

## Chapter IV – Innovation and Competitiveness

The chapter with similar title (same words, but in reversed order – “Competitiveness and Innovation”) was part of the last 2005 R&D Analysis, too. In 2005, the long-awaited closer connection between research, development and innovation took place. The Government approved the National Innovation Policy of the Czech Republic for 2005-2010 by its Resolution No. 851 of July 7, 2005, upon the proposal made by the Research and Development Council. The report concerning the gradual fulfilment of the policy measures forms Chapter VIII of this Analysis.

Chapter IV has four parts as follows:

- Part IV.1 on innovation support in Czechia. This part presents data of the Ministry of Industry and Trade (MIT) that supports innovation from its own programmes of support and results of the innovation surveys made by the Czech Statistical Office (CSO)
- Part IV.2 on the main results of comparison of innovation efficiency according to the European Innovation Scoreboard 2005 (EIS 2005)
- Part IV.3 on the main results of competitiveness comparison according to the World Economic Forum (WEF)
- Part IV.4 on the main results of competitiveness comparison according to the Swiss Institute for Management Development (IMD).

From Part IV.1 it can be concluded that innovation support in Czechia, even at strict limitations resulting from the protection of economic competition according to EU principles, is evidently growing. The growth of support is influenced to a certain extent by change in the methodology of the Czech Statistical Office survey on innovation. On the basis of several other indirect information about the national programmes of support and on support from EU funds, it is possible to say with a high degree of probability that the innovation support in Czechia is really growing.

Part IV.2 providing actual data from the European Innovation Scoreboard 2005 is, however, not too positive for Czechia. It gives values of indicators in three groups of inputs into innovation processes (human resources, financial resources, business innovation activities) and two groups of outputs (impacts of application, intellectual property). For more than half of the indicators in the “input” groups, Czechia reports lower values than is the EU-15 average reduced by 20 %. Only in one “input” indicator - the share of young people with completed secondary education - Czechia attains value higher than the EU-15 average increased by 20 %. Relatively favourable seems the situation in the first group of outputs from innovation processes. Of five indicators, only one is lower than the reduced EU-15 average (high-tech export as a share of total exports). The employment in medium-high and high-tech manufacturing is higher in Czechia than the EU-15 average increased by 20 %. The situation is worst in the second group of output indicators, i.e. indicators of intellectual property (patents and other forms of the intellectual property protection). All indicators are below the EU-15 average reduced by 20 %, few indicators are lower even in order.

One of the objectives of innovation scoreboards being published annually by the European Commission is to provide objective information to responsible bodies in the Member States necessary for drafting and reviewing their innovation policies. The Innovation Scoreboard 2004 was used for compilation of the draft National Innovation Policy of the Czech Republic for 2005–2010.

The process of increasing the competitiveness in Czechia will take many years. This is confirmed by the content of Parts IV.3 and IV.4 showing the main results of the competitiveness comparison according to the World Economic Forum (WEF) and according to the Swiss Institute for Management Development respectively. According to WEF evaluation, Czechia has been always in the second half of the fourth ten of monitored countries during the five monitored years 2001–2005 (best in 2002 – 36<sup>th</sup> place; worst in 2004 – 40<sup>th</sup> place). According to IMD evaluation, which is based upon a different

methodology, the position of Czechia moved from the worst place in 2004 (43<sup>rd</sup>) to the best place in 2006 (31<sup>st</sup>).

## IV.1 Innovation Support in Czechia

### IV.1.1 Innovation support from programmes of the Ministry of Industry and Trade

Since May 2004, the most important tool of the Ministry of Industry and Trade (MIT) to support the development of innovation environment and growth of innovation activity of the entrepreneurial sector has been the Operational Programme Industry and Enterprise (OPIE) announced for 2004–2006. The support granted within OPIE is drawn from EU structural funds – specifically the European Regional Development Fund (75 %) and the state budget funds (25 %). Understanding the innovation as a complex process, the aim of the programme is, besides development itself of innovation infrastructure and product, technology and service innovation, to support the activity of new entrepreneurs and firms with shorter history, establishment of branch groupings on regional and supra-regional levels, and development of consulting services. The main instruments of support are grants and preferential (soft) or interest-free loans.

As of October 1, 2006, the grant award decision was issued or loan contract concluded for implementation of 2,364 projects (out of 4,626 delivered applications) with the total amount of support reaching nearly CZK 7.4 billion, representing ca 80 % of the overall allocation for 2004–2006. As of the same date, the support was paid up in the amount exceeding CZK 2.4 billion for implementation of 1,451 projects. The reason why the amount of realised payments lags behind the decided/contracted amount is that money is disbursed ex post, i.e. after successful completion of the project or its partial phase.

**Table IV.1.1 Situation in applications for support according to OPIE programmes 2004 – 2006 (situation as of October 1, 2006)**

Programme	Delivered		Approved		Decided / contracted		Paid to accounts of end users		Allocation 2004–2006 (CZK mil)
	Number	Amount (CZK mil)	Number	Amount (CZK mil)	Number	Amount (CZK mil)	Number	Amount (CZK mil)	
1.1 PROSPERITY	70	3,836.5	31	1,653.8	28	1,348.2	3	16.0	1,582.0
1.2 REAL ESTATES	228	4,961.4	73	1,392.3	51	1,013.9	11	105.8	2,558.4
1.3 TRAINING CENTRES	106	514.0	44	202.4	36	138.9	3	4.8	309.0
1.4 CLUSTERS	85	351.8	38	73.8	29	66.3	3	2.2	255.9
2.1 MARKETING	666	329.7	348	195.5	319	178.9	55	22.0	284.3
2.1 DEVELOPMENT	504		109	726.8	109	726.8	92	617.7	1,053.9
2.1 DEVELOPMENT II	243	824.2	112	386.8	104	366.6	34	112.7	
2.1 CREDIT	1,290	2,794.5	827	1,727.6	793	1,639.0	596	1,140.4	938.1
2.1 START	891	396.8	785	350.9	773	345.7	626	269.5	238.8
2.2 INNOVATION	218	3,730.9	64	1,049.5	64	1,043.6	19	98.8	1,368.4
2.2 INNOVATION II	113	1,291.5	0	0	0	0	0	0	
2.3 RENEWABLE SOURCES OF ENERGY	165	1,890.6	46	570.8	35	406.0	5	47.9	465.7
2.3 ENERGY SAVINGS	47	189.8	26	101.5	23	97.6	4	6.3	199.0

Grants and loans in total	4,626	24,751.9	2,503	8,431.6	2,364	7,371.2	1,451	2,444.0	9,253.3
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Source: Information System for the Operational Programme (ISOP), MIT

Following programmes of support within OPIE (for details see <http://www.mpo/podpora-podnikani/oppp/>) have the closest links to support of development of innovation environment and innovation activities of the entrepreneurial sector:

## PROSPERITY

The aim of the PROSPERITY programme is to support the development of infrastructure for industrial research, development and innovation. The programme pays special attention to the establishment and development of business incubators and science and technology parks, as well as technology transfer centres. From the programme announcement until October 11, 2006, 70 draft projects were submitted not only by individual enterprises, but also institutions of higher education, science and research institutions, regions and municipalities. As of October 11, 2006, the support was awarded to 28 projects in total amount of CZK 1,348.2 million.

## INNOVATION (INNOVATION II)

The INNOVATION programme supports implementation of product, technology and service innovation. It is focused on development of innovation activity of Czech firms with the aim to enhance their competitiveness in world markets. Within INNOVATION I programme, the grant was awarded to 64 projects (out of 218 submitted applications) in the overall amount of ca CZK 1,043.4 million. The above-described data demonstrate the great interest of the entrepreneurial public in this programme aimed at putting the results of research and development into practice. Follow-up INNOVATION II programme was announced in February 2006 and 113 entrepreneurs submitted their applications. By October 11, 2006, the INNOVATION II Evaluating Committee has recommended 47 projects for approval with total amount of grant reaching CZK 574.9 million.

## CLUSTERS

The aim of the support provided within the CLUSTERS programme is to stimulate the innovation process subjects to establish and develop branch groupings on regional and supra-regional levels. This programme is divided into providing support to activities connected with searching for potential clusters and providing support to establishment and development of these branch groupings. As of October 11, 2006, the grant was awarded to 29 projects (out of 56 submitted applications) in the total amount reaching nearly CZK 66.3 million.

**Table IV.1.2 Innovation expenditures in the entrepreneurial sector in 2001, 2003 a 2005 (CZK mil, current prices)**

	2001	2003	2005
In total	48 041	46 740	115 316
Main branch sections			
• Mining and quarrying	188	179	353
• Electricity, gas and water supply	1 437	3 281	18 787
• Services in total	14 252	11 954	36 051
• Manufacturing	32 158	31 937	60 125
• Of this:			
○ Manufacture of electrical and optical instruments	5 136	7 971	9 581
○ Manufacture of machinery and equipment	4 607	2 839	6 476
○ Manufacture of transport equipment	4 097	3 843	12 272

Source: CSO (Czech Statistical Office), 9605-04 Technology Innovation in CR for 2002–2003; CSO, Innovation in CR for 2005

**Methodological commentary (comparability):** Data for 2005 are not fully comparable with previous years because the target group of enterprises in TI2005 survey was enlarged to comply with the new revision of Oslo Manual (e.g. by sectors of construction, hotel services, retail trade, etc.).

The overall innovation support in 2003 declined in comparison with the support in 2001. This decline occurred in all monitored sectors, with the exception of Electricity, gas and water supply. The decline took place in manufacturing, with the exception of manufacturing of electrical and optical instruments. Not only can we wish that the double or triple increase in innovation expenditures in 2005 against 2003 was not caused only by fragmentation of the group of monitored sectors.

**Table IV.1.3 Cost of innovation in enterprises according to the number of employees in 2001, 2003 and 2005 (CZK mil, current prices)**

Number of employees	2001		2003		2005	
	(CZK mil)	(%)	(CZK mil)	(%)	(CZK mil)	(%)
0–49	3 470	10.7	3 541	11.0	12 038	10.4
50–249	6 315	19.5	5 086	15.9	30 327	26.3
250 and more	22 604	69.8	23 424	73.1	72 592	63.3

Source: CSO (Czech Statistical Office), 9605-04 Technology Innovation in CR for 2002–2003; Innovation in CR for 2005

**Methodological commentary (comparability):** Comparable are only % figures from the same reasons as for Table IV.1.2

It is gratifying that the share of cost of innovation grew in a relatively considerable manner in the medium enterprises with number of employees from 50 to 249 (from 15.9 % to 26.3 %).

**Table IV.1.4 Numbers of economic subjects being awarded financial support for making innovation in 2003–2005, classified by providers**

	Government	Local authorities	EU, structural funds	EU, 5 <sup>th</sup> and 6 <sup>th</sup> Framework R&D Programme
Czechia in total	1 145	275	474	324
Manufacturing	584	113	265	146
Services	399	145	141	157
Others <sup>a)</sup>	162	17	68	21
<b>According to the number of employees in economic subjects</b>				
0–49	501	154	242	156
50–249	441	105	186	124
250 and more	203	16	46	44

Source: CSO (Czech Statistical Office), Innovation in CR for 2005

**Methodological commentary:** <sup>a)</sup> It includes subjects falling under the Industrial Classification of Economic Activities (OKEČ): Construction (F), Mining and quarrying (C) and Electricity, gas and water supply (E).

In Czechia, 2,219 enterprises obtained support in 2003–2005; of this more than one third of enterprises (36 %) obtained the support from EU. In the group of enterprises involved

in the provision of services, the share of enterprises supported by EU is 74.5 %. The support, both domestic and from the EU resources, was directed especially to small and medium-sized enterprises in compliance with the principles of public support provision.

## IV.2 European Innovation Scoreboard

This Scoreboard is published annually by the European Commission. The Scoreboard and its methodology were developed on the grounds of the European Council request announced on the Lisbon spring meeting in 2000. It should contribute to the so called open method of coordination of national policies within EU. The European Innovation Scoreboard is an effective tool for benchmarking innovation policies.

The methodology is going through gradual adaptations. In 2005, the European Innovation Scoreboard was totally rewritten in collaboration with the EU Joint Research Centre – JRC 1. The number of indicator groups increased from 4 to 5, with basic thematic classification into innovation process inputs and outputs. Twenty six indicators were modified and used for evaluation purposes (22 indicators in 2004 and 28 indicators in 2003). The group of monitored countries includes EU-25 Member States, Bulgaria, Romania and Turkey, associated countries, USA and Japan. The evaluation was made for individual indicators and their trends; the summary innovation index and its trends were also measured.

The following table shows five groups of indicators, 26 individual indicators used for evaluation in 2005 and their primary data sources. Nine new indicators appeared in comparison with the European Innovation Scoreboard for 2004.

**Table IV.2.1 Evaluation indicators**

	<b>INPUT – Innovation drivers</b>	
1.1	Science & Engineering graduates (per 1,000 population aged 20-29)	Eurostat
1.2	Population with tertiary education (per 100 population aged 25-64)	Eurostat, OECD
1.3 new indicator	Broadband penetration rate (number of broadband lines per 100 population)	Eurostat
1.4	Participation in life-long learning (per 100 population aged 25-64)	Eurostat
1.5 new indicator	Youth education attainment level (% of population aged 20-24 having completed at least upper or lower secondary education)	Eurostat
	<b>INPUT – Knowledge creation</b>	
2.1	Public R&D expenditures (% of GDP)	Eurostat, OECD
2.2	Business R&D expenditures (% of GDP)	Eurostat, OECD
2.3 new indicator	Share of medium-high-tech and high-tech R&D (% of manufacturing R&D expenditures)	Eurostat, OECD
2.4 new indicator	Share of enterprises receiving public funding for innovation (%)	Eurostat (CIS)
2.5 new indicator	Share of university R&D expenditures financed by business sector (% of total university R&D expenditures)	Eurostat, OECD
	<b>INPUT – Innovation &amp; Entrepreneurship</b>	
3.1	SMEs innovating in-house (% of all SMEs)	Eurostat (CIS)
3.2	Innovative SMEs co-operating with others (% of all SMEs)	Eurostat (CIS)
3.3	Innovation expenditures (% of total turnover)	Eurostat (CIS)
3.4	Early-stage venture capital (% of GDP)	Eurostat
3.5	ICT expenditures (% of GDP)	Eurostat
3.6	SMEs using non-technological change (% of all SMEs)	Eurostat (CIS)
	<b>OUTPUT – Application</b>	
4.1	Employment in high-tech services (% of total workforce)	Eurostat
4.2 new indicator	Exports of high-technology products as a share of total exports (% , monetary data)	Eurostat

4.3	Sales of new-to-market products (% of total turnover)	Eurostat (CIS)
4.4	Sales of new-to-firm not new-to-market products (% of total turnover)	Eurostat (CIS)
4.5	Employment in medium-high and high-tech manufacturing (% of total workforce)	Eurostat
<b>OUTPUT – Intellectual property</b>		
5.1	EPO patents (per million population)	Eurostat
5.2	USPTO patents (per million population)	Eurostat
5.3 new indicator	Triadic patent families (per million population)	Eurostat, OECD
5.4 new indicator	New Community trademarks (per million population)	OHIM
5.5 new indicator	New Community designs (per million population)	OHIM

Values for most of the indicators were given for 2003 and 2004. Several countries had not all indicators available.

The aim is not to arrive at a standing of countries, but search for reasons behind success and failure, and new ways how to apply best practice while respecting specifics of individual countries.

**Table IV.2.2 Innovation drivers**

	EU 15 (EU 25)	FI	DK	FR	DE	NL	AT	GR	UK	CZ	HU	SK	SI	US	JP
Science & Engineering graduates <sup>a)</sup>	13.1 (12.2)	<b>17.4</b>	12.5	<b>22.2</b>	6.4	7.3	8.2	-	<b>21.0</b>	6.4	4.8	8.3	8.7	10.9	13.2
Population with tertiary education <sup>b)</sup>	23.1 (21.9)	<b>34.2</b>	<b>32.9</b>	23.9	24.9	27.5	18.3	20.5	<b>29.2</b>	12.3	16.7	12.8	19.0	<b>38.4</b>	<b>37.4</b>
Life-long learning <sup>c)</sup>	10.7 (9.9)	<b>24.6</b>	<b>27.6</b>	7.8	7.4	<b>16.5</b>	12.0	3.9	<b>21.3</b>	6.3	4.6	4.8	<b>17.9</b>	-	-
Broadband communication network (broadband) <sup>d)</sup>	7.6 (6.5)	<b>11.0</b>	<b>15.6</b>	8.2	6.7	<b>14.7</b>	8.7	0.2	7.4	0.7	2.2	0.4	3.8	<b>11.2</b>	<b>12.7</b>
Youth with secondary education <sup>e)</sup>	73.8 (76.7)	84.6	76.1	79.8	72.8	74.5	85.3	81.9	76.4	<b>90.9</b>	83.4	91.3	<b>89.7</b>	-	-

**Bold letters:** by more than 20 % better than the EU-15 average

*Italics:* by more than 20 % worse than the EU-15 average

a) Share of Science & Engineering graduates in overall population aged 20-29 (in %).

b) Share of population with tertiary education in overall population aged 25-64 (in %).

c) Share of persons taking part in any life-long learning activity in the last four weeks preceding the survey in overall population aged 25-64 (in %).

d) Share of persons using broadband lines in overall population (%).

e) Share of persons with secondary education in overall population aged 20-24 (%).

In the field of innovation drivers (basically human resources), Finland reports 4 indicators with value by more than 20 % higher than the EU-15 average; Denmark and the United Kingdom have 3 such indicators, and the Netherlands and Slovenia 2 indicators.

Most Science&Engineering graduates are reported by France (22.2 %), closely followed by the United Kingdom (21 %). More than 30 % of population with tertiary education in 25-64 years age class is in the United States (38.4 %). The highest share of persons participating in life-long learning is reported by Denmark (27.6 %) and Finland (24.6 %). The first place in the number of persons with completed secondary education in 20-24 years age class is occupied by Slovakia (91.3 %), closely followed by Czechia (90.9 %) and Slovenia (89.7 %).

The highest broadband lines penetration rate is reported from Denmark and the Netherlands, followed by Japan, USA and Finland. The new EU Member States significantly lag behind in this area (including Czechia).

Out of the four monitored new EU Member States, the above average figures (by 20 % better than the EU average) are reported only by Slovenia for indicators of life-long learning and youth who attained secondary education, and by Czechia for the indicator of youth who attained secondary education.

Most indicators with level by more than 20 % lower than the EU-15 average are reported by Slovakia, Czechia and Hungary (4 indicators each).

**Table IV.2.3 Knowledge creation**

	EU 15 (EU 25)	FI	DK	FR	DE	NL	AT	GR	UK	CZ	HU	SK	SI	US	JP
Public R&D expenditures (% of GDP)	0.70 (0.69)	<b>1.03</b>	0.80	0.81	0.77	0.75	0.70	0.41	0.68	0.50	0.62	0.26	0.63	<b>0.86</b>	<b>0.89</b>
Business R&D expenditures (% of GDP)	1.30 (1.26)	<b>2.45</b>	<b>1.84</b>	1.34	<b>1.75</b>	1.01	1.42	0.20	1.30	0.77	0.36	0.31	0.90	<b>1.91</b>	<b>2.65</b>
Medium-high-tech and high-tech R&D <sup>f)</sup>	89.2 (-)	88.1	86.7	87.2	93.5	85.2	82.9	-	91.1	85.4	87.8	68.6	85.0	90.6	86.8
Share of enterprises receiving public funding for innovation <sup>g)</sup>	n/a (n/a)	18.7	3.2	10.3	12.1	14.7	19.2	8.9	3.8	3.7	7.3	1.8	4.1	-	-
Share of university R&D expenditures financed by business sector <sup>h)</sup>	6.6 (6.6)	5.8	2.7	2.9	<b>12.5</b>	6.8	4.1	6.9	5.6	1.0	<b>10.6</b>	0.3	<b>9.6</b>	4.5	2.7

**Bold letters:** by more than 20 % better than the EU-15 average

*Italics:* by more than 20 % worse than the EU-15 average

f) % of manufacturing R&D expenditures

g) % of all enterprises – both innovating and non-innovating (based on CIS)

h) % of total university R&D expenditures

Only Finland, USA and Japan report values by more than 20 % higher than the EU-15 average in both public and business R&D expenditures, Denmark and Germany only for business R&D expenditures. In addition, Germany, Hungary and Slovenia significantly exceed the EU average in the share of university R&D expenditures financed by business sector.

Values for the indicator concerning the share of manufacturing medium-high-tech and high-tech R&D expenditures show no marked variations from the EU average (with the exception of Slovakia). The comparison of selected countries with the EU average cannot be made for the share of enterprises receiving public funding for innovation (data not available).

Most indicators with level by more than 20 % lower than the EU-15 average are reported by Slovakia (4 indicators) and Czechia (3 indicators).

**Table IV.2.4 Innovation & Entrepreneurship**

	EU 15 (EU 25)	FI	DK	FR	DE	NL	AT	GR	UK	CZ	HU	SK	SI	US	JP
SMEs <sup>i)</sup> innovating in-house <sup>j)</sup>	(n/a)	23.8	25.9	29.2	43.4	18.0	44.7	17.5	22.4	23.3	13.2	15.7	14.9	-	-
SMEs involved in innovation co-operation <sup>j)</sup>	(n/a)	18.6	16.6	9.3	9.2	8.0	13.2	6.3	7.2	5.3	32.9	3.8	8.8	-	-
Innovation expenditures <sup>k)</sup>	(n/a)	2.50	2.15	2.53	2.50	0.79	-	2.08	1.61	0.92	0.30	2.40	0.92	-	-
Early-stage venture capital (% of GDP)	0.025 (-)	<b>0.065</b>	<b>0.063</b>	0.029	0.021	0.027	0.013	0.008	<b>0.038</b>	0.001	0.002	0.002	-	<b>0.072</b>	-
ICT expenditures (% of GDP)	6.3 (6.4)	7.1	6.7	6.0	6.2	7.5	6.4	5.1	<b>7.9</b>	7.1	7.1	6.0	5.2	<b>7.8</b>	<b>8.0</b>
SMEs using non-		47.0	26.0	23.0	65.0	38.0	58.0	59.0	-	40.1	29.3	10.1	50.8	-	-

technological change <sup>i)</sup>	(n/a)														
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**Bold letters:** by more than 20 % better than the EU-15 average

*Italics:* by more than 20 % worse than the EU-15 average

i) SMEs – small and medium-sized enterprises.

j) Shares of SMEs of a respective category in the overall number of SMEs in manufacturing and services (in %).

k) Innovation expenditures in % of all turnovers in manufacturing and services.

l) Share of SMEs using non-technological change in the overall number of SMEs (%).

With the exception of venture capital investments and ICT expenditures, all data come from the third survey on innovation CIS 3 (Community Innovation Survey–3) completed by the European Commission in 2003. Data were published in New Cronos/Science and technology. The problem is that EIS for 2005 does not mention EU-averages for CIS 3-based indicators and so it is not possible to compare selected countries in this respect.

The highest share of SMEs innovating in-house is reported by Austria and Germany; in case of SMEs involved in innovation co-operation it is surprisingly Hungary, followed from large distance by Finland and Denmark. Another surprise is that Slovakia and Greece joined the countries with highest innovation expenditures like France, Germany and Finland. In case of SMEs using non-technological change, the first place is occupied by Germany, followed by Greece and Austria, with Slovakia significantly lagging behind.

The Netherlands being top ranked in various evaluations of competitiveness surprisingly reports only below average level of innovation activities and especially innovation expenditures in manufacturing and services.

Czechia mostly reports values approaching average. ICT expenditures are above the EU average, while in the early-stage venture capital investments it shows the lowest value of all above countries. Investments of venture capital being higher than the EU average are reported by USA, Finland, Denmark, and the United Kingdom.

**Table IV.2.5 Application**

	EU 15 (EU 25)	FI	DK	FR	DE	NL	AT	GR	UK	CZ	HU	SK	SI	US	JP
Employment in high-tech services <sup>m)</sup>	3.49 (3.19)	<b>4.68</b>	<b>4.50</b>	4.07	3.32	3.72	3.32	1.75	<b>4.40</b>	3.18	3.14	2.54	2.67	-	-
Exports of high-technology products as a share of total exports <sup>n)</sup>	17.2 (17.8)	<b>20.8</b>	13.4	20.4	14.7	18.8	15.3	7.4	<b>21.0</b>	12.3	<b>21.7</b>	3.4	5.8	<b>26.9</b>	<b>22.7</b>
Sales of new-to-market products <sup>o)</sup>	(n/a)	5.1	5.9	5.8	4.5	3.8	7.6	2.9	1.7	1.4	0.8	10.9	3.5	-	-
Sales of new-to-firm not new-to-market products <sup>p)</sup>	(n/a)	16.4	25.6	11.9	23.3	2.5	10.6	8.9	16.7	5.9	2.0	2.8	3.4	-	-
Employment in medium-high and high-tech manufacturing <sup>q)</sup>	7.10 (6.60)	6.85	6.12	6.50	<b>11.04</b>	4.06	6.21	1.99	6.27	<b>8.71</b>	8.27	8.00	<b>8.94</b>	4.89	7.40

**Bold letters:** by more than 20 % better than the EU-15 average

*Italics:* by more than 20 % worse than the EU-15 average

m) Share in overall employment in services (%).

n) Export of appropriate category as a share of total exports in national currency and current prices (%).

o) Share of “new to market” product sales in the overall manufacturing and services turnover (%).

p) Share of “new to firm” product sales in the overall manufacturing and services turnover (%).

q) Share in overall employment in manufacturing (%).



Employment in medium-high and high-tech manufacturing reaches values by 20 % better than the EU average in Germany (11.04 %), Slovenia (8.94 %) and Czechia (8.71 %). Employment in high-tech services reaches values by 20 % better than the EU average is in Finland (4.68 %), Denmark and the United Kingdom.

Export of high-tech products by 20 % better than the EU average reports USA (26.9 %), Japan (22.7 %), Hungary (21.7 %), the United Kingdom and Finland. Czechia (12.3 %) is in the group of countries with share by 20 % worse against the EU average; the lowest value is reported by Slovakia.

Slovakia (10.9 %) takes the leading place in sales of new-to-market products and Denmark is the best in sales of new-to-firm products (25.6 %). Surprisingly, the Netherlands belongs to the countries with worst results in both these indicators.

**Table IV.2.6 Intellectual property**

	EU 15 (EU 25)	FI	DK	FR	DE	NL	AT	GR	UK	CZ	HU	SK	SI	US	JP
EPO patent applications <sup>r)</sup>	158.5 (133.6)	<b>310.9</b>	<b>214.8</b>	147.2	<b>301.0</b>	<b>278.9</b>	174.8	8.1	128.7	10.9	18.3	4.3	32.8	154.5	166.7
USPTO granted patents <sup>s)</sup>	71.3 (59.9)	<b>158.6</b>	83.8	68.1	<b>137.2</b>	<b>86.6</b>	65.4	1.9	64.5	3.9	4.9	1.9	8.4	<b>301.4</b>	<b>273.9</b>
Triadic patent families <sup>t)</sup>	36.3 (22.3)	<b>94.5</b>	<b>47.6</b>	36.1	<b>70.3</b>	<b>53.8</b>	34.2	0.6	30.0	0.9	3.3	0.8	4.0	<b>53.6</b>	<b>92.6</b>
New Community trademarks <sup>u)</sup>	100.9 (87.2)	82.7	<b>139.9</b>	73.1	116.6	<b>127.8</b>	<b>158.8</b>	24.9	105.8	27.1	11.4	3.0	38.6	32.0	11.1
New Community designs <sup>v)</sup>	98.9 (84.0)	91.7	<b>199.1</b>	69.8	<b>147.1</b>	<b>125.9</b>	<b>143.6</b>	1.1	65.8	10.5	9.3	5.9	24.6	12.4	15.1

**Bold letters:** by more than 20 % better than the EU-15 average

*Italics:* by more than 20 % worse than the EU-15 average

r) Patent applications (number per million population).

s) Patents granted (number per million population).

t) Triadic patent families – patent applications with EPO and Japan Patent Office and patents granted by USPTO (number per million population).

u) Number per million population.

v) Number per million population.

Results by more than 20 % better than the EU-15 average in the area of intellectual property are reported by the Netherlands and Germany (all 5 indicators), followed by Denmark (4 indicators) and Finland (3 indicators). Finland, however, reaches the best results of all monitored countries in the indicator of patents (with the exception of patents granted by USPTO where leading positions are held by USA and Japan).

In all indicators, Czechia and other new EU Member States, similarly as Greece, lag behind the EU average by more than 20 %. The most significant, more than by order, is lagging behind in all patent categories.

### IV.3 Competitiveness according to the Global Competitiveness Report for the World Economic Forum

It has been compiled for the World Economic Forum annual meetings since 1979. The compilation of the Global Competitiveness Report 2005–2006 published in summer 2006 involved the work of 122 institutions from all over the world. For the Czech Republic, the partner organisation is CMC Graduate School of Business in Čelákovice. One hundred and seventeen countries were evaluated. The methodology has been gradually evolving. In the light of advancing economic globalization and thus caused need for more complex analyses, the publication gives for each evaluated country, besides the traditional *Growth Competitiveness Index – GCI*, also the *Global Competitiveness Index – Global CI* with a substantially more complex structure.

The competitiveness is measured by several dozens of criteria in total; the share of survey questions is relatively high.

The total *Growth Competitiveness Index* (GCI) is calculated from three component indexes: the public institutions level, the macroeconomic environment level, and the technology level.

The component index of the public institutions level is composed of two sub-indexes: contracts and law – 4 criteria (4 survey questions) and corruption – 3 criteria (3 survey questions).

The component index of the macroeconomic environment level is composed of two sub-indexes: macroeconomic stability – 8 criteria (2 survey questions, 6 quantitative figures) and government waste – 1 criterion (1 survey question); the component index of the macroeconomic environment level also includes the country's investment rating.

The component index of the technology level is composed of three sub-indexes: innovation – 6 criteria (4 survey questions, 2 quantitative figures), information and communication technology (ICT) – 10 criteria (5 survey questions, 5 quantitative figures); technology transfer – 2 criteria (2 survey questions). So the technology level is evaluated by 18 criteria in total.

Countries are divided into two groups: group of “core innovators” that reported more than 15 patents granted by the U.S. Patent and Trademark Office (USPTO) per 1 million inhabitants in 2003; and “other countries” (with Czechia) that innovate mostly through imported innovations often connected with foreign investments. For each of the above groups the technology index is calculated in a slightly different way.

*The Global Competitiveness Index* (Global CI) is built upon 9 “pillars”: (1) Institution, (2) Infrastructure, (3) Macro-economy, (4) Health and Primary Education, (5) Higher education, (6) Market efficiency, (7) Technological readiness, (8) Business sophistication and (9) Innovation. The relative importance of pillars for the competitiveness growth depends on the degree of development of a country; pillars 1–4 play main role in less developed economies, pillars 5–7 influence significantly the competitiveness of economies based mostly on efficiency, and finally pillars 8 and 9 are crucial for the growth of competitiveness in economies based on innovation.

In the future, the evaluation of competitiveness by Global Competitiveness Index will prevail; the evaluation by Growth Competitiveness Index will stay as parallel indicator for a certain period of time.

Details on methodology and detailed data can be found in original publication: A.Lopez-Carlos (Editor), K. Schwab, M.E. Porter, *The Global Competitiveness Report 2005–2006*, World Economic Forum, 2006. Some information are available also on [www.weforum.org](http://www.weforum.org).

**Table IV.3.1 Growth Competitiveness Index (GCI) – 2001 to 2005 (rankings in the list of 117 countries in 2005<sup>1)</sup>)**

	2001	2002	2003	2004	2005
Finland	1	1	1	1	1
Denmark	14	4	4	5	4
France	20	28	26	27	30
Germany	17	14	13	13	15
The Netherlands	8	13	12	12	11
Austria	18	18	17	17	21
Greece	36	31	35	37	46
United Kingdom	12	11	15	11	13
Czechia	37	36	39	40	38
Hungary	28	29	33	39	39
Poland	41	50	45	60	51

Slovakia	40	46	43	43	41
Slovenia	31	26	31	33	32
USA	2	2	2	2	2
Japan	21	16	11	9	12

1) The number of evaluated countries was smaller in previous years; 102 countries in 2003 and 104 countries in 2004.

Finland has occupied the first place throughout the whole period with high values in all components of the growth competitiveness index. Stable second place of USA is attained thanks to the world highest technology level, in other two aspects – level of public institutions and mainly the stability of macro-economic environment – the position of USA is a little weaker. Most of the monitored countries experience no major changes. The gradual improvement of Japan has stopped.

The evaluation of Czechia does not change very much; the slight tendency of decrease observable in 2002-2004 is over.

Slovenia is the best among the monitored countries that became the EU members in 2004 (32<sup>nd</sup> place), followed by Czechia (38<sup>th</sup> place) and Hungary (39<sup>th</sup> place). A certain decline in the Growth Competitiveness Index being observed after the accession to EU in all monitored new Member States, with the exception of Slovakia (largest in Poland – by 15 places in 2004) stopped and a slight improvement occurred (largest in Poland – by 9 places).

**Table IV.3.2 Growth Competitiveness Index and component indexes in 2005 (rankings in the list of 117 countries)**

	GCI	Public institutions	Macro-economy	Technology
Finland	1	5	4	2
Denmark	4	2	3	5
France	30	20	27	24
Germany	15	8	28	16
The Netherlands	11	16	10	11
Austria	21	11	22	21
Greece	46	43	51	37
United Kingdom	13	12	18	17
Czechia	38	48	46	22
Hungary	39	34	63	30
Poland	51	64	53	39
Slovakia	41	45	49	34
Slovenia	32	35	35	32
USA	2	18	23	1
Japan	12	14	42	8

Total Growth Competitiveness Index (GCI) is composed of three component indexes: “Public institutions”, “Macroeconomic environment” and “Technology”. These component indexes vary in weight; the component index of technology has the highest weight for advanced countries.

Of the EU countries, only Finland and Denmark took places in the top ten countries in all three component indexes in 2005. Better overall position of Finland is given by higher weight of the technology component index.

The evaluation according to these three component indexes appears to be a relatively stable in France, followed by the Netherlands, United Kingdom, Austria and Slovenia. And on the contrary, great differences are reported by all new EU Member States, with the exception of Slovenia, and surprisingly also by USA and Japan. The United States finishing second in

total index, and even first in technology index, are taking 23<sup>rd</sup> place as far as the macroeconomic environment is concerned (Japan even 42<sup>nd</sup> place).

In the evaluation of the technology level a great weight is given to the indicator of foreign investments. These are relatively high in Czechia and due to them Czechia occupies 22<sup>nd</sup> place in the component technology index. Another reason for good position of Czechia is also a high availability of information and communication technologies. USA have been maintaining their leading position in the technology index over the long-term, followed by Finland.

According to the public institutions index, Denmark, Finland and Germany are in the top ten. A steep decline of Poland has stopped (down to 80<sup>th</sup> place in 2004). In this index, a great weight is given to the survey evaluation of corruption spread in respective countries and independence of justice from political pressures.

According to the macroeconomic environment index, Denmark is the best among the monitored countries (3<sup>rd</sup>), followed by Finland (4<sup>th</sup>). Places in the top ten are occupied also by the Netherlands (10<sup>th</sup>) and the United Kingdom. The worst ranked of the monitored countries is Hungary (63<sup>rd</sup>). “Hard” statistical data documenting the rate of macroeconomic stability (e.g. budget deficit, saving rate, inflation) have the highest weight in this index.

**Tab. IV.3.3 Technology Index and its three sub-indexes in 2005 (rankings in the list of 117 countries)**

	Technology (in total)	Innovation	ICT	Technology transfer
Finland	2	2	5	-
Denmark	5	10	1	-
France	24	20	22	-
Germany	16	9	20	-
The Netherlands	11	17	7	-
Austria	21	21	18	-
Greece	37	24	38	35
United Kingdom	17	16	15	-
Czechia	22	39	31	2
Hungary	30	36	35	8
Poland	39	31	43	24
Slovakia	34	46	36	9
Slovenia	32	23	27	54
USA	1	1	3	-
Japan	8	5	17	-

Technology index is measured by three sub-indexes: innovation, information with communication technology (ICT) and technology transfer. The technology index has higher weight (0.5) for determining the total growth competitiveness index (Table IV.3.4) in case of “core innovators”, i.e. countries with more than 15 registered U.S. patents per 1 million inhabitants. For other countries, weight of this index is not so high (0.33).

From three fourths the innovation sub-index is given by the number of registered U.S. patents per 1 million inhabitants and the tertiary enrolment rate in young population. First place is occupied by USA; places in top ten are taken also by Finland (2<sup>nd</sup>), Japan (5<sup>th</sup>), Germany (9<sup>th</sup>) and Denmark (10<sup>th</sup>). The worst within the monitored group is Slovakia (46<sup>th</sup>); Slovenia is the best ranking country of the new EU Member States (23<sup>rd</sup>).

From three fourths, the Information and communication sub-index is given by availability of mobile phones, PCs and Internet access. Denmark is the best among the monitored countries (1<sup>st</sup> place among 117 countries); places in top ten are held also by Finland (5<sup>th</sup>) and USA (3<sup>rd</sup>). The worst ranked of all monitored countries is Poland (43<sup>rd</sup>).

Czechia occupies a relatively good position with its 31<sup>st</sup> place; in the group of new EU Member States, only Slovenia is better (27<sup>th</sup>).

The transfer technology sub-index is given by the amount of foreign investments in a respective country and rate of foreign technology licensing. It is determined only for countries reporting less than 15 patent applications filed with U.S. Patent and Trademark Office (USPTO). Of the monitored countries, this sub-index is determined for Greece and new EU Member States. In this group, Czechia is markedly the best (2<sup>nd</sup> place among 117 countries). This position testifies to the interest of investors and readiness to accept foreign know-how, and not to the ability itself to create new knowledge.

**Table IV.3.4 Growth Competitiveness Index (GCI) and its comparison with Global Competitiveness Index (Global CI) in 2005 (rankings in the list of 117 countries)**

	GCI	Global CI
Finland	1	2
Denmark	4	3
France	30	12
Germany	15	6
The Netherlands	11	11
Austria	21	15
Greece	46	47
United Kingdom	13	9
Czechia	38	29
Hungary	39	35
Poland	51	43
Slovakia	41	36
Slovenia	32	30
USA	2	1
Japan	12	10

The Global Competitiveness Index (Global CI) marks the efforts to measure the competitiveness of countries at advancing economic globalization when it is necessary to make more complex analyses and compile the summary index from more components (sub-indexes) than in case of the so far used Growth Competitive Index (GCI).

The Global Competitiveness Index is based upon nine “pillars”: (1) Institution, (2) Infrastructure, (3) Macro-economy, (4) Health and Primary Education, (5) Higher education, (6) Market efficiency, (7) Technological readiness, (8) Business sophistication and (9) Innovation. The relative importance of pillars for the competitiveness growth depends on the degree of development of a country; pillars 1–4 play main role in less developed economies, pillars 5–7 influence significantly the competitiveness of economies based mostly on efficiency, and finally pillars 8 and 9 are crucial for growth of competitiveness in economies based on innovation. In this division, Czechia is ranked into the transition phase between second and third group; of the new EU Members States, also Slovenia and Hungary are in this group.

In evaluation by the Global Competitiveness Index (Global CI), USA and Finland alternate in leading positions; in the group of monitored countries the positions of France and Germany are significantly improving. In comparison with evaluation by the Growth Competitiveness Index (GCI), also the position of Czechia, which is best of the new EU Member States, is markedly better. Good position of Czechia is caused mainly by favourable values of pillars 2, 4, 5, 7, 8 and 9 (26–29<sup>th</sup> place among 117 evaluated countries) and weaker position (39<sup>th</sup>) attained for pillar 6 (Market efficiency); very weak is the position for pillar 1 (Institution, 52<sup>nd</sup> place) and pillar 3 (Macro-economy, 49<sup>th</sup> place).

#### IV.4 Competitiveness according to the World Competitiveness Yearbook 2006 of the Swiss IMD

The Swiss International Institute for Management Development (IMD) evaluated the competitiveness of 61 economies (53 countries and 8 regions) by more than three hundred criteria arranged into four blocks: economic performance – 77 criteria; government efficiency – 72 criteria; business efficiency – 77 criteria; infrastructure – 95 criteria. When compared with the competitiveness evaluation for the World Economic Forum, the Swiss IMD Institute uses more quantitative criteria (hard statistical data); the share of survey “soft” data (expert panels, public inquiries) accounts for one third.

The infrastructure is divided into five sub-groups: basic infrastructure; technological infrastructure; scientific infrastructure; health and environment; and education.

The infrastructure of science is measured by 22 criteria (17 quantitative; 5 survey questions); technological infrastructure has 20 criteria (13 quantitative; 7 survey questions). For other information see [www.imd.ch/wcc](http://www.imd.ch/wcc).

The Institute cooperates with 58 research workplaces worldwide. In Czechia, it cooperates with CERGE-EI – the joint workplace of the Charles University in Prague and the Economics Institute of the Academy of Sciences of the Czech Republic.

**Table V.4.1 Total competitiveness (rankings in the group of 61 economies<sup>1</sup>)**

	2001	2002	2003	2004	2005	2006
Finland	5	3	3	8	6	10
Denmark	15	6	5	7	7	5
France	25	25	23	30	30	35
Germany	13	17	20	21	23	26
The Netherlands	6	4	13	15	13	15
Austria	14	15	14	13	17	13
Greece	31	36	42	44	50	42
United Kingdom	17	16	19	22	22	21
Czechia	35	32	35	43	36	31
Hungary	30	30	34	42	37	41
Poland	47	45	55	57	57	58
Slovakia	41	38	46	40	40	39
Slovenia	38	35	40	45	52	45
USA	1	1	1	1	1	1
Japan	23	27	25	23	21	17

1) 61 national and regional economies were evaluated only in 2006; in the previous years the numbers were smaller.

#### Commentary:

IMD is arriving at somewhat different results – other ranking of countries – than experts for the World Economic Forum meetings. The United States occupied the first places in all six years of evaluation. Finland was always in the top ten – in 2002 and 2003 on the third place, then it slightly went down with the exception of 2005 (6<sup>th</sup> place) to 10<sup>th</sup> place in 2006.

The monitored new EU Member States report a slightly different ranking against the evaluation for the World Economic Forum; with a substantially worse position of Slovenia that is down on fourth place among the five monitored new Member States (ahead of Poland). The best position among these countries is held by Czechia (31<sup>st</sup>), with a relatively quick improvement of its positions since accession to EU in 2004 (by 12 places).