

CHANGING INNOVATION SYSTEM OF ECONOMIES IN TRANSITION (CEE)

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Summary

The paper gives a general description on the macro economical situation and on the R&D sector of the Central and Eastern European countries in the last decade. There

were radical changes and now there are several national ways to find the solution. The global position of the region, which was not very promising at the beginning of the 90s, is improving fast. Some statistical data and trends describe this process. The difficulties of transition are highlighted from the point of national innovation policy. The importance of EU co-operation is emphasized. A general view is given on the two typical phases of transition, pointing out that there are more and more signs that a positive scenario with a knowledge-driven catching-up process is a realistic goal for the CEE region. There are perhaps time lags but the chance is open for every CEE country to find a suitable role and place in the global economy.

1. Introduction

At the beginning of the new millennium, science and technology and a highly educated workforce are becoming the most important sources of national and regional competitiveness. Natural resources tend to be overcome by human factors like creativity, motivation and overall cultural level. This shift to knowledge-driven economy should give good chance to the Central and Eastern Europe countries where education has valuable traditions and achievements, especially in the field of mathematics and natural sciences. However, the heritage from the second half of the 20th Century history is still a burden in some respects and it is not easy to drop a heritage being present in the economy, infrastructure, and, in certain respect, also in the minds of people. This sophisticated situation and the present trends are analyzed in the study.

Before 1945, the frames of national economies and the national innovation systems differed among Central and Eastern European economies. Some countries from the region were closer to the Western European economies and societies than others, having better chances for institutional and personal contacts, while others had less chance and openness. However, all of them were more or less backward compared with the leading industrial countries.

Since 1917 the Soviet Bloc has been increased in several steps. The ideology-driven economy and the growing political gap between the two parts of Europe lead to a strong isolation, being seen at various levels in the individual countries of the region. There was a forced international co-operation between these countries, aiming at the unrealistic goal in the early 60s to reach and then exceed the technology level of the USA within two decades.

In the CEE economies there was a major contrast between the relatively well developed and successful science and the ineffective and rigid enterprises. Located in a 'socialist world system', this type of latecomer enterprise was dislocated from the main international sources of technology and from the real market messages. Its surrounding technological and industrial infrastructure was poorly developed.

The situation was different from other backward regions, because science was well developed and could offer a remarkable knowledge base even if the average of local universities and other educational and research institutions were poorly equipped. Of course, there were also high-level achievements in some technology fields, mainly

related to the defense sector, but having little or no influence on the technology-based economic development. The remarkable reduction of the technological gap among military industries was not able to reduce the gap in core civilian technologies. Innovative spirit was pushed back by bureaucracy and equalist enviousness. The system was *per definition* very weak in diffusing knowledge and commercialization because it denied the market as a whole. There were some economic reforms in the 60s, for example in Poland and Hungary, using elements of market economy carefully within the narrow political limits determined by Moscow.

The collapse of the Berlin Wall opened up the Central and Eastern European economies and societies. Deep structural changes were necessary in practically all fields. Transformation of innovation systems is one of the crucial factors to improve their competitiveness and well being of their societies.

Central and Eastern Europe countries (CEECs) are developing fast with regard to economic and social transition to market economy and aiming at achieving economic stability and sustainable prosperity but the transformation has a high price: loss of jobs and decreasing social cohesion. Common pattern of all CEECs that has emerged in the first decade of transition is an inherent imbalance in reforms, which is characteristic even of more advanced transition economies. Finding a sustainable balance among development, transition and macro-economic stabilization is the most challenging task of the process. The relationship among them is strong but very different. It is obvious that stabilization and transition cannot be sustained without technological and industrial restructuring.

The transition of systems offers new possibilities for the economics of modernizing their system of innovation. Some aspects of a market economy can and have been created quickly, especially organizatory and legal processes. Competitive financing of R&D and innovation is a more difficult task and still a problem in the whole region. Transformation of innovation systems from a one-way linear model towards the feedback-loops model is an even longer process, depending not only on science and technological advance but on the overall business climate and the demand of the economy, assuming an established and well functioning micro economy.

The question was what to do with the scientific resources left behind by command economy and the Cold War era. The institutional system was not efficient enough to support economic development, and some of the research and development (R&D) organizations, and fields lost their previous purpose with the weakening of COCOM constraints and thus lost their reason for existence. A new mission was needed.

The CEE stock of knowledge is a common global value, but most of these countries are not able to use it effectively. More efficient usage is important for every country competing in the global economy. The future success or failure of these economies greatly depends on how their knowledge-creating institutions can get their regional industry and foreign industry to work in tandem, to form international research partnerships pooling their expertise to develop and commercialize new products and discover new ways to join global networks.

2. Global Position of the Region

2.1 General

This chapter briefly summarizes the most important macro economic indicators and technology indicators of the countries in the CEE region with special focus on the science and technology related issues. The different development levels of national economies and of the S&T sectors are analyzed and the main trends are highlighted briefly. Data of the following country groups are analyzed below:

- *Central Europe* (Croatia, Czech Republic, Hungary, Poland, Slovak Republic, Slovenia);
- *Baltic states* (Estonia, Latvia, Lithuania);
- *South-Eastern Europe* (Albania, Bosnia and Herzegovina, Bulgaria, FYR Macedonia, Romania).

The authors try to avoid lengthy tables and provide the reader with the most important and most interesting data only.

Unfortunately, many data are missing. This is a topic where the methodological difficulties can be traced due to the insufficient comparable data on the CEE region. It is hard to find reliable data on the transition period. Countries and international organizations (OECD, Eurostat) have made great efforts to create comparable statistics but it takes time, and current statistics provided by CEECs have different content, classification and methodology from comparable data available in market economies. Just like the economic systems, statistical systems in these countries are also in a transitional phase.

2.2 Macro Economic Indicators

2.2.1 GDP per Capita

Among the three country groups, the highest GDP per capita values can be observed in the Central European region, the 1997 list ranges from Slovenia (US\$9779) to the Slovak Republic (US\$3887). The differences are smaller among the Baltic countries: from Estonia (US\$3593) to Latvia (US\$2622). There are lower values in the South-Eastern European are: from Romania (US\$1695) to Albania (US\$930). The general price level in all of these countries is lower than in most OECD countries, consequently, the GDP/capita values calculated on a PPP (purchasing power parity) base are considerably higher. This applies also for the comparison among these countries: the differences are largely not proportional with the nominal numbers.

Regarding the trends of the last decade, due the disintegration of CMEA trade, the collapse of the Soviet Union being their largest trade partner and the ongoing economic recession, all CEE countries lost a considerable part of their GDP in 1990–1992. In 1990 all the mentioned countries had ‘negative growth’, from –6.2% to –27.7%, and still in 1991 Poland was the only one with real growth (+2.6%), all others had a decrease between –3.1% and –34.9%. In 1992 there were still more countries with a

decrease than a increase but in 1993 the trend turned and, since 1993, the region as a whole, with local ups and downs, shows sustainable growth. According to the 1998 data, two countries, Romania (−4.0%) and Croatia (−0.5%) had a decrease, five countries, the Czech Republic, Estonia, Lithuania, Bulgaria and FYR Macedonia had no growth and the other seven countries had real growth from Bosnia and Herzegovina (+12%) to Latvia (+1.5%). In spite of this development, there are still countries in the region having lower GDP per capita value than 10 years ago. This is a clear evidence for the long-lasting existence of difficulties related to the transition.

The macro economic indicators at this and following sections are taken from EBRD Transition Report.

2.2.2 Private Sector Share of GDP

At the beginning of the transition, the private sector contributed typically 10–15% of the GDP in the region (extremes: 30% in Poland, 5% in Albania). During the 90s a tremendous privatization wave took place and by 1998, 50% was the lowest value (Slovenia) and 85% the highest (Hungary). The share of foreign owners differs country by country; the highest degree of internationalization can be observed in Hungary where companies with foreign ownership produce over 65% of the industrial export. Countries in South-Eastern Europe are somewhat behind in this respect.

It has to be mentioned that not all privatization transactions were connected with real cash inflow; in some countries there were other forms (e.g. coupons) creating partially formal privatization without the change of the ‘socialist’ management and without the necessary restructuring at company level. This way seemed to be smoother and least radical but in turn the structural changes lasted and last longer: the relatively high growth rates achieved in the early 90s proved to be not sustainable in some cases.

2.2.3 Foreign Direct Investment (FDI)

The level of foreign direct investment in the CEE region was almost ignorable before 1990. After the political turn in 1989–1991, the FDI inflow started at different intensity and at different time. Between 1990–1995 Hungary was the first attracting considerable FDI and per capita she has still the highest stock in the region (about US\$2000). Estonia has also good results per capita. Poland started to receive massive FDI inflow from 1995 on and reached a value of over US\$6.5 bn in 1997 and 1998. After some years of moderate success, the Czech Republic attracted US\$2.5 bn in 1997 and US\$3.5 bn in 1998.

The FDI inflow to Romania accelerated from 1996, reaching US\$2.04 bn in 1997 and US\$1.35 bn in 1998. In all countries not mentioned here, there was no single country reaching the US\$1 bn level in any year up to 1998. It means, there is still a huge potential for FDI which is also necessary because FDI means not only capital but a complex system of technical knowledge, quality requirements, cultural change, advanced management methods and global market access, as it can be seen in the example of some successful CEE countries.

2.2.4 External Debt/Exports

The difficulties of transition lead almost inevitably to the increase of external debts. The lacunae in the infrastructure, the high unemployment levels and loss of traditional markets made debts necessary. Three countries had high external debt/exports level in 1990 in the CEE region: Albania (860%), Bulgaria (430%) and Hungary (245%). An interesting two-way equalization process took place during the 90s: these countries with a relatively high debt could successfully decrease this value by 1997: Albania (424%), Bulgaria (235%) and Hungary (129%) and the decreasing trend is going on. In the other countries of the region having practically no debt at all in 1990, an increasing trend can be observed, and in 1997, this indicator was over 100% for most of the countries. The two positive exemptions are Poland (30%) and Slovenia (54%) keeping external debts at a low level. The financing of external debt is a large load on the yearly budgets in most CEE countries, making the primary and secondary budget balances very different and decreasing the development resources.

2.2.5 Investment Rate

Investment rate is a good indicator showing the share of future in the expenditures given for past, present and future together. It is especially interesting after the external debt giving good indication on the expenditures in the past. In 1990, Czechoslovakia was the country with the highest investment rate (31.3% in Slovak and 26.3% in the Czech part). The Baltic countries had also high rates (Latvia 27.6%, Estonia 23.8%) during the late Soviet times. In 1997, the highest values belong to the same countries: Slovak Republic (38.6%) and Czech Republic (30.7%), further increasing. The lowest value can be observed for FYR Macedonia (7.2%) and Bulgaria (11.6%), but there are several further countries in the CEE region with investment rates under 20%. There was a strong reduction in Hungary from 1992 to 1997: the investment rate decreased from 30.4% to 16.3%. Latest news show that investments are growing again after 1997. In general, fast economic development and successful catching-up is impossible without a reasonable investment rate, as we saw in the example of the small East Asian economies.

2.2.6 Unemployment Rate

Unemployment was an absolutely new phenomenon for societies that were used to full employment by definition for several decades. The main issue is that it does not raise merely economic questions but also a question of morale, optimism in the future and social cohesion. Long-term unemployment can ruin the chance of people to return to work any time and unemployment concentrated with poverty in some regions and social groups can distort values and increase criminality. In 1990, four countries in the CEE region reported unemployment rates over 10%: FYR Macedonia (19.2%), Croatia (13.2%), Poland (11.8%) and Bulgaria (11.1%). In 1997, most countries in the region reached 10%. The highest rates were seen at FYR Macedonia (34.5%), Bosnia and Herzegovina (20.0%), Albania (17.7%) and Croatia (17.2%). The lowest rates were observed in Lithuania (6.4%), the Czech Republic (7.5%) and in Slovenia (7.9%). Radical reforms with high immediate unemployment seem to give the chance for later decrease, as the examples of Poland and Hungary show. Slow restructuring implies

hidden problems, leading to the increase of unemployment several years later, when the reform countries have already improving indicators.

2.2.7 Change of Labor Productivity in Industry

In 1990–1991 all CEE countries had a loss in productivity due to the general economic recession. Poland began the impressive development in 1992 (+12.5%), Hungary joined the trend in 1993 (+16.3%) and Slovenia in 1994 (+11.4%). From 1994, practically all CEE countries show improving numbers. By the end of the decade, the so-called ‘Visegrád countries’ (Hungary, Poland, Czech Republic, Slovak Republic) reached the productivity level of the ‘cohesion’ EU countries and were improving at a good rate. Other CEE countries like Croatia and the Baltic Countries showed also significant improvement in the late 90s. The productivity growth is especially spectacular in the new production facilities established in the region by foreign capital and expertise.

2.2.8 Share of Exports to Non-transition Countries

After the shock-like collapse of the Soviet Union being the most important export market for almost all CEE countries, the region was able to find a new foreign trade orientation quickly. Many data are missing for the years 1990–1992, but most of the existing ones show low percentages at about 11–12%. By 1993, most countries exceeded 70% in this respect and the ration grows further. Surprisingly, Lithuania is the only country where the share of exports to non-transition countries decreased year by year. In 1997, Romania had a share of 88.2%, Hungary 80.7%, Poland 77.5%, Slovenia 76.7%. Lithuania (49.9%) and the Slovak Republic (49.3%) showed the lowest figures. In the case of many countries in the foreign trade to the EU countries exceeded a critical level and their economy is *de facto* integrated in the EU through the complex micro-economic relations between and within thousands of companies.

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OECD (1999a). *Science and Technology Main Indicators and Basic Statistics in Slovenia, 1991–1997*, OECD CCNM/DSTI/EAS (99) 71, Paris. 60 pp. [This volume covers the main indicators and basic statistics for science and technology on Slovenia. This publication contains 40 tables of which the majority concern resources devoted to research and experimental development and some other indicators of output of scientific and technological activities.]

OECD (1999b). *Science and Technology Main Indicators and Basic Statistics in the Slovak Republic, 1992–1997*, OECD CCNM/DSTI/EAS (99) 22, Paris. 67 pp. [The volume on the Slovak Republic covers the main indicators and basic statistics for science and technology. This publication contains 40 tables of which the majority concern resources devoted to research and experimental development and some other indicators of output of scientific and technological activities.]

OECD (1999c). *Science and Technology Main Indicators and Basic Statistics in the Russian Federation 1992–1997*, OECD CCNM/DSTI/EAS (99) 23, Paris. 62 pp. [This volume on Russian Federation covers the main indicators and basic statistics for science and technology. This publication is based on data provided by the Russian Centre for Science Research and Statistics in reply to the OECD international survey on resources devoted to R&D. This publication contains 40 tables of which the majority concern resources devoted to research and experimental development and some other indicators of output of scientific and technological activities.]

OECD (2000). *Science and Technology Main Indicators and Basic Statistics in the Russian Federation 1992–1998*, OECD CCNM/DSTI/EAS (2000) 69, Paris. 63 pp. [This volume on Russian Federation covers the main indicators and basic statistics for science and technology. This publication is based on data provided by the Russian Centre for Science Research and Statistics in reply to the OECD international survey on resources devoted to R&D. This publication contains 40 up-dated tables of which the majority concern resources devoted to research and experimental development and some other indicators of output of scientific and technological activities.]

Some publications of European Union offer moderately comparative data on R&D and innovation statistics on transition economies:

European Commission (2000). *R&D and Innovation Statistics in Candidate Countries and the Russian Federation Data 1996–97*, Luxembourg: Eurostat. 138 pp. [This publication contains a statistical data base on R&D and innovation activities in the candidate countries (Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia Republic)]

Transition report 1999, Ten years of Transition: Economic Transition in Central and Eastern EBRD (1999). Europe, the Baltic States and the CIS, European Bank for Reconstruction and Development. 288 pp. [This special issue within the annual series, takes stock of developments in transition over past decade. The analyses have pointed to broad patterns across the region. The report gives an overview on all transition economies.]

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Biographical Sketches

Annamária Inzelt is an economist specialized on S&T and innovation analysis. She is director of *IKU, Innovation Research Centre* (Budapest University of Economics). She has formerly been head of a research team at the Institute of Economics (Hungarian Academy of Sciences) and research fellow at the *Economic Research Institute* (Statistical Office). Dr. Inzelt has been the Hungarian representative at OECD NESTI group, a member of the Committee for Industrial Economics at Hungarian Academy of Sciences and member of the OMF (National Committee for Technological Development) Council, Honorable Citizen of Nebraska USA, and since 1997 holds the position of Széchenyi Professorship. She has undertaken many research projects and activities related the analysis of innovation (Translation/review of OECD Frascati Manuals, assessment and contribution to employ OECD measurement – R&D, innovation, S&T mobility – in Hungary). Professor Inzelt has been a guest professor and consultant at University of Campinas, Brazil, Visiting Research Fellow at SPRU. She has held the chair of the Scientific Committee of IATAFI (International Association of Technology Assessment and Forecasting Institutions); advisor at ‘Research Policy’; advisory Board Technological Forecasting and Social Change (an International Journal); Member of the Standing Committee on East European Affairs and Hungarian Representative at E.E.A. European Economic Association She is member of the several international organisations and she has been organizer of some international conferences. She has participated in many international research groups in industrial economics and

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