SLOVAKIA
KNOWLEDGE ECONOMY CONFERENCE

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"Benchmarking Slovakia's Readiness for the Knowledge Economy"

The attached document provides an overview of Slovakia's readiness for the knowledge economy in using the benchmarking methodology of the World Bank Institute (WBI). The paper, prepared by Mr. Aimilios Chatzinikolaou, WBI, should be considered as a draft document and in no way implies endorsement by World Bank management or its Board. The document is provided to conference participants for information purposes only.

Slovakia Readiness for the Knowledge Economy
A Preliminary Assessment

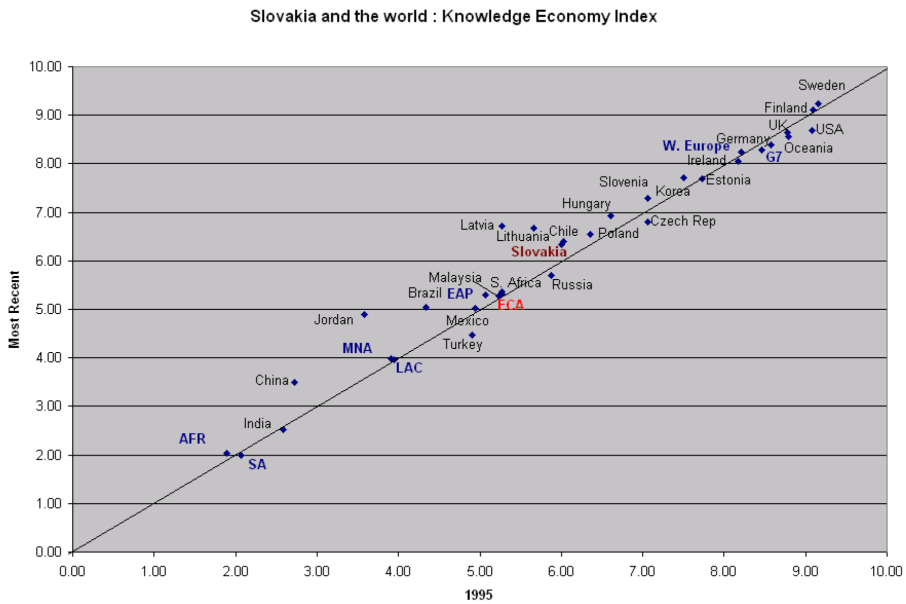
This document discusses Slovakia's readiness for the Knowledge Economy in using the benchmarking methodology developed by the World Bank Institute as presented in annex.

The big picture

Slovakia, despite its transition and recovery period, managed in short-term to improve its overall performance in the aggregate Knowledge Economy Index (KEI), still lagging behind regional EU candidates like Hungary, Poland, Czech Republic, Slovenia and the Baltics, which also demonstrated better rates of improvement. The country performs better than the regional average, standing roughly above the middle in the global KE map (Figure 1), but still lagging significantly behind its OECD peers and EU core members it will soon join. This presents a significant challenge and signals a sense of urgency for Slovakia since it will soon be competing with economies with a well-developed and constantly advancing knowledge foundation.

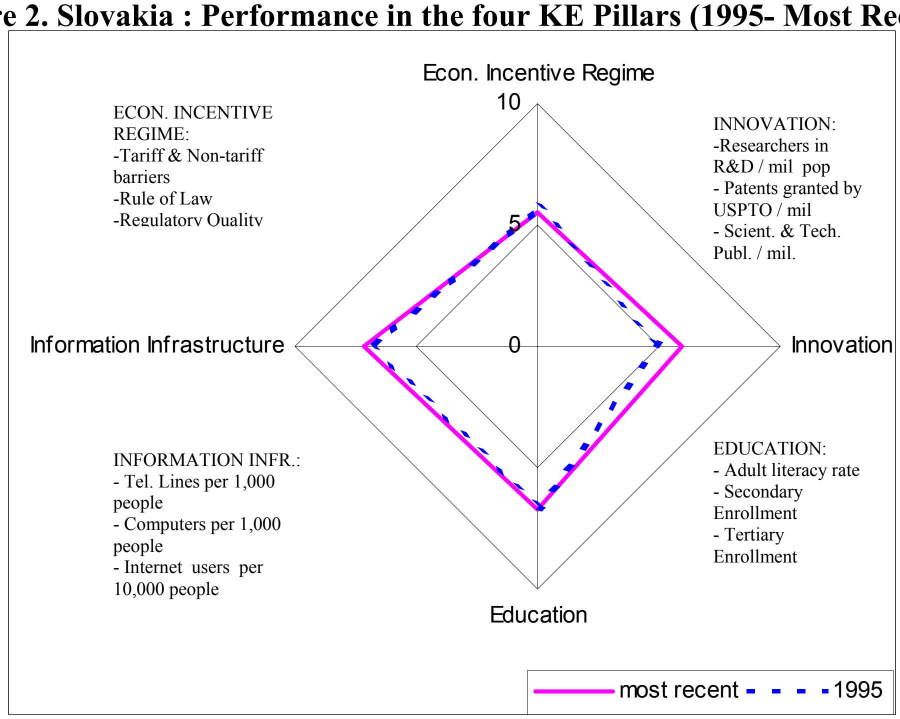
Examining performance in the four KE pillars (Figure 2), Slovakia regressed in Economic Incentive Regime – its weakest area, while rather stagnated in Education, a traditionally strong pillar for countries of the region. Slovakia demonstrated positive developments in its Innovation base, while also improved access and penetration rates of Information and Communications Technologies, the country's strongest pillar. Nevertheless, and as argued before, the country's performance may be overall positive but not as competitive as that of other countries of the region which are also seeking EU membership. In Figure 3. Slovakia is compared with Estonia and Slovenia - the two leading knowledge performers in the region - on their most recent performance in the four KE pillars. The gaps Slovakia needs to cover are obvious in all four pillars and particularly in Education and Innovation.

Figure 1. Knowledge Economy Index (KEI): Slovakia in a global context



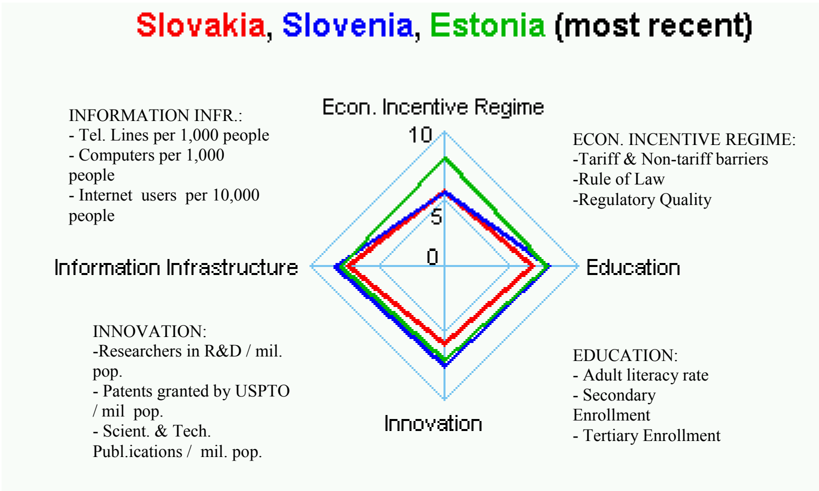
Source : Knowledge Assessment Methodology (KAM), Knowledge for Development Program, World Bank Institute (WBI), World Bank

Figure 2. Slovakia : Performance in the four KE Pillars (1995- Most Recent)



Source : Knowledge Assessment Methodology (KAM), Knowledge for Development Program, World Bank Institute (WBI), World Bank

Figure 3. Slovakia: Most recent performance in the four KE Pillars. Comparison with Estonia and Slovenia

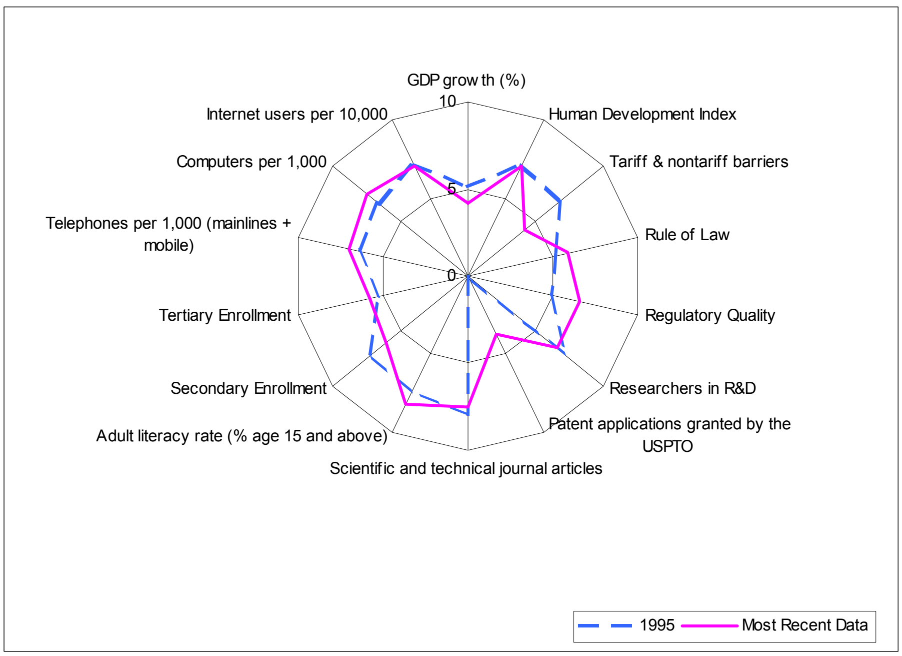


Source : Knowledge Assessment Methodology (KAM), Knowledge for Development Program, World Bank Institute (WBI), World Bank

The Pillars

In Figure 4. below we illustrate how Slovakia performed, throughout time, in each of the twelve variables that describe the four KE pillars and therefore the aggregate KEI, plus two performance variables (GDP growth and Human Development Index - HDI).

Figure 4. Slovakia: Performance through time in the KEI defining variables

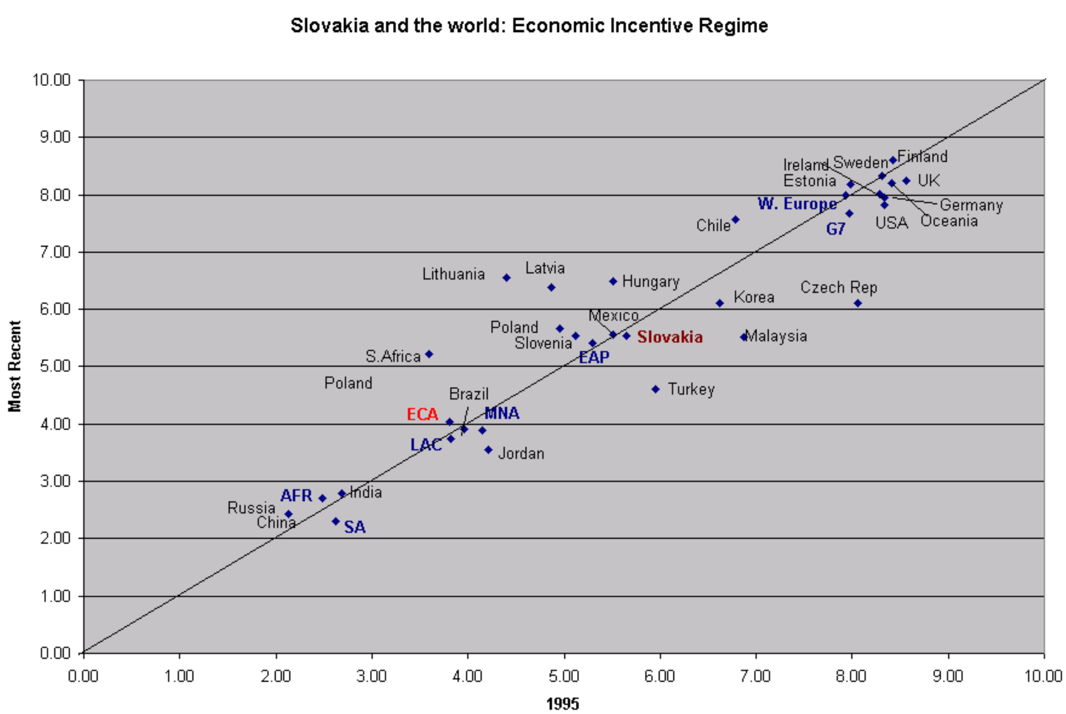


Source : Knowledge Assessment Methodology (KAM), Knowledge for Development Program, World Bank Institute (WBI), World Bank

In the pillar of **Economic Incentive Regime (EIR)** the country regressed, while major economies and EU candidates in the region, such as Hungary, Poland, Slovenia, Latvia, Lithuania, Estonia significantly improved. The country is currently scoring considerably below its EU candidate neighbors and falls significantly behind its OECD peers (Figure 5). Slovakia demonstrated improvements in the Rule of Law and Regulatory Quality indicators, while were outpaced by the current status of tariff and non-tariff barriers in the country. Despite the recent abolition of import surcharges, the average tariff rate -currently at 2.6%- and other non-trade barriers increased over time.

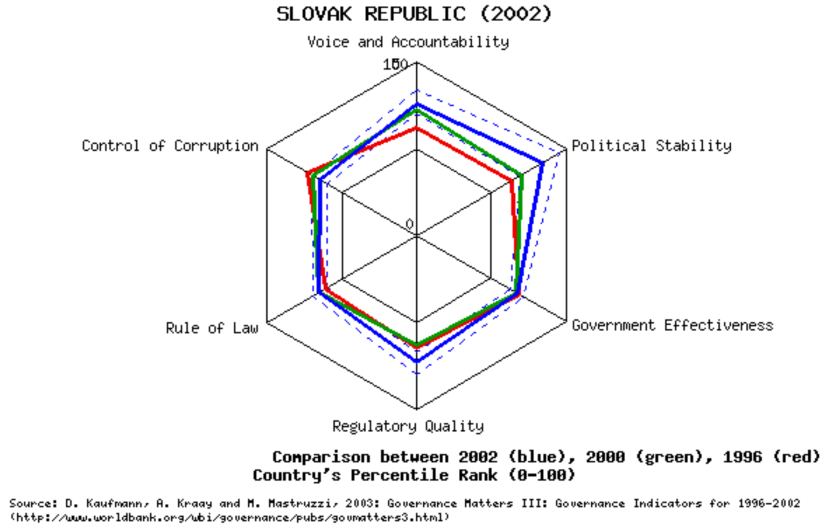
Furthermore, on the quality of *governance*, even tough the country has improved in major indicators over the years (Figure 6.), there seems to be an increased perception of corruption with potential negative impact on the increasing FDIs, recently improved international risk and investment ratings, and overall competitiveness. In addition, Slovakia in the indexes of transparency in policy making and competence of public officials, is ranked very low by the 2002-2003 Global Competitiveness Report (WEF) (66th and 53rd respectively, out of 80 countries in total). In other perception-based Government Effectiveness indexes, which describe efficiency of legal framework and effectiveness of law-making bodies, the country is ranked equally low. Countries such as Czech Republic, Hungary, Slovenia and the Baltics are ranked consistently above Slovakia.

Figure 5. Slovakia and the world : Economic Incentive Regime.



Source : Knowledge Assessment Methodology (KAM), Knowledge for Development Program, World Bank Institute (WBI), World Bank

Figure 6. Quality of Governance



Unemployment has been a perpetual obstacle to competitiveness and sustainable growth for Slovakia and the country's most pressing social problem. For the period 1995-2002 the average rate of unemployment has been at 15.6% (WEO –IMF) while for the year 2002 unemployment was around 19%. The rates of unemployment have been the highest in OECD, while the employment to population ratio, is one of the lowest: 50 percent of the working age population. This is significantly below the EU average of 61 percent and the OECD average of 65 percent respectively.

The persistence of high unemployment also reflects rigidities in the labor market. Since 1995 more than 50% of all unemployed persons have been without work for one year or more. Similarly, the heavy payroll-tax burden (amongst the highest in the OECD and the highest amongst EU candidates– around 51% of gross wages), raises labor costs and discourages job creation -particularly for the less skilled population- at least in the formal economy. Finally, the social welfare system - even though managed to limit the increase of poverty rates- remains over-generous and poorly targeted, providing those with low earning potential little incentive to find work, expanding the informal economy and worsening labor mobility by paying uniform benefits throughout the country, regardless of large regional differences in the cost of living. In addition, employment protection is high, discouraging employers from hiring new workers. An analysis by the World Bank[1] found a close link between unemployment and poverty: a household headed by an unemployed person in Slovakia was five times more likely to be living in poverty than a household headed by an employed person.

*Fiscal Deficit***:** In 2002, the fiscal deficit deteriorated to around 7% of GDP[2] from an average 4% for the period 1998-2001, and it has been amongst the highest in the OECD. This fiscal expansion comes at an inappropriate time in view of the EU accession

[1] Slovak Republic: Living Standards, Employment and Labor Market Study, World Bank 2002
[2] Slovak Republic, OECD Economic Outlook 2003

economic recovery, with growth accelerating from 1.3 percent in 1999 to 4.4 percent in 2002. The fiscal deterioration primarily reflects the impact of policy-driven measures such as the general tariff reduction, the elimination of the import surcharges, and other corporate and personal income tax cuts in several areas with the aim of making the country more competitive and attractive to investors. Controlling the deficit requires also an overhaul of the cash assistance provided by Social Security and Assistance programs for the unemployed and support for the disabled, which have grown exceptionally rapidly in recent years and need to be carefully reviewed. According to OECD[3] social assistance has increased at a 22% average annual rate during the period 1996-2001 – in line with wage increase. Tightening of fiscal policy, also in part to reduce the external imbalance to a more sustainable level should be a top priority for the Government.

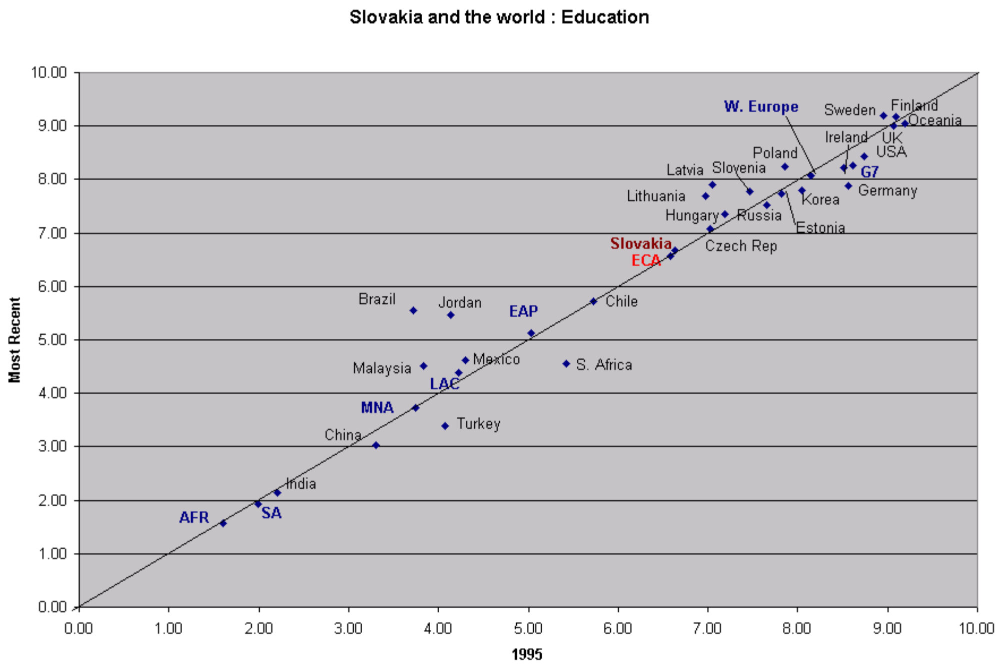
In terms of *trade,* the account deficit reached almost 9% of the GDP in 2001 and still standing close to 8%[4], reflects significant inflows of FDI and imports of capital goods as Slovakia becomes more fully integrated with EU economies. Nevertheless, the unfinished transformation of the enterprise sector has increased the reliance of the economy on imported goods because domestic producers have had difficulties adapting to the new competitive environment and large enterprises had difficulties finding reliable good quality domestic suppliers. This element in conjunction with a slow down in exports caused by weaker export demand by Slovakia's major trading partners, have contributed to high current account deficit.

How successful the government will be in its fiscal consolidation efforts, and in its broader efforts to reform the economy to prepare for EU accession, will depend critically on progress in building the institutions and capacities needed to design reforms and manage them, and in improving the tools of fiscal management and trade facilitation.

In **Education**, Slovakia carries a strong tradition, particularly in science and math, and it is a pillar which is instrumental for the country's transition to a knowledge based environment. Nevertheless, during the past five to seven years the country, improved marginally, rather stagnated in its overall performance in the pillar. The country falls behind other regional EU candidates, such as Hungary, Czech Republic, the Baltics, and it is significantly lagging its OECD peers (Figure 7).

[3] Slovak Republic, OECD Economic Outlook, June 2002
[4] Slovak Republic, OECD Economic Outlook 2003

Figure 7. Slovakia and the world: Education

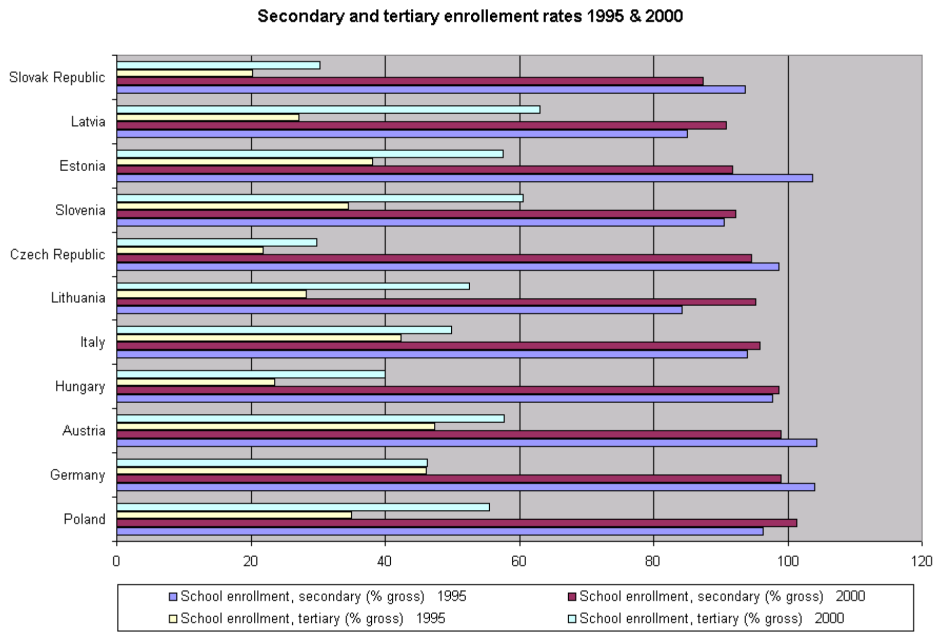


Source : Knowledge Assessment Methodology (KAM), Knowledge for Development Program, World Bank Institute (WBI), World Bank

Slovakia has 100% adult literacy rate. Enrollment rates in secondary fell significantly between 1995 and 2000 from 94 to 87 percent, while tertiary enrollment rates significantly improved over the same period, from 20 to 30 percent. In both indicators though, and particularly in tertiary enrollments, Slovakia is not performing as competitively as other economies of the region (Figure 8). In Slovakia, enrollment rates in tertiary education are around 30%, when regional economies like Slovenia, Latvia and Estonia demonstrate enrollment rates twice as large. The lack of highly qualified human capital appears to be a major factor hindering progress in Slovakia, since the also very small proportion of university graduates limits the scope for technology-intensive industries, and overall competitiveness. In Slovakia only 10 percent – versus an OECD average 23 percent[5] – of workers has completed tertiary education.

[5] Slovak Republic – Joining the EU. A Development Policy Review. World Bank, June 2003

Figure 8. Secondary and tertiary enrollment rates.



Source: SIMA, World Bank.

The secondary school system has a traditionally strong technical focus, which could be one of the most important shortcomings of the system, since early and narrow specialization, is creating mobility and flexibility problems in the labor market. One of the most important factors of the high rates of unemployment is the severe mismatch between existing stock of labor resources, which dramatically shifted from traditional manufacturing, mining and agriculture towards private sector services, finance and public administration (Table 1), and what is demanded in the new market economy. At secondary level, only 17 percent of students attend grammar schools preparing them for higher education. Recent trends seem to be encouraging, but the large majority of students is in specialized or vocational schools providing narrow technical skills. These students have little opportunity to change skill foundations, since only 2.7 percent of them are trained in enterprises[6], and overall training activities in the country are limited. More than a third of technical and vocational schools focus on skill training for the industrial sectors that are declining (i.e. mining, traditional manufacturing) helping to explain why nearly 80 percent of the registered unemployed.

Table 1. Employment by sector (% of total employment)

	1991	1992	1993	1994	1995	1996	1997	1998	1999
Agriculture	12.6	11.8	9.4	10.2	9.4	9	7.9	7.7	7.1
Industry	32.8	30.3	29.6	29.3	29.3	29.5	30	28.6	26
Construction	11.2	9.1	8.2	7.6	7.2	7.5	7.6	7.5	6.9
Services	48	52.6	54.2	55.1	55.5	55	54.4	55.9	59.1

Source : Slovak Republic, Living Standards, Employment and Labor Market Study (2002), page 30, The World Bank.

[6] Slovak Republic. OECD Economic Surveys. Volume 2002/11 June

Educational attainment has been critical for the rising income inequality in the overall egalitarian society of Slovakia, as measured by the Gini Coefficient, which between 1988 and 1996 increased by at least a third – from 0.18 to 0.25. Those with the highest risk of being poor are those living in a household headed by an unemployed person, or someone with only elementary education. As presented in Table 2., the poverty headcount for individuals living in households where the head has only elementary education, is 14.3 percent, with a risk of poverty 41 percent higher than the average. But, workers with basic or less than basic education represent almost a third of the total unemployed, and nearly 40 percent of the long-term unemployed. Unemployment rates for workers with completed basic education are around 30 percent; while for those with no completed formal education at all, unemployment rates are close to 90 percent. Workers with higher secondary or university degrees demonstrate negligible unemployed to vacancy ratios. Analogous to the disproportionate unemployment rates by educational attainment, are the educational wage differentials with university graduates earning about 70 percent or more on average than primary school graduates.

Table 2. Poverty Risk by Education Level (%) 1996

Education Level	Poverty Headcount	Relative Poverty Risk
Elementary	14.3	41
Apprenticeship	8.8	-13
Middle Vocational	10.1	0
Complete Middle Vocational	8.2	-19
Complete Middle General	12.8	26
Higher Vocational	11.1	9
University	7.9	-22
Total Average	*10.1*	*0*

Source : Slovak Republic, Living Standards, Employment and Labor Market Study (2002), page 30, The World Bank.

Despite the weak market relevance, quality of education is generally high and student performance is impressive: Slovakia's 26-64 year olds rank fourth highest in terms of completing secondary education (85%) amongst the OECD members. The three countries scoring higher than Slovakia, are USA (88%), Switzerland (87%) and Czech Rep.(86%). Fifth is Japan (83%). According to the Global Competitiveness Report 2002-3 (WEF), Slovakia ranks 3rd and 5th (out of 80) in two Indexes respectively that describe Availability of Scientists and Engineers and Quality of Math and Science Education.

Total public *spending on education* in Slovakia has been declining over the past seven years and is currently around 4 % of GDP, lower than the OECD average (almost 6%)[7], and that of countries like Hungary, Poland, Estonia, Latvia, Lithuania, Slovenia, which spend anywhere between 5% and over 7% of their GDP. Investment at the University level and faculty salaries are low, driving qualified academic staff to the private sector.

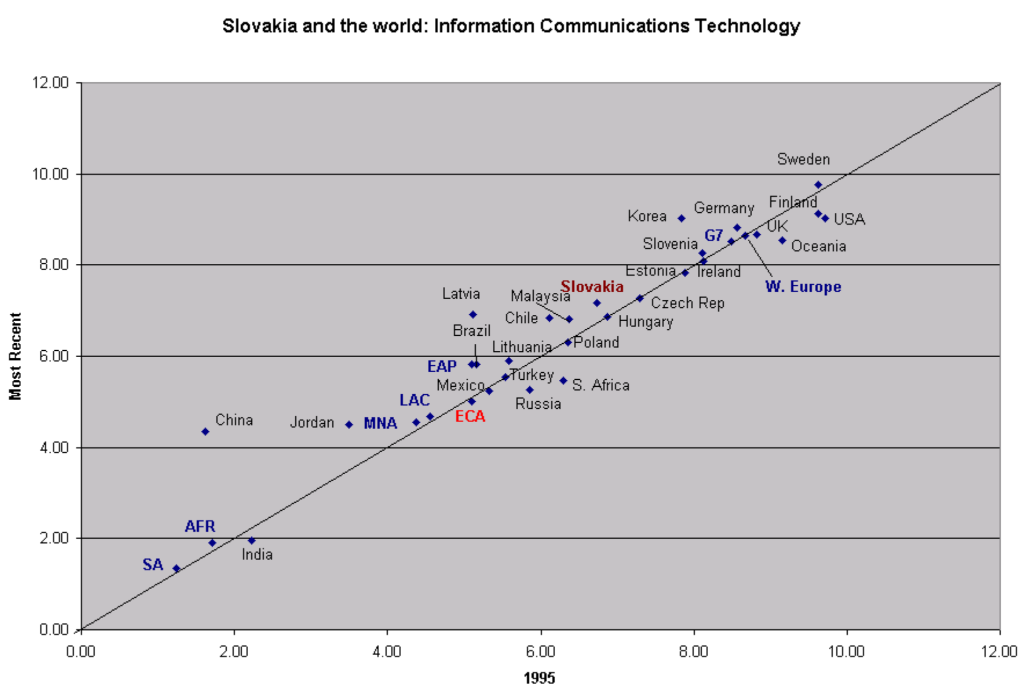
Overall, it is apparent that the sweeping changes brought about by the transition are having a major impact on the demand for education, but the supply side has not adapted

[7] OECD Economic Surveys Slovak Republic Volume 2002/11 June

fast enough or far enough to improve its relevance to the needs of the modern market economy. The system needs to be reoriented so as to provide more general, flexible and higher level skills which would enable workers to learn and to adapt throughout their careers. These skills may be better developed in general academic schools so that most students acquire capacity for lifetime learning, in contrast to vocational schools with narrow-focused, specialized programs. In addition to this, access to tertiary education should be expanded.

In the pillar of **Information Communications and Technology (ICT**) Slovakia did demonstrate a significant improvement during the last five to seven years, as shown in Figure 9. Currently accessibility, penetration and availability of ICT infrastructure shows as the strongest KE pillar for Slovakia. However, the country still lags behind other regional economies, such as the Czech Republic, Estonia and Slovenia, and the vast majority of its OECD peers and other EU members.

Figure 9. Slovakia and the world: Information Communication Technologies



Source : Knowledge Assessment Methodology (KAM), Knowledge for Development Program, World Bank Institute (WBI), World Bank

Looking at major ICT indicators in Slovakia (Table 3), telephone penetration numbers almost quadrupled in a period of seven years, with telephone mainlines and mobile phones per 1,000 people rising from 210 in 1995 to 804 in 2002. During the same period, computers per 1,000 people soared from 41 to180, while Internet usage, measured by internet users per 10,000 people, grew at a spectacular rate – from 52 to 1,604.

Nonetheless, despite the impressive progress it is evident also from Table 3 below, that the existing gap in the availability and penetration of communication technologies is still significantly large, particularly when Slovakia is compared with EU and OECD averages and other countries from the region like Hungary and Czech Republic. When also compared with other EU candidates like Slovenia and Estonia, Slovakia performs less competitively.

Furthermore, overall *ICT expenditure* as percentage of GDP in Slovakia (7.5%) is not far below the OECD average (8%), or the EU average (7.8%). It is though significantly lower that of other nations that are running the same EU accession race with Slovakia. For example Czech Republic and Hungary are spending respectively 9.5 and 8.9 percent of their GDP. A similar trend is evident in investment in telecoms as percentage of GDP in Slovakia (0.87%), which is also lower than that investments in Hungary (1.16%) and Czech Republic (0.93%).

Table 3. Key Information and Communication Technology Indicators

Countries	Telephones per 1,000 people(tel. mainlines+mobile phones)	Main Telephone lines per 1,000 people	Mobile phones per 1,000 people	Computers per 1,000 persons	TV Sets per 1,000 people	Radios per 1,000 people	Daily newspapers per 1,000 people	Investment in telecom as % of GDP	Internet hosts per 10,000 people	Internet users per 10,000 people	In/nal telecommunications, cost of call to US ($/3 min)	E-Gov/ment	ICT Expenditure as % of GDP
Slovakia	804	261	544	180	407	965	131	0.87	160	1,604	0.79	3.40	7.50
OECD averages (excl. Slovakia)	1,247	533	714	349	594	1,062	268	0.70	760	3,629	1.24	4.70	7.99
EU averages	1,387	568	819	347	626	960	231	0.66	655	3,753	0.48	4.72	7.80
Czech Republic	1,226	378	849	147	534	803	254	0.93	223	1,467	0.79	4.45	9.50
Hungary	1,008	361	646	108	445	690	465	1.16	192	1,576	0.98	4.39	8.90
France	1,216	569	647	347	632	950	201	1.01	233	3,138	N/A	4.67	9.10
Germany	1,367	650	717	435	586	570	305	0.37	314	4,237	0.33	3.95	7.90
Estonia	1,001	351	650	210	629	1,136	176	1.99	468	4,133	0.70	5.77	N/A
Slovenia	1,242	407	835	301	367	405	169	0.86	179	4,008	0.52	3.66	4.70

Sources : SIMA (World Bank database), ITU,WDI, WEF,IMD
Note : The table presents the most recent data available in the sources indicated. All variables are of quantitative nature, apart from the variable labeled: "E-Government", which is a qualitative Index based on interviews conducted by WEF (The Global Information Technology Report).

In the Networked Readiness Index (NRI)[8] put together by the World Economic Forum (WEF) which describes the degree of preparedness of a nation to participate and benefit from ICT developments, Slovakia, amongst 82 countries, is ranked 40th , but scores again poorly when compared to regional EU members, candidates, and other OECD peers (Table 4). The rankings in the table indicate, that even though the environment for ICT development in Slovakia is conducive, (particularly now with the almost complete liberalization of the sector), the overall capability, readiness, of the government, businesses and people to employ and leverage the potential of ICT is weak, particularly when compared with other advanced economies in the region and EU members. Similar indications, are also presented in Table 3, where Slovakia is ranked very poorly in an E-

[8]The Global Information Technology Report 2002-2003, WEF. The NRI is defined as "the degree of preparation of a nation or community to participate in and benefit from ICT developments. The Index is a composite of three components : the Environment for ICT – measured by three sub indexes (market, political/regulatory situation, and infrastructure) – Readiness – measured by three sub indexes (individual readiness, business readiness, government readiness) – and Usage – measured by three sub indexes (individual usage, business usage and government usage).

government Index produced by the WEF[9], which reveals considerably limited availability of government services on the Internet.

The overall picture in the sector is expected to change radically for Slovakia, since ongoing foreign investment in fixed line services, combined with the full liberalization of all telecom services as of January 1st 2003, is expected to contribute to strong growth in

Table 4. Network Readiness Index (NRI) and Component Indexes

	NRI Rank	Environment	Readiness	Usage
Slovakia	40	37	39	45
Estonia	24	28	21	21
Czech Rep.	28	31	25	29
Hungary	30	30	28	36
Slovenia	33	36	32	30
Latvia	38	41	32	39
Poland	39	47	45	34
Austria	16	12	18	14
Germany	10	9	14	11

Source: The Global Information Technology Report 2002-2003, WEF

the ICT sector over the next five years[10]. The completion of liberalization, introducing competition into the sector and raising the quality of network, is also expected to affect significantly Internet usage and penetration, which have been held back because of comparatively poor quality of lines and unreliability of telecom services. The sector's liberalization is expected to also significantly increase the number of internet usage boosting e-commerce, Internet banking and e-government initiatives.

It is very critical that the Government sets the development of the ICT sector as a priority in its agenda, particularly in view Slovakia's EU accession, by not only opening the market to investments and competition, but also by raising public awareness of the benefits of modern ICTs and by strengthening and enforcing laws related to ICT. (The adoption of a new advertising act in mid-2001 and an act on electronic signatures that came into force at the start of 2002, are good steps towards this direction). Currently, and as shown in three relevant indexes by WEF[11] (Table 5), Slovakia, out of a sample of 80 countries, ranks poorly particularly when compared with regional EU candidates. This indicates the gaps the country needs to cover, in order to improve efficiency and competencies in probably the most dynamic pillar of the knowledge-based economy.

[9] The Global Information Technology Report 2002-2003, WEF
[10] Slovakia Country Profile 2003,EIU
[11] The Global Competitiveness Report 2002-2003

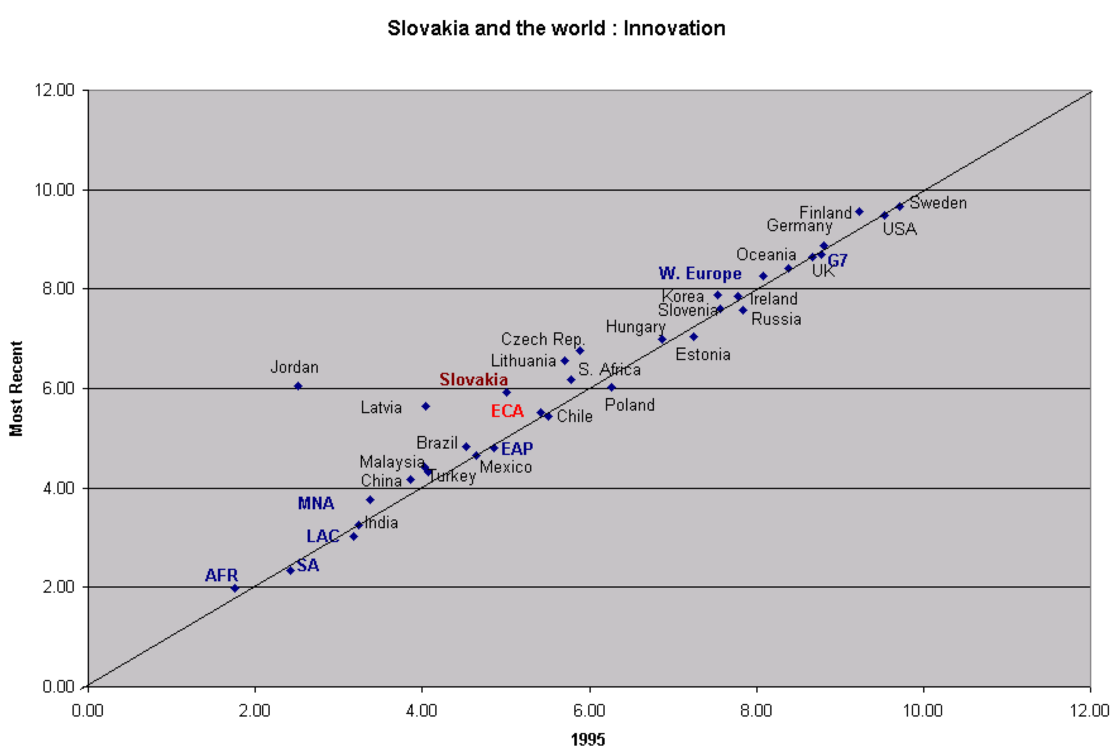
Table 5. Government's role in ICT development.

	Government Prioritization of ICT Ranking	Government Success in ICT promotion Ranking	Laws relating to ICT Ranking
Slovakia	59	63	51
Estonia	17	9	12
Hungary	13	17	13
Czech Rep.	29	44	32
Slovenia	47	38	21
Latvia	34	45	49
Poland	65	59	36

Source: The Global Competitiveness Report 2002-2003,WEF

In **Innovation,** Slovakia improved its overall performance during the last five to seven years, but it still remains significantly weak when compared to regional and EU economies (Figure 10). Slovakia is lagging behind numerous countries from the region, such as Czech Rep., Hungary, Lithuania, Poland, Slovenia, the Baltics, and it falls further behind its OECD peers.

Figure 10. Slovakia and the world : Innovation

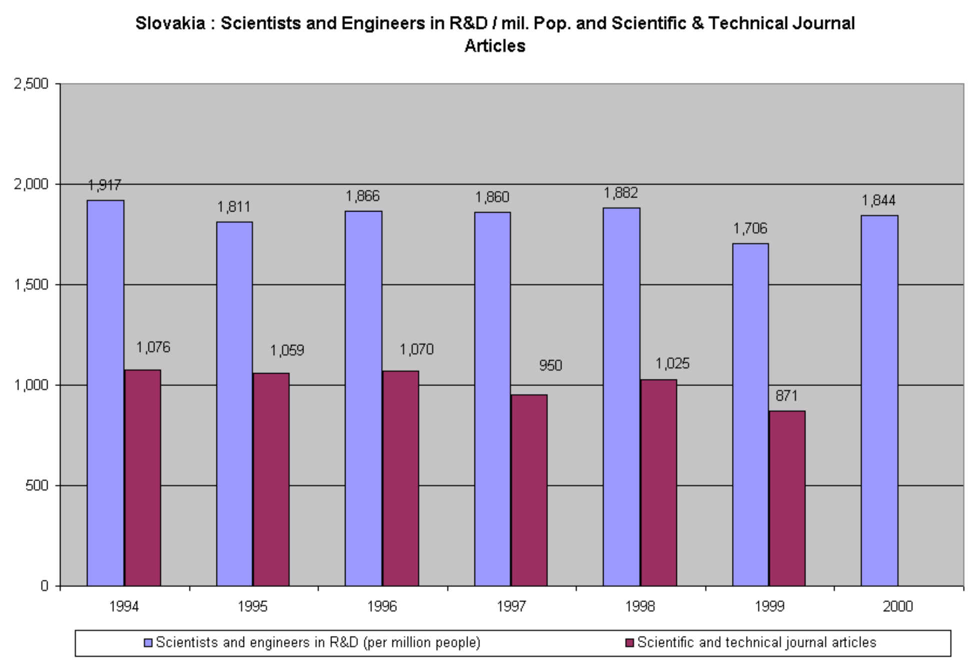


Source : Knowledge Assessment Methodology (KAM), Knowledge for Development Program, World Bank Institute (WBI), World Bank

Looking at thee major Innovation variables which defined Slovakia's position in the figure above, data indicates that Slovakia lost some of its research personnel during the last five to six years, while patent activity -even though increased- still remains minimal. The availability of scientific articles and journals between 1995 and 1999 actually decreased, which is an interesting phenomenon, considering the strong tradition in science and math education and substantial availability of scientists and engineers in the country (Figure 11).

Gross domestic *expenditure on R&D* in 2000 in Slovakia, reached 0.69% of GDP (0.45% business R&D and 0.24% public R&D). Spending in R&D for the period 1996-2000 presents a declining trend (Figure 12), and the current level of spending is lower than that in 1996. Slovakia's current R&D expenditure is one of the lowest in OECD which had an average spending of 2.24% of GDP, while the EU-15 group in 2000 was spending on average 1.88% of GDP. Neighboring countries and EU candidates, like Hungary, Czech Republic, Estonia spend significantly more. Business R&D expenditures in Slovakia also decreased throughout the period 1997-2000- from 0.85% of GDP in 1997 to 0.45 in 2000, and remains significantly low by EU and OECD standards[12]. Only though 9.5% of the total spending on R&D was spent in 2000 by the higher education system. This share, which is equivalent to 0.07% of GDP, is the smallest in the OECD arena, with an average of 17.1% of total R&D spending, or 0.38% of GDP[13].

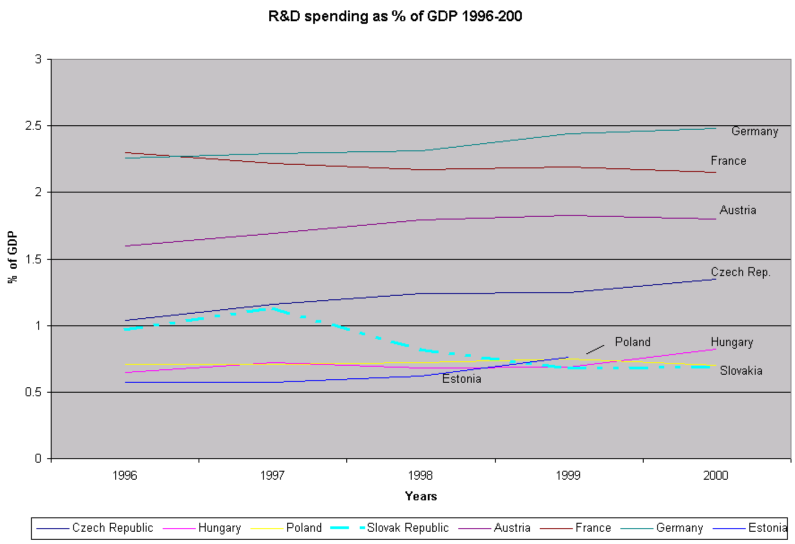
Figure 11. Slovakia : Scientists and Engineers in R&D and Scientific Publications



Source : SIMA, World Bank . Note : Data for Scientific and technical journal articles was not available after 1999.

[12] OECD Science, Technology and Industry Outlook, OECD 2002
[13] OECD in figures. Statistics on the member countries. OECD 2002.

Figure 12. R&D spending 1996-2000.



Source : SIMA, World Bank

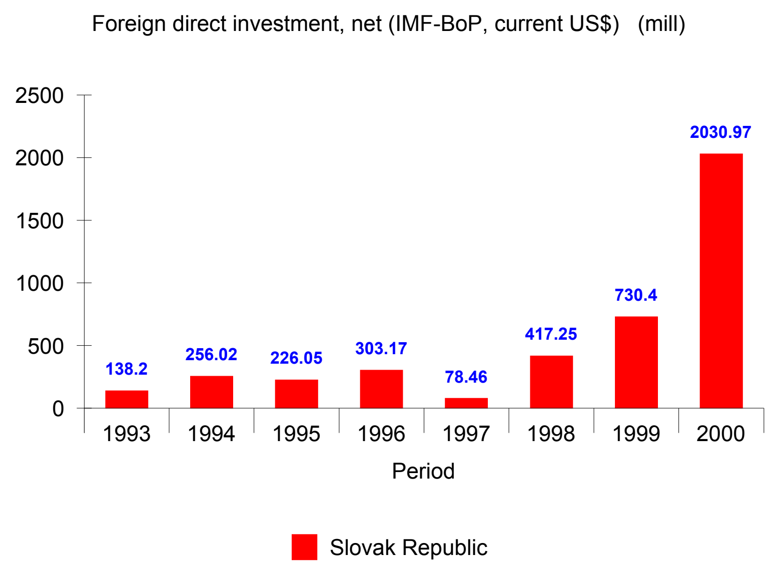
Another significant element of Innovation is *attraction of FDIs,* where Slovakia picked up in volume and pace significantly after 1998 (Figure 13). Historically, Slovakia was amongst the least successful transition economies at attracting FDIs. However, progress in privatization since 1998 and an improving business environment led to a sharp increase in FDI inflows, from US$730m in 1999, to US$2bn in 2000, and to US$4bn in 2002[14]. In Slovakia and in year 2000 FDI inflows reached the equivalent of 10.4% of GDP- from 1.7% in 1999 - which was amongst the highest in the OECD arena and far higher than what other regional economies attracted. In 2001, FDI inflows amounted close to 7% of GDP. Slovakia's additional advantages as a destination for FDIs are its strategic position in Europe, with some investors also attracted by the competitive Slovak labor market, which offers a relatively highly qualified but inexpensive workforce. Following the examples of Henkel, Volkswagen, Siemens, Coca-Cola, the decision of PSA Peugeot-Citroën (France) to locate its new €700m (US$752m) auto plant near Bratislava (to start production in 2006) sets a positive signal for other potential greenfield investment into the country. The country's main disadvantages though still remain its relatively small domestic market, the unreformed nature of many of its companies, and a relatively less developed infrastructure.

The sectors that accounted for almost 95% of FDI inflows in 2001 were the industrial production sector (43% from 53.1% in 2000), transport, warehousing and communications (13.9% from 16.9% in 2000), finance and insurance (26.2% from 12%

[14] Slovakia: Country Profile 2003. The Economist Intelligence Unit.

in 2000) and wholesale and retail trade (11.3%)[15]. The challenge for Slovakia would be to secure a consistently large amount of FDIs in the Slovak economy which would be instrumental for the economy's competitiveness and long-term growth.

Figure 13. FDIs in Slovakia: 1993-2000



The large inflows of FDIs have been promoting the growth of fixed investment which rose by 11$^{1/2}$ percent in 2001, reaching 31percent of GDP, well above other OECD transition countries and the highest in the OECD arena[16]. The overall investment trends, along with privatization, restructuring or liquidation of loss-making companies and recent and on-going structural reforms, have improved substantially the overall business climate, though slightly less attractive than in neighboring countries. The recent investment boom has occurred amid hardened budget constraints, higher profitability and enhanced corporate governance. Moreover, the restructuring of the banking sector and improved banking supervision have lessened the risks of unsound lending.

Strengthening the regime *of intellectual property rights* is also crucial for investment in creative industries and industries intensive in research and development. Strengthening the judiciary system and closer coordination with the countries' neighbors and particular the Czech Republic would help. With the split of the former Czech and Slovak Federal Republic, most of the staff, equipment, and know-how stayed in the Czech Republic, while the Slovak intellectual property rights protection was established from scratch. In relevant Indexes measuring protection of property and intellectual property rights provided, by WEF and Heritage Foundation, Slovakia is ranked lower than the vast majority of EU candidates.

[15] FDI in Slovakia. Impact on Economy. Effects on Domestic Industry. Positive Results and Limitations. National Bank of Slovakia and OECD, 2002.
[16] Slovak Republic, OECD Economic Surveys.

Alongside of the hardening of budget constraints, trade integration has been a significant driver of enterprise restructuring, particularly in the manufacturing sector. Made possible by trade liberalization and driven by foreign investors, the process permitted the insertion of Slovak manufacturing into global manufacturing networks. Manufacturing trade as percentage of GDP in Slovakia is one the most competitive in the region, with large contribution from the auto-manufacturing industry. In year 2000, the production pattern of car manufacturer Volkswagen Slovakia accounted for 15% of Slovakia's total exports. High-tech exports though, as percentage of manufactured exports, still remain at one of the lowest levels by regional and OECD standards (Table 6).

Figure 6. High-tech exports as percentage of manufactured exports 1994-2001

	1994	1995	1996	1997	1998	1999	2000	2001
Slovak Republic	4.9	3.8	3.8	3.7	3.7	4.5	4.1	4.2
Hungary	4.8	6.3	5.4	17.1	19.8	21.9	25.5	23.4
Czech Republic	4.6	5.8	7.7	8.1	8.6	8.8	8.6	10.1
Estonia		6	8.7	9	11.6	12.7	27.9	19.1
Slovenia	3.5	3.4	4.2	4	4.2	3.8	4.5	4.9
Lithuania	5.2	3.6	3.6	3.8	3.3	3.3	4.4	4.9
Germany	12.8	13.1	13.1	13.9	14.8	16	17.6	
France	18.1	19	18.3	21	22.1	22.7	23.9	22.8
Austria	9.9	9.1	9.7	11.1	11.2	12.4	13.3	13.9

Source :SIMA, World Bank

Despite all recent positive market and legislative developments, SMEs in Slovakia still face serious challenges which include significant amounts of bad loans held by many companies, the challenges of supplying foreign retail chains, and the need to improve access to financing. Such access would be essential to fund equipment investment and adapt marketing strategies to the new environment. Biases against small business in the business framework have arisen from the preferential tax treatment provided to large (and largely foreign) investors and from the absence of actionable debt resolution procedures. Partly as a result, Slovak banks are reluctant to lend to small business. In a survey[17], small firms in Slovakia identified the high cost of borrowing, the high level of taxes, the complexity of tax regulations, and restrictive entry procedures as the four main obstacles for their business. In particular, start-up costs and particularly registration costs in Slovakia remain particularly high, which makes cost of doing business really expensive[18].

Amongst the OECD countries availability of venture capital in Slovakia, as well as growth of venture capital markets over the period 1995-2000, has been stagnating at the very bottom of the group. Actually data from OECD[19] and indexes from WEF[20] indicate that availability of venture capital in Slovakia has been deteriorating.

In Table 7 below, relevant qualitative indexes by WEF are presented indicating perceptions about how easily businesses can be conducted in Slovakia, also providing

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[17] Slovak Republic Living Standards, Employment and Labor Market Study . A World Bank Study, World Bank, February 2002.
[18] Entrepreneurs and the ordering of institutional reform. Poland, Slovakia ,Romania, Russia and Ukraine compared. Economics of Transition, Volume 8(1) 2000, 1-36.
[19] OECD Science, Technology and Industry Outlook 2002 & 2003, OECD
[20] The Global Competitiveness Report 2001-2002 and 2002-2003

with a general description of innovation and entrepreneurial capacity in the country. Out of 80 total countries in the sample, Slovakia scores very poorly, and falls behind other economies of the region, particularly Hungary, Estonia, Czech Rep. and Slovenia.

Table 7. Slovakia : Global Competitiveness Report Rankings by WEF

	Slovakia	Hungary	Czech Rep.	Estonia	Slovenia
Availability of Venture Capital	54	40	56	24	32
Intellectual Property Rights Protection	46	26	30	31	24
Burden of Regulation	64	19	44	7	35
Administrative burden for startups	46	17	51	6	24
Intensity of Local Competition	65	21	27	45	40

Source: The Global Competitiveness Report 2002/3,WEF.

Significant attention and priority needs to be placed by the Slovak Government in the Innovation pillar, by providing and securing an innovation/entrepreneurship-friendly framework where existing relative strengths, such as expanding SMEs, educated human capital and foreign capital, can be linked together and enhance competitiveness and overall knowledge readiness. In this manner, Slovakia will be better positioned to reap the benefits from its imminent EU accession, at administration, enterprise and household levels.

ANNEX

Knowledge Assessment Methodology

(The link will soon be available to public, current link for WB staff: http://info.worldbank.org/etools/kam2004/home.asp)

WBI's program on *Knowledge for Development* (K4D) uses an interactive web-based tool-the knowledge assessment methodology which consists of a set of 76 structural and qualitative variables that benchmark how an economy compares with its neighbors, competitors, or countries it wishes to emulate. This simple benchmarking tool is a first step in helping to identify the problems and opportunities that a particular country faces in the four pillars of the knowledge economy (see below), and where it may need to focus policy attention or future investments. The comparison for the 76 variables is undertaken for a group of 121 countries which includes almost all of the OECD economies (except Luxembourg) and about 90 developing countries.

The set of 76 variables serve as proxies for the following four pillars that are critical to the development of a knowledge economy (KE):

· An *economic and institutional regime* that provides incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship.
· An *educated and skilled population* that can create, share, and use knowledge well.
· A *dynamic information infrastructure* that can facilitate the effective communication, dissemination, and processing of information.
· An *efficient innovation system* of firms, research centers, universities, consultants and other organizations that can tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology.

Included in the KAM are also several variables that track the *overall performance* of the economy. These variables help to illustrate how well an economy is actually using knowledge for its overall economic and social development.

Basic Scorecard

As working with a large set of 76 variables can be unwieldy, a simplified "basic scorecard" consisting of 12 variables that are based on the four pillars of the knowledge economy, plus two relating to performance, has been developed. In essence, this scorecard attempts to capture a country's preparedness for the knowledge-based economy. *This scorecard can be captured for 2 points in time: for 1995 (or closest available) and for the most recent available year.*

The indicators used in the basic scorecard are as follows:

i. Performance Indicators

Two variables are used to illustrate the overall performance of a country: *annual GDP growth* and the *human development index*. Annual GDP growth is a good indicator of a country's overall economic development. The human development index (HDI) is a composite measure of three components: longevity (measured by life expectancy); knowledge (adult literacy rate and mean years of schooling); and standard of living (real GDP per capita in purchasing power parity). The HDI provides information on the human development aspect of economic growth.

ii. Economic Incentive and Institutional Regime

Three variables are used as proxies for this pillar. The *first, tariff and non-tariff* barriers from the Heritage Foundation provides a measure of the degree of competition, and is a composite of the rating on the average tariff rate, non-tariff barriers, and corruption in the customs service. The other two variables have been chosen from WBI's Governance dataset. *Regulatory quality* measures the incidence of market-unfriendly policies such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas such as foreign trade and business development. *Rule of law* measures the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of both violent and non-violent crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts.

iii. Education and Human Resources

Three variables are used for this pillar*: the adult literacy rate (percentage of population aged 15 and above)* gives a very broad stock measure of educated population, while *secondary and tertiary enrolment rates* provide a flow rate.
Adult literacy rate refers to the percentage of people aged 15 and above who can, with understanding, read and write a short, simple statement on their everyday life. Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education indicated. *Secondary education* completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers. *Tertiary education*, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.

iv. Innovation system

Three variables have been chosen to represent this pillar. As an input into the innovation system, we *use researchers in R&D per million population*. For output, we have *patent applications granted by the US Patent and Trademark Office (USPTO) per million population*, and *scientific and technical journal articles per million population*. *Patents granted by the USPTO* includes utility patents and other types of U.S. documents, such as design patents, plant patents, reissues, defensive publications, and statutory inventions and registrations. The origin of the patent is determined by the residence of the firstnamed inventor. *Scientific and technical journal articles* refer to the number of scientific and engineering articles published in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences.

v. Information Infrastructure

Three variables are used for this plank of the knowledge-based economy. *Telephones per 1,000 population* is the sum of telephone mainlines and mobile phones and provides a better indicator of connectivity than either in isolation. *Computers per 1,000 population* refers to the number of self-contained computers designed to be used by a single individual and is an indicator of personal computer penetration and use of relatively new technology for information processing. *Internet users per 10,000 population* refers to the number of computers with active Internet Protocol (IP) addresses connected to the Internet and is used as an indication of how well a population has advanced to the level of adapting and using advanced communication channels (Internet) to serve its priorities.

Note: While there may be more robust data describing a country's preparedness for a knowledge-based economy, the 14 variables selected and described above are generally available for a larger time series and remain regularly updated for the vast majority of the countries that are assessed by the KAM.

Knowledge Economy Index (KEI) and Knowledge Index (KI)

The basic scorecard is used to derive the Knowledge Economy Index (KEI) as well as the Knowledge Index (KI). The KEI is calculated based on the average of the performance scores of a country or region in all four pillars related to the knowledge economy (economic incentive regime, education, innovation and information and communications technology). The KI is the simple average of the performance of a country or region in three KE pillars (education, innovation and information and communications technology). The aggregate score for each pillar is derived based on the calculation of the average normalized scores of the three variables that describe a pillar. For both the KEI and the KI, the data is shown for two points in time: 1995 and most recent.