costs of capital, budget deficit, drops in demand, or labor mobility are shown to be secondary factor for the low productivity in Russian industry. The sector level market distortions result primarily from bad federal or regional state governance. The sector specific distortions lead to continued, large governmental financial transfers to the enterprises, especially the larger ones which is the major reason for the unevenness and slower pace of adjustment by Russian enterprises (Fan and Schaffer, 1994).

In economies that have better state governance and less sector specific market distortions, the policy mix should be much more geared towards industrial and innovation policy. These policies explicitly address the issues of industrial upgrading.

### ***Shifting the focus to industrial and technology (innovation) policy: new opportunities and problems***

The CEE countries have only recently started to develop restructuring policies for different industrial sectors, primarily the 'old' industries, like coal or steel in Poland. Massive financing is needed for sectoral restructuring; lacking political will to come to grips with the large social and regional unemployment problems of troubled sectors, together with limited administrative capacities of governments, led to the postponement of industrial policy measures for troubled industries. This may be understandable given difficult choices that governments have to tackle. Should restructuring of troubled sectors be postponed until growth becomes stronger and room be given to winning sectors? Even where there is a will for restructuring is there a state capacity to undertake it? The quality of financial intermediation is critical to the success of restructuring projects. Yet, domestic financial systems are 'shallow' or unable to take their role in this process.

Recorded economic growth so far has come from new, small enterprises (Poland, Slovenia) or those sectors where foreign enterprises were willing to act as restructuring agents (Hungary, Czech Republic). These sectors did not grow due to government industrial policy but because of business opportunities exploited by foreign investors and domestic entrepreneurs. Instead of siphoning huge funds into few troubled cases, would it not be better to support new small firms through pro-active innovation policy rather than focus on

socially oriented industrial policies? Being for quite some time caught into the framework of transition policies governments only recently came to realize that restructuring at the firm level will not take place automatically in response to macroeconomic policy changes or rapid shifts in global conditions (Lieberman, 1991). They are searching for a new role, which would go beyond normative reductionism of transition policies but would avoid large government failures and take into account the quality of state governance<sup>24</sup>.

Within the common trend of withdrawal of state from their role in industry restructuring, we find a variety of responses, which can be explained only by taking into account the specific national context. For illustration, we show a variety of responses in relation to industrial R&D in CEE.

The diversity of different national responses in industry R&D in CEE can be classified by distinguishing between two components:

- (i) Whether countries have pursued *sudden* or *gradual* changes in the rules of public funding of S&T. For example, in the Czech Republic, the government rejected any active policy in restructuring R&D institutes and abruptly withdrew financial support to the majority of industrial institutes. Since 1991, industrial companies in the Czech Republic have had to finance their R&D activities themselves. Industrial institutes suddenly lost a relatively secure income and had to find means for survival. Also, in privatisation R&D institutes were treated as 'normal' production enterprises. This 'shock therapy' led a to massive conversion of their activities to services and production.
- (ii) Whether countries have pursued *active* organisational restructuring in the R&D system or whether they have left the organisational structures intact. In its strongest form, active restructuring was pursued in eastern Germany where individual institutes were evaluated and than either closed, split, reorganised, or merged. In the case of passive adjustment the organisational structures remain intact. Gradual changes are only in terms of financing through gradual introduction of competition principles.

Using these two criteria, the degree of shock or gradualism in public funding and the existence, or lack of an active micro restructuring policy, we can distinguish four different national situations (see more about this in Dyker and Radosevic, 2000)<sup>25</sup>.

Figure 1: Different national patterns of R&D restructuring

'Radical active restructuring' (I) Example: eastern Germany	'Gradual active restructuring' (II) Example: Poland
'Radical passive adjustment' (III) Example: Czech Republic	'Gradual passive adjustment' (IV) Examples: Russia, Bulgaria, Romania

<sup>24</sup> We illustrated earlier that even when governments tried to operate as 'watchman' that has produced stalemate.

<sup>25</sup> Hungary and Slovakia do not fall clearly in this matrix as they have followed inconsistent policies which may be described as 'Combined radical and gradual passive adjustments' (see Dyker and Radosevic, 2000).

In this matrix Russian S&T policy falls in the box 'Gradual passive adjustment'. Institutional (basic) funding on civil R&D in Russia is still dominant. More than half of basic funding is targeted to R&D institutions in the industrial sector, meaning that as before, budget funds continue to be a substitute for applied R&D financing by enterprises (Gokhberg and Sokolov, 1998). If this was part of active restructuring than it would not be a problem. However, there is no sign that this policy is leading to integration of R&D into industrial enterprises.

Officially, the Ministry of Science and Technological Policy officially has abandoned the policy of 'science salvation' and has initiated prioritisation in funding and differentiation among institutes. For example, it has granted sixty institutes the status of 'State Scientific Centre'. However, this is still a gradual change which has only prevented full erosion of these institutions (see Gaponenko, 1995).

How do we evaluate different national options in restructuring of S&T? Are some better than others? The answer is that there is not better or worse policy pattern in isolation. Policy options can become a problem when they are inconsistent, i.e. when objectives cannot be supported by funding or other mechanisms. Whether a policy should be in the direction of active or passive restructuring, or gradual or radical reduction in public funding, depends on the capability of policy to achieve its objectives without generating too much cost for the S&T system and economy.

Gradualist policy in conditions of limited budgets could be very costly in terms of erosion of R&D system and prevention of active restructuring. If budgets and a management capability are available to undertake organisational restructuring in an S&T system, as was the case in eastern Germany, than radical solutions are the 'cheapest'. When the decline in financing is so marked that an orderly restructuring of R&D institutions is impossible, than gradual passive adjustment may be the only option for some time. This was indeed the case in Russia in the early years of transition. However, we think that the future persistence in this policy has become counterproductive by actually speeding up the erosion of S&T system. After 10 years of gradual changes in the principles of funding but without any undertaking of an active organisational and functional restructuring, Russian S&T policy should finally develop the component of active of restructuring. The continuation of current gradual, passive adjustment causes good research groups and teams to be squeezed out by those who do not have the chance to prosper in a long-term.

However, as with any strategic change, its complexity is in its *implementation, costs and resistance to change* rather than in its design. The difficulty of active restructuring in Russia is in the need to ensure that the restructuring is decentralised and bottom-up driven and yet, that it is co-ordinated at the same time.

So far, CEECs have been trying to restrict themselves from any explicit and clear role in restructuring and industrial upgrading. A withdrawal from any explicit role in industry restructuring and in industry upgrading is a common characteristic of the most of the CEECs, including Russia. For example, Russian government still retains a controlling stake of shares in 30% of all industrial firms, with total output accounting for 20-25% of GD as well as the controlling power of a majority shareholder through the so called golden share in

large firms and key industries (Kuznetsova and Kuznetsov, 1999). . Yet, in practice, representation of state interests is left to the discretion of individual administrators and the system operates without any performance targets as far as the state property is concerned. This withdrawal of the state to impose any performance requirements hinders restructuring of enterprises (ibid.).

The result of withdrawal of the state in industry upgrading in CEE is its unsystematic, implicit and ad hoc involvement through other policies in particular privatization and FDI policy. Central European states are now in the process of building alternative policies like innovation policy. Poland and Slovenia have been early precursors in that respect. There are signs that in other countries, innovation issues are beginning to be given a higher place in policy agenda. Hungary has developed a range of programs to support technological development in the last few years. In addition, Czech government reoriented its priorities since 1998 towards emphasis on industrial R&D, FDI and competitiveness<sup>26</sup>. However, the current situation can be characterized as the one of exploration and search for a new role of government, which would go beyond the 'watchman'.

### ***In search of policy rationale***

After 10 years of pursuing the transition policy agenda, CEECs are now searching for alternative policy solutions that will also address the problem of their technological competitiveness. Given the current role of the state in these countries, it is unlikely that we will see the implementation of highly selective structural (industrial and technological) policies aimed at a strengthening of inter-firm and inter-sectoral technological linkages. The CEECs are in the process of developing public policies, which are 'market friendly' and correspond to the capacity of individual states to implement them in co-operation with enterprises, public, and private organisations. This process is not a rational search but highly politicised process, in which ad hoc interventions dominate in most countries. Policy options range from sector-specific or vertical policies (industrial policies) to horizontal policies (technology policy). Should CEE pursue industrial policies that have immediate effects but are also much more demanding in terms of administrative requirements and finance? In view of the negative experiences of CEE with state-run policies, there is a natural resistance to promote policies with the imminent danger for government failure, whereby policy is easily turned into lobbying. An alternative would be to pursue technology (horizontal) policies that do not address specific sectors but target deficient capabilities, like R&D, engineering, production quality, or deficiencies in technical infrastructure (IT, testing and measurement facilities, etc). The drawback of these policies is that they work slowly and with unclear sectoral effects. When setting aside limited public funding, governments are seeking tangible and much quicker results. To illustrate these policy dilemmas, we will use examples from sectoral studies.

### ***The pros and cons of industrial policy***

Technology policy is only one element in the market-finance-technology triangle. Industrial restructuring is an activity that tries to assist in recombining the relationship between these

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<sup>26</sup> ADE, MERIT and SSEES, (2001) 'Innovation Policy in Six Applicant Countries: the Challenges' Second Interim Report to the EU, DG Enterprise, January.

three elements. In different cases problems arise in different elements of the triangle. In some cases, finance will automatically solve the problem of technology, which is easily available. For example, the major policy issue in Polish shipbuilding is not S&T but industrial policy. Once the issues of large orders and finance were resolved, technology was not the key constraint. In the government-led restructuring of the former East German shipyards, the crucial bottleneck was not in the area of technology but in the huge amounts of finance needed for technical modernisation. In telecommunications in CEE, sectoral S&T policy turned out to be secondary to industrial policy, which is actually implemented via privatisation policy. Solving the issue of control by privatising the national telephone company, the Hungarian government simultaneously resolved the problem of technical modernisation. In Russia's in telecom sector, it is privatisation and financing policies, in addition to a liberal regulatory environment, that seem to be more important than S&T policy.

We pointed to problems of industrial policy that are primarily problems of government failure. A case in point would be government support for sectoral restructuring used to balance the cash flow. However, an equally serious problem may be the irrelevance of industrial policy due to the inter-sectoral nature of new technologies. CEE industrial transformation is full of examples of enterprises that have had to change from one industry to another when faced with the danger of closure. A Hungarian enterprise that became part of Hungary Ericsson initially evolved in the PC sector and is now assembling switching equipment and support for its software, while the Hungarian telephone company, which came from the transmission side, was now having to learn about the manufacturing of switching equipment. Examples like this illustrate that what matters is the knowledge base of enterprises and the irrelevance of industry as a policy category. This is not only true in sectors whose boundaries are changing, like software and telecoms, but also in sectors that are increasingly becoming "bundles of technologies," like the shipbuilding, food processing, or car sectors.

### ***The pros and cons of technology (innovation) policy***

Targeting industry-specific constraints may not solve technological constraints, as technologies largely are also generic. Many of the constraints in the diffusion of information technologies in CEE are generic or applicable to a large number of sectors. Inventory control of optimisation of business processes, quality control systems, problems of measuring and testing infrastructure, or the technical level of small firms, are generic, not industry-specific, problems. The networks of innovation centres are one of the solutions for problems of SMEs. Also, innovation (technology) policy is less prone to government failure as its constituency is more dispersed and unable to capture the policy process.

However, we already pointed out that these horizontal types of policies have long-term effects. They are pro-active but may not be a priority for CEE governments, which usually have to react ex-post to a variety of emergency problems. It may not surprise that many technology policy initiatives, like S&T parks, innovation centres, etc, in CEE have been supported by foreign funds and through technical assistance. Pressed with immediate sectorally specific problems, governments prefer to see the immediate effects of their actions rather than build a support system whose final users and benefits cannot be immediately identified.



### ***The pros and cons of sector-specific (technology) innovation policies***

Implementing sector-specific innovation policies could solve the problem of technology policy target groups and their long-term effects. For example, the sectoral study on car industry produced within this project clearly suggests that innovation policies should concentrate on how to help SMEs working in this sector access and absorb the technology needed to be able to respond to demand from car assemblers. Market forces by themselves will not be adequate to develop this sector; specific policies will be necessary to support its growth. Thus the issue is one of developing specific policies and enlarging and deepening the cluster of subcontractors. We believe that a large number of such cases should be addressed through sector-specific innovation policy. These policies can target groups of companies and identify their key competence gaps, which can then be addressed - in co-operation with industrial associations or foreign investors.

However, objections to this type of policy are similar to objection vis-à-vis industrial policy. Industries are increasingly incorporating a mix of core technologies. For example, four major technological streams influence food processing at present: mechanical equipment in the production process; food chemistry in production technology; biotechnology in product innovations; and technologies in raw materials and packaging. How would or could industry-specific innovation policies work in this case?

In conclusion, when we delve into the specificity of industry dynamics in CEE and try to go beyond economists' generalisations and abstractions for and against government intervention, we find that there is no conclusive answer regarding appropriate policy. The problem is not the type of policy *per se* but the capability of government to implement it in cooperation with industry. In other words, the empirical evidence produced within this project shows a variety of possible policy approaches, none of which should be dismissed as *a priori* more appropriate than another. Their (in)appropriateness is possible only within the specific industry and country context and includes an assessment of the role of the state and business-government interactions.

One could imagine a situation where all three approaches are possible in one country depending on sector- and country-specific constraints and opportunities. From a normative point of view, any option seems viable as long as it is effective and leads to industrial upgrading.

### **How to support industrial upgrading in globalised economy?**

We already pointed to the difficulties of building new role of the state in a globalised economy where state has to learn to cooperate with MNCs in order to improve the competitiveness of its industry. Most CEE economies have fully liberalized FDI inflows and guaranteed the free repatriation of both profits and FDI capital. EBRD (1998, p. 89) shows that capital flows have been liberalized gradually, with the most liberalized flows being in countries that are at an advanced stage of transition. Through privatization states also tried to maximize benefits of their open door, policy by negotiating better terms with individual foreign strategic investors. However, these have been unsystematic attempts to trade ownership of domestic 'blue-chip' companies for long-term benefits in technology and

employment. CEE governments have not yet learned to deal with foreign investors in a more systematic way and integrate them into domestic industry strategy. A current policy is to welcome whoever comes and to offer as much as possible a generous set of incentives. An experience of east Asian economies and recent experience of 'Celtic tiger' Ireland shows that this may not suffice. Similar to east Asia the experience of Ireland (see O'Connor, 20001 for a review) shows that the selectivity in FDI policy and enhancing complementarities with indigenous industry are essential in order to exploit benefits of globalised environment. A need for strategic FDI policy has come clearly from the previous experiences. The complexity of factors needed for 'growth miracles' is far too complex to be emulated in any other country. However, some ingredients from successful cases will have to be learned and implemented. In a new globalised environment selective targeting of individual foreign investors and joint work with them towards industrial upgrading is one of them. An emerging new agenda for CEE governments is to foster a match between developments in the domestic research and training infrastructure and the specialization profile of foreign investors.

#### 4. CONCLUSIONS AND SUMMARY

1. There is an increasing differentiation among CEECs in growth and institutional change: catching-up and falling behind: structural improvements but also structural deterioration. The cases of fast growth and also of further falling behind correspond to structural improvements and to structural deterioration. The question what explains the increasing differentiation among east European economies in terms of growth and institutional change is not resolved among economists. Our explanation has highlighted the importance of structural factors in explaining these differences, and in particular factors that determine technology accumulation and learning processes.
2. If judged solely by initial endowments, the CEECs have the opportunity to grow faster than the world leaders. Based on their GDP, R&D and investment levels they belong to 'catching-up' economies (Verspagen, 1999). The science and technology base of the CEE countries was relatively large during the socialist period. The educational level of the population and the skills of labour force are also relatively developed. These initial endowments indicate a growth potential but they are far from sufficient for high growth. A social capability to make use of factor endowments and to align domestic with the interests of a foreign capital is decisive for catching-up. The lack of social capability is most striking in the case of Russia where the gap between export and human capital structures is striking.
3. We traced the current problems in industry and technological upgrading in CEE to differences in the socialist period, in particular to factors at the micro-level. The three main micro-aspects of transformation of national industrial systems in CEE are: the way enterprises develop their business functions; the way business functions between enterprises and related infrastructure are redistributed; the ways in which insertion into world markets and production networks of Eastern European enterprises and sectors takes place. The development of business functions is essential for the reconstitution of enterprises and growth of their organizational capabilities. It has been assumed that privatization and then good corporate governance will stimulate firm restructuring. The evidence shows that privatization has been automatically followed by restructuring. Ownership is an endogenous variable in restructuring and growth of enterprises. The extent and depth of restructuring reflects ownership but also the available resources and institutional constraints of the environment in which they operate. The most restructuring has been passive or reactive. Foreign firms and de novo private firms, which are spared of ownership problems but also of problems with outdated product mix, surplus of employment, old organisational routines, etc. have been much more active in terms of scope and scale of restructuring activities.
4. Industrial upgrading requires changes at the firm as well as at inter-firm and sectoral levels. A lack of organisational capabilities in this respect was especially detrimental to this process. A lack of product system integration capabilities and a lack of network building capabilities at firm level which were endemic to in the past continue to hinder restructuring in CEE. This has been further aggravated by the phenomenon of disorganization, which has become a strong feature of transition in the CIS. All this led to a situation that we described as 'truncated integration' into world economy. By this we mean that enterprises with undeveloped all business functions are integrated by surrendering control over critical functions (R&D, finance, marketing) to foreign

partners. This has led to large efficiency improvements in production, especially in foreign controlled firms, but also to limited strategic autonomy of domestic enterprises and affiliates.

5. Industry and technology upgrading of CEE is based on significantly, and in some sectors fundamentally, changed innovation process and knowledge base. A locus of technology efforts has moved from extra-mural R&D activities to firm-specific operations oriented around cost-efficiency and quality management activities. These are areas where the socialist enterprises were the weakest in the past. However, we also pointed out industry upgrading is non-linear process with thresholds in learning and structural barriers in terms of composition of required skills and factors. The best way to overcome them is to build firm-specific skills as well as broad and diversified knowledge base through innovation infrastructure that closely cooperates with industry. The successes of the last 10 years brought new structural barriers. A continued marginalization of R&D system may become obstacle for further industry upgrading. A general level of education of labour force does not seem to be an obstacle for productivity improvements at shop-floor level. However, a high share of population with vocational education is an obstacle for economy wide restructuring, in particular concerning adoption of IT technologies, not so much their use. Training and re-training programs, designed in cooperation with industry, should be given priority.
6. CEE has been reintegrated into the world economy at a time when trade patterns are strongly shaped by complex integration strategies of MNCs and by changes in international trade and FDI regimes. CEECs, especially central European, have fully conformed to the new regime of global political economy and continue to adjust to the requirements of the EU accession. The scale of their restructuring challenges and the reduced scope for autonomous action in this respect made them extremely dependent on foreign markets, capital and organisational capabilities. Even Russia cannot expect any fast restructuring of sectors like oil, gas, cars or telecoms, without deep involvement of foreign capital and management. Central European economies have been very active in trying to lure foreign investors. Much of FDI has entered to access local markets, to export to EU and to takeover assets in sectors like telecoms, and energy. The degree and pace of penetration of FDI in CEE has been fast and deep and is now comparable to the East Asian economies. The direct effects of FDI have been very positive as indicated by productivity data, especially when compared to domestic controlled firms. This has created concerns about the emergence of dual economy, similar to other economies whose growth is reliant on FDI. Experience from other countries shows that furthering of positive effects of FDI (indirect effects) does not come automatically. The degree to which FDI will benefit CEECs will to a great extent depend on their absorptive and innovative capabilities. Fortunately, the changes in the way MNCs increasingly operate create more opportunities for CEECs to use FDI to their advantage than it has been generally case in the past. There is evidence that MNCs are not longer closed hierarchies where headquarters are responsible for all critical functions. Local affiliates have much more opportunities for upgrading their position within companies' networks. Innovation can be now generated at different locations within MNC network. A limited research on non-equity or external-MNCs links are currently more important for production integration of CEE than FDI. In particular, subcontracting arrangements play an important role in quality management and in learning process-engineering skills. There is strong need for further research on subcontracting networks in CEE. It is only recently that the policy in central Europe has recognised subcontracting as an important channel

of production integration by establishing departments for supporting subcontracting activities.

7. A review of several industry studies has generated six stylized facts on industry restructuring in CEE. First, there has been a significant vertical disintegration of old production links and re-establishment of new links, especially with foreign suppliers and buyers. These are: vertical links, organized the most often through subcontracting links, and, horizontal links, organized most often through FDI. Second, CEE companies have integrated into production networks primarily as subcontractors or processors. Their inherent weakness is marketing and finance and the lack of brands as well as high barriers to enter into non-production parts of value chains prevented them from to integrate as autonomous producers with the complete set of value chain activities. However, the dependence on foreign organizers of value chains enabled them to quickly catch-up in terms of productivity, especially when they are parts of intra-MNCs networks. Third, a radical change in production chains and in the innovation process made much of imitative skills from the past obsolete or irrelevant in a new context. However, the transferable skills have often been successfully re-employed in a new context. Fourth, in situations when old transferable or sector-specific technology skills are favorable and when domestic market and finance are available there is a great probability that domestic-led modernization will take place. Examples are PC assembly, software, and parts of food industry. In sectors where technology gap and financial requirements are large we may observe technology modernisation that is led by foreign investors. Examples are telecommunication and car assembly. Fifth, whether technical modernisation will take place does not depend on structural variables – market, finance and technology – but is dependent on a variety of other factors like mode of privatization, political commitment and entrepreneurship. Examples of Polish and Russian shipbuilding industries illustrate well different outcomes with structurally similar factors. Sixth, high productivity improvements and catching-up, through increased unit prices and reduced quality gaps, is bringing some of advanced countries and sectors to new structural barriers for further growth. Further industry upgrading in several sectors, like car parts, will require more diversified subcontracting networks, close cooperation between large and small firms, and support to public/private R&D activities.
8. Factor availability is only a conditional advantage, which requires a network organizer to be turned into real advantage. A network organizer is an agent who is willing and able to restructure production networks. Limited and unsystematic evidence shows that there is a diversity of network organisers in CEE. For the time being, the most active network organisers are foreign MNCs. They have significantly improved productivity levels of firms that have been taken over and through competition in sectors like food industry have induced domestic firms to restructure. Our understanding of their role as organizers of supply chains is still limited. A specific institutional environment of CEE has produced diversified business groups as an organizational response of domestic capital. There are individual examples that these groups have started to operate as network organizers. Few examples, especially of Moldavian Agency for Restructuring and Enterprise Assistance (ARIA) which operate as a true restructuring agent are extremely valuable as they show the range of policy options.
9. The more successful economies have a co-ordinated structure of 'local governance' that appears to be giving them the ability to reproduce themselves as successful economies. The CEECs left socialism with very weak layer of regional institutions and competencies

for independent decision making. This is the result of lower level of development where networks are usually fragmented and separated. In addition, socialist heritage has further weakened region as a locus of innovation. Proximity was not an asset in socialism. In CEE, regions lack horizontal links; a share of monostructural regions is high. Most often current actions to support innovation at regional level suffered from top-down approach and emphasized organizations, not functions. The impression is that no coherent regional policy agenda has been set in CEE as transition related issues had absolute priority.

10. Under the influence of transition agenda the CEE states to varying degrees tried to disengage from industry upgrading or any active role in industry restructuring. After 10 years there are indications that the CEE states are searching for a new role which would reconcile requirements of a new global regime of trade and investment openness with the need to support industry modernization. Transition policies have been successful in systemic transformation but their effects on technical modernization have been ambiguous. The experience has shown that there is a clear need for integration of transition and structural policies. The issue is to develop policy mixes, which would be suitable for individual countries. The further countries are in transition they should search for mixes, which address issues of innovation and structural change. We argue that countries should experiment with a variety of approaches, none of which should be dismissed as more appropriate than others. The key criteria for the effective policy should be the quality of state governance, not the degree of selectivity. All CEE states have realized that industry upgrading can be efficiently done only in cooperation with foreign capital. However, their capabilities, in particular the quality of state governance, to engage foreign capital into this process varies greatly. They vary from 'open door policy' to attempts to control involvement of foreign capital through implicit (privatization) and explicit (FDI) policies.
11. For the time being it seems that there are three emerging models of production integration at micro level in CEE which have visible effects on the tiering of countries in terms of growth and types of development:
  - cross national production network driven industrial restructuring (central Europe);
  - *maquilladora* type of restructuring through subcontracting links (Romania and Bulgaria and other Balkan states);
  - autonomous development strategy (Russia, Ukraine and Belarus).

These types of networks are the result of the role, which the emerging global networks play in individual countries as well as of the nationally specific patterns of transition and growth. An additional factor in these outcomes is the EU accession policy whose impact will become much stronger as the enlargement progresses. Its effect may be further polarization of modes of involvement of foreign capital in these three groups.

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<sup>1</sup> In countries of central and eastern Europe we include countries of central Europe, Baltic countries, eastern and south east European (Romania, Bulgaria and other Balkan countries), and European countries of the CIS (Russia, Ukraine, Belarus and Moldova).