

Innovation policy in six candidate countries: The challenges
Contract: INNO-99-02

Innovation Policy Profile: Czech Republic

Compiled by: Karel Mueller, Universita Karlova v Praze

Final Version, September 2001



**Study commissioned by the
Directorate General for Enterprise -
European Commission.**

**The views of this study are those of
the authors and do not necessarily reflect
the policies of the European Commission.**

Contents

SECTION 1 - INNOVATION POLICY FRAMEWORK	7
1.1 ISSUES FOR INNOVATION POLICY ARISING FROM THE PROCESS OF ECONOMIC REFORM AND ACCESSION.....	7
1.2 MAIN DEVELOPMENT IN INNOVATION POLICY.....	14
1.3 THE INNOVATION POLICY COMMUNITY	18
1.4 ASSESSMENT OF INNOVATION POTENTIAL: DATA COLLECTION, SURVEYS AND INDICATORS.....	22
1.5 LEGAL AND ADMINISTRATIVE ENVIRONMENT FOR INNOVATION	23
SECTION 2 - MEASURES TO FOSTER INNOVATION IN BUSINESS	27
SECTION 3 - BUSINESS INNOVATION INTERFACES AND SUPPORT MEASURES	39
3.1 RESEARCH COMMUNITY - INDUSTRY CO-OPERATION	39
3.2 SUPPORT FOR START-UPS AND NEW TECHNOLOGY BASED FIRMS	44
REFERENCES	55

Section 1 - Innovation Policy Framework

The perception and solution of the innovation issues in the Czech Republic (CR) will be introduced in the following two paragraphs. In the paragraph 1.1 the *innovation resources/capacities* will be described, and the ways outlined, how they have been changing. The attention will be focused on the period of last 5 years which is - in case of the CR - noted by immediate impact of radical economic reform. Of course, the factors which exert influence on innovation resources are mostly of long term nature. They are depending on education system, scientific schools, research traditions, industrial pattern, last but not least on readiness of society to accept and absorb changes. For this reason a short comment on innovation tradition will be added. One will be, consequently, able to see better what innovation related effects have been mobilised by recent economic reform and what issues still remain to be solved. Next paragraph will be more focused on the recent regulatory efforts, their political justification and institutional background.

1.1 Issues for innovation policy arising from the process of economic reform and accession

Let us define *innovation tradition* as the accumulated knowledge and practices of action how to develop industrial resources in the environment of economic considerations, political aims and cultural valuations, more specifically, technological capabilities to develop new products and manufacturing processes, adopt organisation patterns in order to improve economic performance and attain justified socio-cultural aims. The growth and pattern of innovation tradition in the Czech lands is closely associated with its extensive industrialisation the scale of which was mostly shaped by demand of large economic blocs (Austrian empire, East bloc), including their military aims. The transition from war periods to peaceful ones, from bloc dependence to independence has been always great challenge to national economic system since it had to be export intensive in order to utilise the extensive manufacturing capacities, and flexible enough in order to adapt to the changing environment (similar situation happened in the 90s). The innovation tradition has been shaped by two (macro-) economic circumstances:

- Existence of manufacturing branches which were intensive in technological skills (machinery, chemical industry,

telecommunication, arms production).

- Intensive export and openness to world markets with technology advanced products.

These factors had also innovative influence in the command system (1948-1990), even if it had the features of a „closed system,, with anti-innovative impact; in this period always one third of export was going to western countries, and new high tech branches were developed. The innovation tradition in Czech lands can be specified by some additional and nation specific factors of influence:

- Educational system with strong position of engineering training both in the second level (technical high schools) and the third level (university) training.
- In-house R&D capacities in manufacturing firms (two thirds of industrial science capacities were employed in production (at the beginning of 90s the national R&D system employed about 100 thousands persons, out of which 60 thousands were active in the field of industrial science, and out which 40 thousands worked in the laboratories of the industrial enterprises).
- Production co-operation among the manufacturing branches and sub-branches (organisation capability to organise manufacturing of larger investments segments, like construction of power stations, production plants, refineries).
- Positive - yet informal - relationship between academic and industrial science communities.

These factors should been taken into consideration while studying institutional aspects of innovation resources, the options and constraints of their growth.

The *transitive situation in the 90s* can be described by help of *two periods* which are noted by different circumstances, strategies of economic reform, political context as well as different approach to the issue of innovation. In the first period which covered the first half of the 90s, the aims of the *radical* economic reform were followed - privatisation of state enterprises, subsequent liberalisation of prices, foreign trade, foreign currency regime and other production factors. Coupon method - as the prevailing form of privatisation - was chosen not only because of the conceptual considerations but also for the reason that one counted with important role of domestic capital in the privatisation process, and formation of domestic business strata. The strategy of economic reform was justified by the political victory of right-wing parties in the first democratic elections. The effects of the economic reform seemed successful: economic growth was restored shortly, the unemployment was low (about 2%) and inflation was pushed down to 10%, shortly after liberalisation.

During the first half of the 1990's, there was no specific innovation policy. It was assumed that the rapid transition to the terms of private ownership is the best way of restructuring economy, including the growth of its innovative capacities of firms.

During the first half of the 1990's, there was no specific innovation policy. However, there existed political awareness of the innovation issues which was „built in„ the concept of economic reform: it was assumed that the rapid transition to the terms of private ownership is the best way of restructuring economy, including the growth of its innovative capacities of firms. Two measure can be named which were related to the innovation issue (mostly indirectly): (i) undervaluation of exchange rate of domestic currency which made it possible for manufacturing firms to re-orient their export from collapsing eastern markets to western ones; experience with advanced markets had positive effect on practices of domestic firms - they have learnt how to combine the technological and marketing issues in management of firms, and (ii) a general impact of economic reform on innovation capacities of firms mediated by the changes in the industrial branch structure; namely, rapid and extensive way of privatisation of undercapitalised firms, and in the situation of constrained access to new capital, has brought about that larger (usually low tech) enterprises (like metallurgy, heavy machinery, coal mining, energy production) could better face the constraints set by economic reform than the middle and high tech manufacturing; middle tech manufacturing enjoyed certain advantage of foreign capital and technology inflow (like the case of automotive production ŠKODA/VW), yet the volume of FDI was in this period low (in comparison with Hungary and Poland).

There were taken also more direct measures which were more directly related to innovation resources: (a) privatisation of (about 100) industrial R&D institutes which had, however, ambivalent effect on the R&D capacities of industries; on one hand it pulled R&D institutes to respond to technological demand of firms and, on the other hand, it de-valuated research capacities of the R&D institutes since they *could* find market for their services or even specific products but *could not* find it for research output, and (b) decision of government to pursue a R&D policy (1994) which, however, accepted the above mentioned „concept„ of economic reform - government and public R&D funding was to be limited to public science (Academy of Science and universities) while the industrial science was expected to be funded from the resources of enterprises (see closer the section 1.2).

Since 1995-96 a certain revision of the strategy of economic reform is going on.

Since 1995-96 a certain revision of the strategy of economic reform is going on. It is carried out by left-wing Government (which gained support in last elections) and mostly based on the reflection on the unexpected consequences of the strategy of radical economic reform: decline of economic growth, growing deficit of trade balance (see Table 1); failure of domestic capital to restructure domestic industry (not so much because of its insufficient size but loss of autonomy which has been undercut by the entanglement with large and inefficient enterprises); insufficient changes in the level of enterprises, in particular unsuccessful privatisation of large enterprises; lagging institutional

framework, in particular in the sphere of market and judiciary institutions; low dynamics and restructuring of education system; serious underfunding of R&D.

**Table 1 - Basic Macroeconomic Indicators
 (CR, 1995-1999, current prices, bil. of CZK)**

Indicator/year	1995	1996	1997	1998	1999
GDP¹	1 381	1 572	1 680	1 820	1 870 ³
GDP²	1 381	1 434	1 438	1 405	1 400 ³
GDP² annual growth, %	5.9	3.8	0.3	-2.3	-0.5 ³
Final consumption of households	692	740	756	733	.
Final consumption of government	275	272	281	283	.
Rate of unemployment	2.93	3.52	5.23	7.48	9.4 ³
Rate of inflation	9.1	8.8	8.5	10.7	2.1 ³
Gross formation of fixed capital	442	478	458	441	.
Export of products and services	741	809	875	969	.
Import of products and services	806	922	988	1 066	.

Sources: Czech Republic in Numbers, Czech Statistical Office, Prague, 1999; 1. current prices; 2. constant prices (1995), 3. preliminary data

The Government measures have been oriented to a solution of the above mentioned problems. Its efforts have been focused on promotion of exports; privatisation of domestic banks; introduction of incentive schemes for FDI; anti-corruption efforts; establishment of revitalisation agency which is intending to solve the problems of selected large enterprises; advanced efforts to improve legal framework for business sector and other spheres (in accordance with approachment to EU framework); elaboration of new concepts for education and R&D including the increased funding and institutional changes. In particular, the increased public promotion of FDI, domestic R&D, and formation of industrial zones can be considered as the most relevant measures which are positively, even if indirectly, related to the innovation issues. The investment intensity, which is crucial condition for a growth of technology based innovation, does not still indicate positive trend in favour of technological restructuring and innovation. These issues are mentioned in the **Table 2** as the country specific indications/indicators of innovation. They are not specific so much by type of indicator (such indicators are in general available); they are specific by type of problem - these are relevant problems for the analysis of the innovation issues in the CR. Moreover, some indicators are, indeed, country specific - they are mentioned in last three lines of the **Table 2**.

Increased public promotion of FDI, domestic R&D, and formation of industrial zones can be considered as the most relevant measures which are positively, even if indirectly, related to innovation issues.

Table 2 - Country specific indicators of economic & technological performance

Indicator	Source	Period covered	Comments
Structure of investments	Czech Statistical Office	annually	see text
FDI	Czech National Bank	annually	see text
Foreign based companies	Czech Statistical Office	since 1997	see text
Industrial zones	Czechinvest	since 1999	see text
R&D	Czech Statistical Office	annually	see text
Patents as R&D results	Industrial Property Office	annually	see Analysis, 1999
Purchase & sale of licences	Czech Statistical Office	annually	see text
Projected and actual utility of applied R&D grants	relevant ministries	1994-1997	see Analysis, 1999
Import and export of high-tech products	Ministry of Industry and Trade	1995-1998	see Analysis, 1999

The prevailing share of FDI is so far oriented to services and infrastructure while the key manufacturing branches are still outside of the foreign investors attention (except automotive manufacturing).

Since 1998 one can observe a radical growth of *FDI* (see **Table 3**). In last two years their size is nearly equal as the whole FDI amount which flew to the CR in the period 1992-1997, and goes on to grow in the recent years as well. Presently the share of FDI covers nearly half of the whole amount of foreign capital inflow while in the first half of the 90 it was at the level of one third (most of it was covered that time by portfolio investments and short term speculative capital). However, the prevailing share of FDI was oriented to services and infrastructure while the key manufacturing branches are still outside of the foreign investors attention (except automotive manufacturing). *However, in last two years the situation has been changing - growing share of FDI is flowing into manufacturing*

The economic impact of FDI can be observed via the growth of foreign based companies and their share in the total domestic manufacturing output. It is still in the level of one fifth but the aggregate economic indicators are reporting about high dynamics of this segment of domestic economy (see **Table 4**).

Table 3 - Foreign capital inflow
(CR, 1996-1998, bil. of CZK)

Indicator/year	1996	1997	1998	1999 ¹
FDI	38.8	41.3	81.9	45.1
Portfolio investment			8.9 ²	9.1 ²
Long term investment			-14.5 ²	4.8 ²
Short term investment			13.8 ²	-99.9 ²
Total net foreign assets	281.9	338.5	425.3	518.5 ¹

Source: Czech Republic in Numbers, Czech Statistical Office, Prague, 1999; 1. the first half of the year; 2. January-September

The formation of *industrial zones* has been another positive measure related to foreign capital & technology transfer and growth of the innovative capacities of the domestic

manufacturing. The industrial zones have been formed since 1990 but they were located mostly in the frontier regions to Austria and Germany. They became a failure - these regions have been short of qualified manpower that was drained by foreign regions close to Czech borderline. In 1999 the specific Government measure was issued to promote the formation of industrial zones in the selected regions and cities throughout the country. In 1999 158 millions (CZK) of subsidies for the construction of infrastructure in the industrial zones in 19 localities were expended. In this year (2000) the sum of subsidies has been increased to 380 millions of CZK, distributed to 32 localities.

Table 4 - Share of foreign based companies in the economic performance (CR, in %)

Indicator /year	1997	1998
Sales	13.3	16.6
Annual growth of production	139	138
Total number of employed personnel	8.7	10.5
Annual growth of employed personnel	11.1	123.7
Average monthly wage	12 294	13.470
Annual growth of wages	113.4	109-5

Source: Statistical Yearbook, Czech Statistical Office, 1999, 1998

Table 5 - Basic R&D indicators (CR, bil. of CZK, persons in FTE)

Indicator/year	1995	1996	1997	1998	1999	2 000
State R&D funds	4,9	6,23	7, 72	8,73	9, 67	12, 6 ¹
of which Ministry of Industry	0,17	0,52	0,88	0,96	1,19	2,0 ¹
R&D funds of BES	8.8	9.6	11.6	13.7		
GERD as % of GDP	1.01	1.03	1.19	1.25		
Total R&D personnel¹	44 716	46 913	47 027	45806		
Total R&D personnel	22 678	23 374	23 230	22 740	.	.
R&D personnel in BES¹	20 175	19 468	20 265	19 761		
Researchers	11 936	12 916	12 580.	12 566.	.	.
of which with HE degree¹	37 151	17 706	18 520	19 003	.	.

Sources: Statistical Yearbook 1999, Czech Statistical Office; R&D indicators in the CR for the year 1998. Czech Statistical Office; Ministry of Industry and Trade (internal materials); remark: 1. in physical persons; average figure for the year.

The infrastructure of the *industrial R&D* was seriously affected by privatisation process. Its size decreased by more than half (in some branches even more) and the profile of respective R&D units has been changed in favour of non-research activities. The last Government has declared that the promotion of R&D belongs to its priorities. Since the amount of R&D funding has been growing (**Table 5**); also specific measures were taken in favour of industrial science promotion (see the item of Ministry of Industry and Trade in the **Table 5**). The number of R&D personnel in business enterprise sector (BES) tended, however, to decline. In 1998 about 20 thousands people were employed in the R&D of this sector (11 thousands in FTE).

Industrial R&D capacity was seriously affected by the privatisation process. Its size decreased by more than half (in some branches even more) and the profile of respective R&D units has been changed in favour of non-research activities.

The impact of the *investment* intensity and sources of funding on re-structuring of industries is subject to public criticism. The problem doesn't rest so much with the size of investment funds but their distribution. Mostly, they were located into infrastructure and less in manufacturing branches. It is argued by the critics of the current situation that the investments (including the foreign ones) are mostly flowing into non-manufacturing areas while the re-payment of obligations (related to invested funds) will be dependent on a sound balance of payment and, therefore, on active, export oriented manufacturing. Large portion of investments is, moreover, going to improvement of environment and infrastructure which are lagging behind the EU standards (see **Table 6**).

**Table 6 - Investments, their resources and distribution in the CR
(billions of CZK, current prices, % of GDP, 1993-1999)**

Indicator/year	1995	1996	1997	1998	1999 ^a
Rate of investment, %	34.0	34.9	33.2	29.9	29.5
Total investment	442.4	500.6	506.9	501.4	.
of which environment (A)	32.3	37.0	39.5	35.4	n.a..
of which infrastructure² (B)	61.6	91.8	126.1	130.0 ¹	n.a..
A+B as share in total investment, in %	21.2	25.7	32.7	33.0 ¹	.

Source: IPB, Prague, *Hospodářské noviny* 17.2.2000, p.7; Remarks: 1. estimate; 2. transport, postal services, telecommunication, water supply

The last couple of indicators about the *licences, patents* (see **Table 2**), their intensity, utility, diffusion and sources (including domestic R&D) are explaining that in comparison with EU countries the activities described by these indicators are lagging behind. The patents are applied for mostly by foreign residents, while the domestic applications have higher utility than the foreign ones. The data on the effects of domestic applied research projects are indicating, that their orientation to the improvement of technological process still prevails over the orientation to the development of new products. Some other data can be gained from export statistics, namely the date for export/import of high tech products. In the period 1995-98 the share of high tech products in the imports has kept the level of about 12% of the total imports while in the exports it grew larger - from 4.4% in 1995 to 7.4% in 1998. *The data about the relative share of manufacturing branches in the exports for the period of 90s are also indicating that there was different dynamics within the group of high- and medium tech branches. In the group of high tech products higher rate of growth set through in consumer electronics and office machines. In the group of medium tech products the higher growth rate of exports happened in motor vehicles while the role of traditional consumer oriented products (glass, ceramic, textile, leather a shoe products) and semifinished products (chemistry and metallurgy products) was falling down.*

1.2 Main development in innovation policy

The policy approach to S&T has been based on the traditional science push model. It has been understood that the S&T responsibilities of the Government should be oriented to the support of research - it should pursue research policy only. However, one can identify two periods with different political approaches to S&T: in the first half of the 90s the conservative Government applied explicitly the research policy approach. Its main efforts in this field were focused on the issues of academic science - how to regulate the relationship between the research institutes of Academy of Sciences and universities, and increase the R&D capacities of universities. Two documents have been issued in order to regulate research policy:

- 1994: Main Aims (Principles) of Government in the Field of R&D (25.5.1994).
- 1995: Law about the support of R&D, No. 1/1995 (amendment of the Law about the support of R&D from 1992).

Direct government support of innovation issues was limited to a minimum. By the above mentioned principles 95 % of state budget R&D funds should be devoted to research activity and its infrastructure; only 5% of the state R&D funding should support the development of new products. Of course, one assumed that concept of economic reform will have by its general consequences - in particular by formation of competitive environment and realistic price system - very positive impact on growth of innovation resources.

In the *second half of the 90s* the Social Democratic Government has started to change the policy approach to S&T. The change has followed two lines of regulatory efforts: (i) support of education including science and research, and (ii) support of re-structuring domestic industries via support of investments, export, SME and regional development. The *first line* of governmental efforts has been enacted by the following basic documents:

- 1997: Main Aims (Principles) of Government in the Field of R&D(23.4.1997).
- 1998: The Decision of Government of CR from 2.9.1998 No. 811 about preparation of national policy in the field of R&D) - framework of „science policy for 21st century“.
- 2000: „National Policy of Research and Development of the Czech Republic“ resolution of Government from 5.1. 2000 No.16.

The resolution of Government from 1997 led to increased public R&D funding, including industrial research and innovation related

The policy approach to S&T has been based on the traditional science push model.

The resolution of Government from 1997 led to increased public R&D funding, including industrial research and innovation related activities.

Most dynamic and influential innovative impact has been attained by the scheme of FDI incentives. The impact of other schemes i.e. for support of export, SME, regional development and quality control seems to be of a long-term nature.

activities. This resolution has been extended and specified for the period 2000 - 2002 by the resolution No. 249 from the year 1999. Accordingly, the public (state budget) R&D funding should grow in the year 2000 to the level of 0.6% of GDP, in the year 2001 to 0.65% and in the year 2002 to 0.70% of the respective indicator (its present level is 0.5%). The resolution of Government from 1998 formulated the guidelines for the discussion about the science policy in a long-term perspective. Its outcome was reflected in the resolution of Government from the beginning of the year 2000. The pressing fiscal issues make it often difficult for the Government to keep to the foreseen aims. E.g. the R&D budget of Ministry of Industry and Trade for the year 2001 was reduced by 800 millions of CZK and is, in fact, constraining its efforts in the support of SMEs and industrial research projects - important resources for a growth of innovation capacities.

The adopted „National Policy of Research and Development“ has also identified serious problems in the co-ordination of R&D efforts: the existing forms of co-ordination do not allow to orient and concentrate the available R&D resources to important issues; there is still disjunction between academic and industrial research and low co-operation among their organisations; and, still improper part of public R&D funding is bound to institutions rather than to projects with practical relevance. Consequently, some measures have been taken to advance R&D regulatory measures: Ministry of Education, Youth and Sports has initiated establishment of „Research Centres“ which have been selected to carry out advanced research and funded on ground of 5-year projects. „Research centres“ are composed of research teams from Academy of Sciences, Universities, industrial of research organisations and even some technology based firms. Currently, 21 Research centres are operating in the program of non-oriented (basic) research and 12 of them in the program of oriented (applied) research. Another regulatory provision is aiming to improve orientation of R&D efforts. To the end of 2001 priorities for the oriented R&D should be set up; leading experts are participating in these efforts and advanced assessment technique is applied to accomplish such aim.

The *second line* of support has exerted rather indirect impact on the innovation capacities of the domestic industries. The schemes of support will be closer discussed in the section 1.3. In general it can be now said that the most dynamic and influential innovative impact has been attained by the scheme of FDI incentives and SME support; impact of other schemes i.e. for support of export, regional development and quality control seems to be of long-term nature. Rather indirect role will be played by Re-vitalisation Agency the aim of which is to re-structure a couple of largest manufacturing companies (like metallurgy, lorry production, aircraft production) with the aid of state funds and authorities (Fund of National Property which is majority owner of these firms) and appropriate foreign investor. The successful re-structuring of these firms may call up important multiplicative economic effects for the whole regions and their manufacturing &

technological infrastructure. *The steps which have been taken so far have not been indicating some visible effects in this perspective.*

The national investment incentive scheme has been re-designed by government decrees and acts of law in April and December 1998, May 1999 and January 2 000. The minimum investment level for which the relieves can be applied has been decreased from USD 25 millions to USD 10 millions. The new Act offers the following incentives:

1. Corporate tax relief of ten years for new companies and five years for expansion of existing companies

New enterprises created in connection with investment incentives will be able to receive a full corporate tax discount for 10 years from the start of production and expanding companies will be able to receive a partial corporate tax relief for 5 years.

2. Financial support for creation of new jobs

In regions with high unemployment rate job creation grants are offered. The grants differ according to the unemployment rate in the region and can reach up to CZK 200,000 (approx. US\$5,500) per each new job created.

3. Financial support for training employees (up to 35 % of total training costs)

Training and retraining grants are offered only in regions with high unemployment and may cover up to 35 % of the total training costs according to the unemployment rate in the region.

4. Location incentive

An investor can be provided with low-cost development land (publicly-state-owned land only) and municipalities may receive subsidies for the development of infrastructure on the site where the production should be located.

As far as the *support of SMEs* is concerned crucial regulatory steps were facilitated in 1999 the *resolution of Government on the support of enterprising in SME* (No. 562 from June 9th, 1999). It is specifying both the goals in short- and middle terms (until 2002) and the ways how they can be attained. The short term aims are focused on the improvement of SMEs' access to venture capital and credits, their protection against unfair competition, simplification of accounting and building industrial zones. The middle term aims are intending to improve legal framework for enterprising, extend consulting and innovation related support, education and training, statistical surveying and preparation of SME for entry in the EU. This policy document (Politika, 2000) is a good example of the efforts which are oriented to a crucial segment of economic system (SME) where the growth of innovation capacities can be expected. The existing support schemes and their aims are discussed in the **Chapter 2**.

Taking into account the evolution and state of art of the above indicated policy documents in the field of S&T the following conclusion can be drawn:

- There is no distinct and coherent innovation policy document; the public awareness and policy concepts have been so far following the traditional approach: the policy is focused on the support of R&D - it has a nature of R&D policy.
- The above described standing of S&T policy is reflected also in the distribution of competencies in the executive branch: the Government co-ordinates R&D activities only (via its Council); the public R&D funding is carried out by the relevant ministries; the manufacturing related innovation issues are regulated and funded by the Ministry of Industry and Trade (usually with 50% support of BES); only in some cases the support schemes promote interfaces of R&D and industry, e.g. the scheme CENTRES (- see **Table 8**), or interfaces of firms to innovation sources, like in the case of SME support schemes.
- In comparison with the policy concepts of the first half of the 90s, which had set hard and fast lines between public and private spheres, and consequently between R&D and innovation, the situation in the second half of the 90s has been improved: one has been attempting to set „bridges„ between the public and private spheres, to promote the interfaces between the R&D and industry.
- The support of the domestic industrial research, FDI and SMEs can be identified as the policy measures which are close to innovation based policy; however, there are rare interfaces between them.
- Another innovation related measure can be identified *in the formation of „Research Centres“ composed of research teams from academic and industrial spheres* and an extension of criteria which

are used in the assessment of R&D grants; the evaluation of the projects is also applying the criterium of relevance of R&D projects for industrial application (patents, new products, new processes etc.).

1.3 The innovation policy community

The basic framework for the assessment of actors and agencies in the *executive branch (i.e. Government funded agencies)* has been already outlined in the preceding section. Therefore, we can approach right away the conclusions.

Table 7 - Main policy documents and consultative papers since 1996

Title of document	date	responsible organisation	legal status	comment
Rules for R&D subsidies + amendment	3.1.1996; 21.8.1996	central organs of state administration (including Academy of Sciences and Grant Agency of CR)	resolution of Government No. 27	related to the Law No.1/1995
Main Principles of Government in the Field of R&D	23.4.1997	Government	resolution of Government	see text
Status of Council of Government of CR for R&D	30.3.1998.,	Government	resolution of Government No.222	related to respective Laws from 1992,1995
The Decision of Government of CR about R&D background paper	2.9.1998	Government	resolution of Government No.811	discussion paper
About the State Support of R&D in years 2000-2	22.3.1999	Ministry of Finance	resolution of Government No.249	targets for increased R&D funding
Law on FDI incentive scheme	January 2000	Parliament and Government	Act of law	see text
National Policy of R&D of the C R	5.1. 2000	Government	resolution of Government No.16	see text

The executive branch is shaped by several principles which are of importance for the issues of innovation: (i) principle of distribution of competencies by sectors; (ii) principle of differentiation between academic and industrial science, and (iii) concept of executive responsibilities for R&D, perhaps for the transfer of its output into practical application as well. The first principle has two basic consequences for the issue of innovation: (a) there is no executive agency specialised for the co-ordination and regulation of innovation issues, and (b) the sectoral principle is rather an obstacle for the co-ordination of innovation related projects. The second principle can be reflected in the distribution of R&D resources - existence of research institutes of Academy with comparatively strong research capacities in basic disciplines; lagging position of research in HE system and shift in the orientation of industrial science from research to services. In the

There is no executive agency specialised for the co-ordination and regulation of innovation issues

In the national R&D system there is now not only a functional gap in the sphere of applied research but also under-representation of its actors in the executive and public funding agencies.

national R&D system there is now not only functional gap in the sphere of applied research but also under-representation of its actors in the executive and public funding agencies. The third principle can be identified in the way, how the issues of S&T are co-ordinated in the executive branch: the Council of Government of CR for R&D is co-ordinating the R&D activities of Governmental agencies (ministries, Grant Agency of CR) only. The governmental impact on the issues of innovation is implemented through ministries and their competencies which are limited to respective sectors. The most influential executive impact on innovation is that of the Ministry of Industry and Trade via its programmes (see **Tables 8** and **9**). The role of the other ministries in the promotion of innovation via the sector based R&D is rather indirect and less important (except Ministry of Agriculture, the R&D programme of which is partly devoted to projects which can be directly utilised by farming organisations or individual farmers).

The above described government bodies and agencies are holding responsibilities for the operation of R&D organisations (institutional funding) and promotion of the R&D projects which are selected on the ground of competition and assessment partly by criteria of scientific excellence, and partly by criteria of practical relevance. Until recently the former criteria

Table 8 - Major Government Funded Programmes and initiatives in favour of innovation

Name of programme	Responsible body	Objective	Sources of funding
EXPORT	Ministry of Industry & Trade	support of competitive capacities of domestic industries	50% - public (subsidy /5-year-loan); 50% - BES
STRATECH	Ministry of Industry & Trade	support of development and diffusion of key technologies in the field of defence & state security technologies	50% - public (subsidy /5-year-loan); 50% - BES
CENTRES	Ministry of Industry & Trade	support of Centres of competitive products and technologies	50% - public (subsidy /5-year-loan); 50% - BES
TECHNOS	Ministry of Industry & Trade	support of SME and their technological capacities	50% - public (subsidy / loan - max. 8 mil. Kč for 5 years); 50% - BES
R&D funding programmes of ministries	Ministries of Education ..., Health, Agriculture, Environment, Transport & communication, Culture, Interiors, Foreign Affairs, Defence	support of branch relevant research	public (state budget) funds
Academy of Sciences of CR	Academy of Sciences of CR	support of basic research in key science areas + additional grants	public (state budget) funds

Grant Agency of CR	Grant Agency of CR	support of research in key branches of science, engineering, social science humanities, agriculture science	public (state budget) funds
Research centres	Ministry of Education, Youth and Sports	support of top level and co-operative R&D	public (state budget) funds

have been preferred. Currently, all grant agencies and other R&D funding agencies are attempting to apply also the latter criteria (of relevance). In this aspect, i.e. growing stress on applicability of R&D outcome, the R&D organisation in Academy of Science and HE, as well as those funded by ministries can be considered as a potential knowledge providers for the innovation related activities. Their specific programmes & capacities which are oriented directly to innovations are mentioned in the **Table 10**.

The organisations of *industrial science* are crucial knowledge provider for innovation. All of them have the form of plc and are operating in BES. They are predominantly funded by contract research, only a part of their budgets is covered by public or foreign funds (2-15% - my assessment on the ground of case studies). As mentioned above the key role is played by Ministry of Industry and Trade and its programmes „Centre,, which is designed for the promotion of the localities of top technologies, and the programme „Technos,, which is promoting innovative efforts of SMEs. „*Association of R&D organisations*,, is the most important self-organising body representing the stakes of industrial science actors.

Table 9 - Government funded agencies

Organisation	Status	Responsibilities	Assessment
Council of Government of CR for Research & Development	executive body	co-ordination of R&D funded by state	advisory body, improving co-ordination of R&D funded by state
Grant Agency (GA) of CR	public body	distribution of public (state) R&D funds	quality control of R&D by excellence;
Academy of Science (AS)	public body	promotion of basic research in (28) selected areas via GA of AS,	promotion of research in key science disciplines
Ministry of Education, Youth and Sports	executive body	1. articulation of concepts of state R&D policy 2. co-ordination of international R&D co-operation; 3. promotion of R&D at HE via specific programmes	responsible for a part of academic science which is carried out at faculties of HE
Ministry of Industry and Trade	executive body	programmes Export, Centres Technos, Stratech	see Table 4
other ministries	executive bodies	specific GAs, or R&D programmes	important R&D capacities are supported by Ministry of Agriculture, Ministry of Health and Ministry for Environment

One can specify some respective knowledge providers also on the side of manufacturing actors, their self-organising bodies, governmental and non-governmental agencies for the promotion of industries. First, the governmental agencies *Czechtrade* and *Czechinvest* should be mentioned. While supporting export of domestic industries and foreign technology transfer they have accumulated expertise in technology and innovation aspects of manufacturing. Important innovation related database & expertise is provided by *Industrial Property Office* dealing in the field of patents, industrial samples and the other industrial property issues.

Of course, an important role in promotion of innovation is played by the foreign and domestic actors of capital market which are providing investment funds for domestic industries. So far, the role of domestic investors in the promotion of innovation via investments is very limited (high interest rate, low acceptance of high risk projects). The key role is played rather by the foreign capital. The role of FDI has been already mentioned. The explicit innovation related role is played by the Funds of risk capital. Until the year 1998 there were 2-3 risk capital funds operating in the CR. In last year the number of risk capital funds has grown as well as the amount of granted funds. In 1999 the amount of 1.3 billion CZK of risk capital was invested in the CR. „*Association of Risk Capital*„ can be considered to be one of the stakeholders in the issues of innovation and an important knowledge provider.

There are several associations dealing in the field of promotion of S&T including the innovations. „*Association for Innovative Enterprising*„ is the most active actor in this field. It has been formed as a „roof body„ comprising various public (non-governmental) organisations oriented to the issues of S&T, in particular the „*Association of Scientific and Technological Parks*„ and „*Association for Technology Transfer*„.

Table 10 - Main knowledge providers

Organisation	Type of service	Assessment of provider
projects TECHNOS, CENTERS	allocation of public R&D funds for industrial R&D	Expert councils of R&D programmes(responsible for evaluation of R&D projects)
Technological Centre of AS	support of knowledge diffusion, consulting	co-ordinating role in co-operative projects of AS with industry, international research projects
Association for Innovative Enterprising	co-ordination of S&T parks; expertise in innovation issues	lobbying in favour of innovation issues
Czechinvest	facilitating FDI	promotion of foreign technology transfer
Association of Risk Capital	co-ordination of risk capital actors	promotion of innovative enterprising projects
Association of R&D organisations	promotion of self-organising activities of R&D units	support of industrial research issues

1.4 Assessment of innovation potential: data collection, surveys and indicators

In the CR there are available different data collecting agencies and databases concerning the resources of innovation: Czech Statistical Office is carrying out annually R&D statistical surveys and collecting also the data about the licences which are reported by the respondents of R&D statistics; Industrial Property Office is collecting data on patents; the grant agencies are collecting data on approved and finalised R&D projects and dispose of various bibliometric databases (including SCI); some ministries have sector specific information about the R&D capacities and technology issues of the respective branch. Similar sector specific databases are held by the non-governmental bodies. However, these data bases are of traditional type - they cover first of all the indicators of the R&D resources. The innovation indicators are in the stage of being studied and planned to be introduced. No specialised innovation indicators for specific manufacturing (high tech) sectors, services or public sector have been developed and used (except the export statistics which are able to give size of high tech products in the total volume of export/import).

Innovation indicators are in the stage of being studied and planned to be introduced. No specialised innovation indicators for specific manufacturing (high tech) sectors exist.

Since the CR entered OECD (1994) the standards of statistical surveying have been changing towards the international standards, including the S&T indicators. In the transitory period 1992-95 the data were collected by a scheme which combined the national pattern with the OECD's one. The data for 1995 and since this year have been already collected by the methodology of Frascati Manual. R&D staff has been also indicated in FTE. The data are collected annually by two statistical statements - one for the small organisations with less than 25 employees and one for the organisations with 25 and more employees. In 1995 there were 664 organisations - respondents: 37 in the group of small organisations and 627 in the group of larger organisations; in 1998 their number has grown to 289 in group of smaller organisations and 900 in the other one - in total 1 189 responding organisations. It is planned that Czech Statistical Office will extend the set of indicators by (i) patents statistics (in co-operation with Industrial Property Office) covering not only R&D organisations; (ii) balance of technological payments and (iii) regional distribution of R&D resources. The available R&D data are published by Czech Statistical Office once in a year (Ukazatele).

Czech Statistical Office is also taking steps to introduce the innovation indicators and surveys. It is co-operating in this field with Eurostat and OECD. The OSLO Manual has been translated and is prepared for publication in the Czech language. In 1995 the *pilot survey of technical innovation* in the selected industries was

organised in order to find out how the OSLO manual indicators may be understood by the domestic respondents. In co-operation with OECD another innovation survey was organised in 1998; 1 110 respondents were asked to fill in questionnaire covering the data on innovations as suggested by OECD. 500 questionnaires returned back (the outcome of this survey is not yet published). With reference to co-operation with Eurostat the Czech Statistical Office is about to carry out the following activities in favour of implementation of innovation statistics:

- To verify and evaluate the outcome of the pilot-survey about the technical innovation (1995) and the survey on innovation (1998).
- To join CIS 3 - Community Innovation Survey for the years 1998-2000.

Other knowledge providers are also involved in collecting data which are relevant for understanding the innovation issues. The Council of Government for R&D is taking care of *Central Register of R&D projects and Central Register of R&D institutions* (such data are provided by all R&D grant agencies). The above mentioned non-governmental agencies have the internal databases about their members (e.g. *Association for Innovative Enterprising* has a database on science and technology parks).

1.5 Legal and Administrative Environment for Innovation

Legal and administrative framework has been regulating environment for innovation mostly in an indirect way. The innovation is closely related to the opportunities to establish new firms. In this respect the strategy of radical economic reform has shaped a very liberal environment for the start-up of new business firms. There are no legal obstacles for a foundation of a new firm. So far, a firm could be established while registering it at a commercial court provided it has an adequate equity; the equity in the amount of 100 thousand CZK was required for the establishment of a company limited and 1 million Kc for a stock company (since the beginning of the year 2001 the rates have been doubled). Legal and administrative problems are usually starting when new firms are investing and extending their production facilities. The existing regulations are complex and complicated. Extensive efforts must be made to come up with the technical norms and regulatory provisions. More difficult obstacles are arising in case of institutional norms, like establishment of contracts, violation of contracts, credibility of partners, competition for public funds, fair and non-corruptive treatment by public authorities etc. The market, juridical, and repressive institutions are not still well developed to regulate a liberalised and competitive environment for enterprising.

There are no practical obstacles for the foundation of new firms.

Obstacles arise in the case of institutional norms, like establishment of contracts, violation of contracts, credibility of partners, competition for public funds etc.

The visible impact on innovation is framed by Business Code, tax legislature, active employment policy and some other additional legal steps which are summed up in the **Table 7**. First provisions for legal framework of private business enterprising were established at the beginning of the 90s. Nearly each year the respective Laws are amended, and usually for several times. E.g. in 1999 the Tax Law was amended four times, in the year 2 000 the Business Code was amended 6 times. In the transitive situation a permanency of changes in the legal framework is understandable but its impact on situation of entrepreneurs is negative. The last version of *Business Code* gives advantage to enterprising firms to choose the appropriate legal form (from various legal types) in terms of optimal relation between income, tax load and material guarantees.

More direct impact on innovation can be identified in the case of *income tax*. The last amendment of the relevant Law (in 1999) has decreased the rate of income tax from 40% to 32% for „physical persons“ (individuals) and from 35% to 31% for organisations („legal persons“). Similar impact can be identified in the case of tax relieve which is granted to firms' investments: the firms are allowed to decrease the tax base by 10-20% of purchase price for new machines and technology (investments). Another positive measure for investments and innovation has been called up by decreased life time (and increased the depreciation rate) for selected groups of tangible and intangible assets. The existing time span has been reduced by one third.

In May 2000 the „*National Policy of the Support of Quality in favour of development of Czech industry and services*“ has been enacted by means of Government decree. This policy measure has finalised the efforts to transform the existing technical norms and modes of technical control to the standards of the EU countries. Several types of provisions have been developed: the technical provisions which are concerning firms implementing the practices and techniques of TQM; the provisions concerning state support to the firms which have decided to implement TQM; provisions concerning non-governmental agencies dealing in the field of quality control, in particular Czech Association for Quality. The practical implementation of this policy objective is performed by the „Council of CR for Quality“, its secretariat and National Information Centre for Support of Quality. The Council is responsible for evaluation and selection of schemes for quality support which are to be financed from public funds; the other organisations and their schemes are supporting diffusion of information in this field. This legal measure has, of course, more direct impact on innovation. In particular the export oriented firms and suppliers to foreign firms operating at domestic market have been implementing TQM and ISO measures together with innovation of their production programs.

Influential legal framework for support of innovation has been set up by *investment incentive scheme* which has been adopted by government decrees and acts of law in April and December 1998, May 1999 and January 2 000. The scheme is not oriented on direct support of innovations. It is promoting them indirectly - via size of investments, their job creating effects, orientation to machinery and equipment. The tax and other relieves can be applied for by foreign as well as domestic investors. The framework of the scheme has been closer described in **para 1.2**.

The industrial research is supported by direct measures (support schemes of selected projects as described in **para 1.3** and **Table 4**); no direct tax relieves in favour of R&D, or innovation, have been implemented so far even if such measure is suggested by research community.

One can observe legal improvement in favour of innovation also on the side of academic science. New HE act (1999) has changed legal status of HE organisations from „budget„ to „public„ organisations. They have gained disposal rights over their assets and can more easily establish commercial contracts with private firms. Such provision will open new opportunities for growth of interactive relationship between academic and industrial spheres.

Table 7 - Legislative measures in favour of innovation

Title	Date of adoption	Specific measures in favour of innovation	comments
Business Code	Law No. 264/1992; and later corrections	variety of legal forms of business companies	see closer text
Law on Income Tax	No.35/1993, and later corrections	decreasing tax rate; shorter life time for depreciation; decreased tax base	see closer text on tax situation
National Policy for Quality Support	resolution of Government No. 458, 10. 5. 2000	Council of CR for Quality	supported by Association for Quality
National Plan of Employment	Government Decree No.418; from 5.5.1999	active policy of employment	support of re-qualification, mobility schemes for graduates
Support of SME	Resolution of Government No. 562, 9.6.1999	support of training in innovation enterprising	indirect support to innovation
Law about Protection of Industrial Property	No. 116/2000	Agency for Industrial Property	harmonised with aqis
HE Law		improved chances for contract R&D	see text
Law on FDI incentive scheme	Law, January 2000	foreign, domestic firms	supported by Agency Czechinvest

Conclusions

- There is no direct law, or resolution of Government, which would directly regulate innovation based, or innovation oriented activities.
- The existing legal framework does not constrain the innovative activities of firms except the existing technical, environmental and other norms; their administrative (and bureaucratic) framework does not differ substantially from that one of EU countries.
- In last two years active legislative steps have been taken to facilitate innovations via improved legal framework for enterprising, tax relieves, mobility and qualification schemes (within the framework of active employment policy - see in paragraph 2.1).
- Improvement of legal framework is oriented to single issues - academic science, industrial science, SMEs, quality control, technical standards, investments etc. rather than to promotion of the interactions and co-operative actions among innovation driven institutions.

Section 2 - Measures to foster innovation in business

Description and assessment of measures which are intended to promote innovations should take into account the transitory situation in the CR, and the CEE countries in general. It is essentially influenced by changes of the institutional framework and the regulatory regime. In such situation it is understandable that the policy efforts are to be focused, first of all, on the formation of new framework for action which is expected to promote the change of economic activities in favour of the growth of standard competitive (market) institutions. Due to existing constraints the short term economic and financial reasons are often getting priority to long term issues, like restructuring the assets, legal and institutional change, promotion of infrastructure and public facilities. In such context the issues of innovation policy can emerge as elements of other policies, rather than as an independent and coherent policy focused on specific objective. For these reasons the study of innovations in the CEE countries should be reflexive to whole spectrum of policy efforts, and identify those measures and factors which may facilitate or constrain innovative processes. Moreover, the interaction between the top-down (framework-oriented) and bottom-up (action based) efforts should be assessed since their balancing is an important way how to form competitive nature of the institutional framework. Dis-balances between them may promote a growth of static and corporative features in the institutional framework.

The Czech situation has been noted by dis-balance between the bottom-up economic actions, which have been abruptly mobilised by massive privatisation and liberalisation of economic environment on one hand, and lagging formation of the legal and institutional framework on the other one. This dis-balance was identified in the years 1996-7 and led to corrective measures of economic policy (still that time by right wing government and later by government of Social Democrats). Since 1998 extensive (top-down) measures have been taken to improve the framework for economic activities, including the support of specific fields/regions of economic activity and the support of specific actors (selected large firms and SMEs in general). Support schemes have been, first of all, oriented to an *improvement of environment for enterprising* both the conditions/opportunities and the regulatory framework. Ministry of Industry and Trade (MIT) and Ministry for Regional Development (MRD), Ministry of Labour and Social Affairs (MLSA) are the most important government bodies of the public support schemes. The below

mentioned survey of support schemes is giving the picture about the key areas of enterprising support (and indirect support of innovation), and the issues which are directly oriented to innovations (fat letters):

- SME support (MIT, MRD).
- Fund of risk capital (MRD, EU delegation).
- Reconstruction (of SME in the regions hit by floods - MIT)
- R&D support schemes (MIT).
- Labour market (MLSA).
- Information, Consulting, Training & Education (MIT and its agencies).
- Regional Support Schemes (MRD).
- **Innovation enterprising (Association of Innovation Enterprising - non-government agency).**
- Special Support Schemes (energy conservation, export, production quality, environment, agriculture - respective ministries).

The support schemes are, first of all, focused on the issue of enterprising capacities of SMEs; next, the specific issues of enterprising environment are involved - availability of venture capital, qualified manpower, adequate information sources and related technology issues, like energy conservation, environment, quality control etc. There is also specific scheme for support of innovation management which is co-ordinated by non-governmental agency (but funded by public sources). This survey is explaining that most of these activities are oriented to an improvement of the environment for enterprising, and only small part is directly focused on the issues of innovation.

The public support of enterprising activities has short history (it started in 1992) but it is already well differentiated and many-sided. However, there has not been always political agreement about its role and size. One can identify two periods: until 1998 it was restricted and its relative share in state budget was declining (from 0.31% in 1992 to 0.14% in 1998); since 1998 it has started to grow - in 1999 the share attained 0.26% of state budget. The present Government is intending to increase essentially this type of support. While in years 1992-1998 the annual support amounted (on average) to 900 millions CZK, in 1999 it nearly doubled (1900 millions of CZK) and in 2002 it should attain the level of 4 000 millions of CZK.

In 1999 the Government has issued the *resolution on the support of enterprising in SME* (No. 562 from June 9th, 1999) which is a good *example* of a strategic approach to this issue. It is specifying both the goals in short- and middle terms (until 2002) and the ways how they can be attained. The short term aims are focused on the improvement of SMEs' access to venture capital and credits, their protection against unfair competition, simplification of accounting and building industrial zones. The middle term aims are intending

In 1999 the Government has issued a resolution on the support of enterprising in SME which is a good example of a strategic approach in this field.

to improve legal framework for enterprising, extend consulting and innovation related support, education and training, statistical surveying and preparation of SME for entry in the EU. This policy document (Politika, 2000) is a good example of the efforts which are oriented to a crucial segment of economic system (SME) where the growth of innovation capacities can be expected. It is indicating a need for improvement of the financial situation of SME and the formation of credible environment for enterprising and co-operation among the firms. After certain improvement in these areas is achieved the growth of innovation related activities can be expected.

Important supportive role in the fostering of innovation in business enterprise sector (BES) is played by the *non-governmental organisations*. The role of Association for Innovation - based Enterprising has been already mentioned. According to the interviews a similarly positive role can be ascribed to other organisations as well: Chamber of Commerce of the CR and its regional departments; Union of Industry and Building; Association of Entrepreneurs (they are named in the order of significance for innovation issues). The mentioned organisations are mostly active in diffusion of information and promotion of communicative networks - the issue which is discussed in the next paragraph. Some activities are also focused on the demonstration projects, or the promotion of the niches of best practices. E.g. Chamber of Commerce has identified the regions which will not be able to take part in the EU structural funding because of their higher GDP p.c. and started in these regions pilot projects which will assess the competitive capabilities of SMEs for the situation after the accession to EU. There is an opinion that in particular SMEs do not have enough information about the competitive environment in the EU framework. Prague is such region and its local Chamber of Commerce has launched such programme at the beginning of the year 2000. The involvement into the programme is conditioned by the following criteria: maximum 250 employees, stabilised governance structure, „enlightened„ management and co-funding of the project, good financial standing and sound production programme, export to EU countries, ISO 9000. Two SMEs (Prague Machinery Plant, SATRA - design firm) have been so far selected in order to participate in the scheme.

With similar objective the *Czech Innovation Relay Centre* has been established. It is composed of three domestic innovation oriented organisations: Technology Centre of AS CR (leading partner), BIC Plzen and BIC Brno, and is cooperating with relevant European network. The aims of this project is to promote the competitiveness of domestic SMEs by means of technology transfer from and cooperative agreements with firms from EU countries, foster the exploitation of the domestic R&D as well as R&D of EU countries, and improve the exchange of information within 5th Framework Programme.

Conclusions

- Main lines of governmental measures in favour of innovation are associated with support of manufacturing firms (MIT) and human resources development (MLSA).
- Ministry of Industry and Trade is following two ways of fostering of industrial research: for (several) large firms (projects STRATECH, CENTRES) and for SMEs.
- Support scheme of SMEs has features of well tuned strategy with short and medium term objectives, and well administered measures (TECHNOS, PARK).
- Support schemes are focused on promotion of in-house R&D in the selected domestic firms and implementation of R&D output in production and exports; no wider schemes of support are applied.
- the governmental support schemes are often accompanied by the support activities of non-governmental associations and agencies.

2.1 Training and human resource programmes in favour of innovation

In the transition period the employment structure has been undergoing essential changes. Taking into account the available statistical data the attained shifts can be outlined as follows: the share of primary sector in active population (4, 8 millions in 1998) has declined from 8.7% in 1992 to 5.5% in 1998, the share of tertiary sector (services) has grown up from 46.5% (1992) to 53.6% and the share of secondary sector (manufacturing) dropped from 44.8% to 40.9%. The employment in the secondary sector has grown in the branches of tourist services, banking and insurance and public administration; in the tertiary sector the share of health care and education has been declining while the other services growing (Müller, 1998).

Emerging labour market, and its institutions, have been forming a new framework for assessment of labour force, and the wage level of various professions. The function of market assessment is still constrained by rather low vertical and regional mobility. Yet, the data about unemployed are giving useful information about the structural changes, and the flexibility of labour force. Due to mass privatisation, which postponed the decisions about re-structuring of firms, the level of unemployment was until 1996 low (about 3%). Since it has tripled and climbed up to more than 9%. There is also a change in the structure of unemployment, both in terms of regional distribution (some regions with the level of unemployment 15-20%) and by level of education (see **Table 7**).

**Table 7 - Unemployment by level of education
(1992, 1998, %)**

Level of education	1992	1998
No education, basic education	37.8	30.3
Apprentices, secondary education	59.4	67.0
University education (HE)	2.8	2.7
Total	100	100

Source: *Statistical Yearbooks (1993,1999), CSÚ, Prague*

Growing level of unemployment, and growing state outlays for its payment, have forced the present Government to start more active approach to this social issue. In 1999 the National Plan of Employment was adopted by Government (Resolution of Government No. 418, from May 5th, 1999) which has extended the current approach to unemployment (so called passive employment policy which is building effective network for help to the unemployed) to an *active employment policy*. The **Table 8** is explaining dynamics and proportions of this change in terms of financial outlays from the state budget.

Active employment policy is supported by monitoring capacities and implemented by various types of support. Monitoring capacities are carried out in particular by National Education Fund (NEF) - non-profit organisation founded by Ministry of Labour and Social Affairs (and co-funded by public funds, Phare and European Foundation for Education - ETF). NEF is following changes at supply and demand side of labour market and delivering relevant information to the agencies co-ordinating active employment policy (MLSA and District Labour Offices). Two schemes of active employment policy are relevant for innovations: (i) re-qualification scheme, and (ii) mobility scheme for graduates. In 1998 both schemes were supported by 264 millions CZK, i.e. nearly 30% of total outlays for active employment policy. The aims of re-qualification scheme are also concerning „...essential changes in manufacturing processes and technology occurring in the sites of the key employers in the region ...”, (Zpráva, 1999, p.96).

**Table 8 - State budget outlays for passive and active
employment policy
(CR, 1993-1998, current prices, millions of CZK)**

Type of policy	1993	1995	1996	1997	1998
Passive employment policy	1 884	1 782	2 106	3 420	4 194
Active employment policy	753	635	558	552	902

Source: *Zpráva o lidském rozvoji, VÚPSV, Praha, pp. 90, 92*

The demand side of labour market is also monitored by Ministry of Education, Youth and Sports and the results are published. The studies are assessing the employment of graduates and suggesting relevant changes in the study programmes and school curricula (see Uplatnění, 2000). Together with German Federal

Ministry of Research and Technology the database about the R&D capacities of the domestic S&T institutions has been published (Technology Profile, 1999).

The training and education programmes, including these ones concerning IMT, are regulated by Ministry of Education, Youth and Sports. The Ministry is setting up the general framework for training and education programmes. It is regulating the organisation of the courses by means of certificates (issued on the ground of well-grounded application). The HE organisations are gaining certificates for their study programmes and, consequently, are entitled to organise any courses on non-profit or profit terms in the certified subjects. The training courses (in local terms they are called „re-qualification courses,“), which are organised by non-university actors (training and consulting firms), have to be also certified by this ministry if the graduates of the courses are to receive a diploma. The innovation management technique (IMT) courses are organised both by the HE, the other public training organisations and the private training & consulting agencies.

With respect to the above mentioned regulatory framework the education and training in the IMT are carried out by the standard education and training institutions:

- The faculties of Higher Education.
- Governmental organisations on the non-profit ground.
- Training profit-oriented agencies and consulting firms.

The considerable impact on education and training of IMT is exerted by the governmental bodies, in particular Ministry of Industry and Trade via its support programmes. These activities are associated with application of IMT in the particular projects and firms rather than independent efforts. For this reason this activity is dealt with in the next paragraph. The profit oriented training agencies are focused on the basic programmes (accounting, financial analysis, management etc.) where there is great demand for such expertise; the demand for training in IMT is low so far. The prevailing share of training in IMT is carried out by the universities.

In the period of last 2-3 years some HE faculties have started to extend their standard management courses by the specific course of innovation and IMT. Taking into account (i) the location of the courses, (ii) their structure and (iii) role in neighbouring study programmes one can observe several types of IMT teaching (study programme).

First type has been developed by the faculties of technical science and engineering. These courses are closely associated with the programmes of production and technology management. Such type of IMT programmes have been developed at Building Faculty and Engineering Faculty of Czech Technical University in Prague. The former faculty has been presenting not only the

In the last 2-3 years, some HE faculties have started to extend their standard management degrees with specific course on innovation and IMT.

courses in IMT but also succeeded in organising the master's study programme „Production and Innovation Engineering„ which had first graduates in 1997. In 1999 17 students graduated in this study programme. The course is composed of subjects about production & technology processes and their management (production system and innovation, management of technology, transfer of technology); innovation concepts (innovation cycle, innovation system); specific methods of analysis (benchmarking, value analysis, expert systems); the issue of intellectual property (patenting practices, international patenting systems); entrepreneurship (SME, support systems, legal aspects).

The *second type* of courses is organised by Economic Universities and their faculties of management and informatics. In this case the IMT lectures can be identified as segments of management study programmes, marketing study programmes or study programmes in informatics. E.g. the Faculty of Management, Faculty of Firms' Management and Faculty of Informatics and Statistics at University of Economics in Prague have already series of specific courses which are concerning management of innovation, management of change, marketing management of innovation, quality management, human resources management.

The *third type* has been developed mostly by regional universities which have usually both the faculty of technology or engineering and the faculty of economics & management. In this case one is attempting to set up the teaching programmes for the graduates of both faculties. Such teaching programmes are running at Technical University in Brno, regional Technological Faculty and Faculty of Management and Economics in Zlin and University of West Bohemia in Plzen. The University in Plzen is presenting the course about innovation in modular form. The module is called PRISMA: „**PR**ojects - **I**nnovation - **S**trategies - **M**anagement„.

The Association of Innovative entrepreneurship is the most influential non-governmental actor in the field of education and training in IMT.

The Association of Innovative entrepreneurship is the most influential *non-governmental* actor in the field of education and training in IMT. In this field its activities are oriented in two lines: (i) it has taken up initiative to co-ordinate the education of innovation management, including the relevant HE teaching; and, (ii) it is organising its own (part-time) course for those who are interested in the advancement of their qualification. One three year course was already accomplished. It was attended by the management staff of the science and technology parks, and co-funded from resources of the governmental project PARK (Ministry of Industry and Trade - see above). The course is structured into three clusters of subjects: (i) foundations of innovation enterprising (100 hours, selected subjects: concept of innovation, economic environment for innovation, role of SME, intellectual property, innovating firm); (ii) technology transfer (60 hours, selected subjects: domestic and international networks of TT, technology consulting); (iii) projecting and planning in innovating firm (140 hours, selected subjects: national

programmes for support of innovation, project management, business plan/project, feasibility study, sources of funding, methods of project evaluation).

Table 9 - Main organisations involved in human resource development for innovation

Name of organisation	Type of training or advisory services	Commentary	Participation in networks, programmes
Ministry of Industry and Trade	course bound to projects TECHNOS, PARK	carried by Agency for Promotion of Enterprising	network of regional centres
Agency of Industrial Property	one term course	training in intellectual property rights	-
Czech Technical University in Prague	study course „ Production and innovating engineering„	Faculty of Engineering Faculty of Building	co-operation with AIE
Economic University in Prague		Faculty of Enterprise Economy	co-operation with AIE
Technical University in Ostrava	joint course about innovation at economic and technological faculties	respective faculties	co-operation with AIE
University of T. Bata in Zlin	course in preparation	Faculty of technology, Faculty of Management	co-operation with AIE
University of West Bohemia in Plzen	course „Integrated management of innovation„	chair of innovation and projecting	co-operation with AIE
Association of Innovative Entrepreneurship	national co-ordinator, course for experts	co-ordinating the IMT courses in national framework	network of experts organising the courses in IMT

Table 10 - Main initiatives taken in favour of human resources development for innovation

Responsible organisation	Objectives	Target public	Funding
Ministry of Industry and Trade	Resolution of Government No. 562, 9.6.1999 for support of SME	Training and education of entrepreneurs in SME in innovation	Public, Phare
Ministry of Education, Youth and Sports	White book - national programme of education	Primary, secondary, tertiary education; adult education	Public
Government	Resolution of Government No. 418, 5.5.1999, National Plan of Employment	Unemployed,	Public, Phare, private

Conclusions

- Active approach in upgrading human resources is carried out by foreign based firms. restructuring of the domestic firm is mostly accompanied by technology transfer and training of local labour force.
- Government bodies and other public agencies are promoting upgrading of human resources by policies in the selected areas, in particular through improvement of study programmes in all levels of education system and through active employment policy.
- Responsive supply of demanded training schemes is delivered

by private training and consulting firms; they are acting mostly locally, only a few of them are operating in the national framework.

- The participation of the firms in training courses (funding and specified demand) is established mostly in the level of localities and regions; similar feed back between demand and supply is also between the firms and district Labour Offices and their role in active employment policies.
- The level of IMT training is so far low; IMT courses have been already introduced into curricula of leading universities, and their economic, engineering and technological faculties.

innovation is mostly associated with an availability of technology and its application, first of all in manufacturing.

2.2 Awareness and use of innovation management techniques

The awareness of expert community as well as the awareness of the political public about notion of innovation is mostly associated with an availability of technology and its application, first of all in manufacturing. For this reason the other sources of innovation (human resources, organisation and management techniques, innovation in services and public sector) as well as their interaction and complexity are usually underestimated. The impact of such awareness can be followed in the public debates and decision making. This pattern of cultural and valuation context has been already identified in the analysis of the policy documents and their issues (see section 1.1): the public regulatory efforts have been focused mostly on the support of R&D activities; the issues of innovation are reflected and supported by means of partial schemes rather than comprehensive innovation based policy measures.

Previous research has indicated that larger learning effects have been more influential and positive in foreign owned firms and those domestic firms which are involved in the export to advanced markets

Similar valuation pattern can be observed also in the way of management in the domestic firms. Of course, in comparison with the situation at the beginning of the 90s extensive learning effect has been attained. The firms which have been effectively privatised and restructured have also learnt about the importance of accounting, financial analysis, controlling, internal auditing, quality control, environmental issues and marketing. Also the experience with human resources management and organisation change have been advanced. My previous research has indicated that more advanced learning effects have been attained in foreign owned firms and those domestic firms which are successful in the export to advanced markets or supplies to foreign firms located in the CR (The Impact, 2000; Müller, Stedronsky 2000). Since the enterprising environment has not been so far stabilised (in terms of legal framework, labour market, capital market) the management practices could not grow to standard rules of advanced markets. They have been laden with lot of contingencies and ad hoc situations for which specific management practices

have had to be applied. For these reasons the application of standard management techniques has been quite limited.

The constraining impact of the transitory situation has not concerned so much the technological issues of manufacturing. Here, the transition to new system of production and quality control and appropriation of advanced management techniques have progressed well. A smooth transition to an advanced level in the technological know how in the firms has been supported by the prevailing (traditional) belief of management personnel, and work force in general, that advancement in technology is the key issue of innovation. For the above mentioned reasons many firms have been very active in the implementation of TQM techniques and have been granted the ISO certificates (see closer the data in the statistical annex). The diffusion of IMTs to and their acceptance by the management of the firms is so far low. However, one can expect that their wider application will grow. Two reasons can be mentioned in favour of this claim: (i) universities are already training students in this management capabilities, and (ii) the experience of foreign owned firms will promote the diffusion of these modern management practices. Taking into account the steps which have been taken by foreign based firms the application of methods of Project Management and Development and Product Design and Development will go ahead, since they are closer to current practices. On the other hand the application of Business Process Reengineering, Value Analysis, Benchmarking, Marketing of Innovation will be slower since not only the management's awareness but also the business environment is not supportive to their application.

The diffusion of IMTs to and their acceptance by the management of the firms is so far low. However, one can expect that their wider application will grow.

The above described situation in the application of IMTs in the firms can be also supported by the analysis of schemes which have been so far developed and implemented by public and private bodies in order to promote their application. The experiences in the advancement of technology in the manufacturing, both in the level of firms and executive bodies, have made it possible to prepare and enact „National Policy for Quality Support„ (May 2000) which is aiming to promote the issue of quality control in the domestic manufacturing and services. Among others, this policy measure is expected to promote (i) acceleration of innovation processes, (ii) restructuring organisation and management pattern in the firms, and (iii) implementation of new technologies (see closer its main provisions and agencies in paragraph 1.5).

The National Policy for Quality Support is understood as a comprehensive scheme comprising activities of different yet relevant agencies Under the term „relevant activities„ the following activities are involved: co-operation with governmental and non-governmental bodies in the field of quality (e.g. Association of Industry, Association of Banks etc.); improvement of public awareness about role of quality; annual competition and

award for product with best quality; promotion of consulting, training and educational firms and activities in the field of quality. Immediate challenges are seen in the implementation of ISO 9000 and ISO 1400 in large segments of industries and the establishment of domestic certification centres (attached to international centres). Rather long term task is concerning the improvement of management capabilities which would be able to combine TQM techniques with other modern elements of management techniques, like just-in-time, business excellence, lean production etc. The application of TQM in the public services can be mentioned as another field for urgent advancement of quality control.

Ministry of Industry and Trade is the crucial *government body* which is supporting the diffusion and implementation of IMTs by several programmes. The programme „Consulting„ is oriented directly to the issues of IMT. It is organised through the Agency for Promotion of Enterprising (APE) which is a subsidised organisation of Ministry of Industry and Trade. The programme is supporting the consulting and innovation management for SME. Two sub-programmes are followed by the Agency: (i) „*Business Innovation Centres*“ supporting 5 centres (BIS); and (ii) „*Regional Consulting and Information Centres*„ supporting 14 such centres which are located in all major districts and do services in particular for SMEs. The sub-programmes are offering the subsidies for consulting services; support of innovating firms which are located in BICs (renting of premises); subsidies for training of entrepreneurs; subsidies for the Association of female entrepreneurs and managers. The subsidies are covering 30-60% of costs for the received consulting service or training, i.e. the rest of funding is covered by the firm. Some other programmes are affecting the issues of innovating SME and their management practices in rather indirect way. The following programmes can be mentioned as most relevant: „Design„; „Park„ (support of training in IMT of the firms located in BIC or science & technology parks - see closer paragraph 1.3).

The positive role of Association for Consulting in Enterprising can be mentioned. It has introduced an accreditation system of the consulting capabilities of its members.

The role of the universities in the diffusion of IMTs is not limited to the teaching of the students only. They take part also in the consulting and training of the firms' staff. The new HE Act has improved the legal position of the universities in terms of their rights to establish the commercial contacts with the firms. In particular, the regional universities have advantage in closer contacts to local firms and have been able to start up contract research and consulting for the firms. *Good practice* has been e.g. developed by Faculty of Management of Technical University in Brno which has founded *Business Support Centre* (partly funded by Ministry of Industry and Trade). Its objective is to offer to SMEs training programmes, consulting, research and building of information systems. It has also established an incubator for new firms.

The important role in acceptance of new management techniques is carried out by private consulting and training firms. Their role has been already described in the paragraph 2.1. They are very flexible in response to local demand for consulting and training. If they are not accredited by ministry of education the problem of the quality of the service may arise. In this respect the positive role of Association for Consulting in Enterprising can be mentioned. In co-operation with Segal Quince Wisksteed Ltd (and with co-funding of Know How Fund from GB) it has introduced the system of accrediting the consulting capabilities of its members. The access to the association is controlled by this accrediting scheme; so, the service quality of its members is guaranteed.

Conclusions

- The domestic firms are applying IMTs in a negligible scale so far; it is not the case of foreign owned firms which are already applying some management techniques of this type.
- Wider application can be observed in the case of TQM, partly Project Management and Development and Product Design techniques.
- Positive role in the diffusion of IMTs is played by interaction of local initiative (university, consulting firm) and public support scheme.

Table 11 - Main initiatives taken in favour of IMT diffusion

Responsible organisation	Objectives	Target public	Funding
Council of CR for quality	the aims of National policy for quality support	organisations of technical control and testing; firms; public organisations	domestic public funds; domestic private funds Phare
Ministry of Industry and Trade	middle-term measures for support of SME	SMEs	domestic public funds, Phare
Ministry of Industry and Trade, APE	programme "Consulting"	SME	domestic public funds, domestic private funds, Phare
Agency for Promotion of Enterprising	programme „Business Innovation Centres„ (BIC)	5 BICs (in Ostrava, Brno, Plzeň, Prague)	public, private, Phare
Agency for Promotion of Enterprising	programme „Regional Consulting & Information Centres	14 centres covering all country	public, private, Phare

Section 3 - Business innovation interfaces and support measures

3.1 Research community - Industry co-operation

The co-operation between research community and industry has been always an important issue in public debates and a need for its improvement has been claimed. Government bodies have been searching for appropriate measures to attain such improvement. Last important political and executive intervention in this issue was organised in the years 1993-5 by the strategy of economic reform. Its concept accepted assumption that the most appropriate measure to improve the relation between research community and industry there should be *privatisation of industrial research organisations*, and the way of their funding¹. The academic science was to be funded from public funds and the industrial science from the private ones. Consequently, about one hundred industrial research organisations were privatised. Indeed, the industrial research organisations got closer to industry (their full capacity was covered by contract research, mostly with domestic industry) but their profile was essentially changed: they have become centres of industrial services (measuring, testing, training, quality control), or small scale production of technology based products, rather than centres of industrial research (Kubík, Neumajer, Müller, Obst 1997). The situation of industrial research has been already described earlier (see paragraph 2). So, let us formulate a summarising assessment about an impact of economic reform on co-operation of research community with industry: privatisation of industrial research organisations and marketisation of their interchanges with industry moved closer industrial research community to industrial community; however, solution of short term issues of domestic industries became the main objective of their interactions. Such re-approachment of both communities had, however, high social losses: (i) industrial research capacities stopped to be reproduced institutionally, and (ii) the gap between academic and industrial research community was deepened.

¹ Research community, in particular industrial research actors, resisted this concept and were suggesting that a German model is applied, i.e. competent industrial research organisations are funded partly from state R&D funds and partly by contract research

The current situation of the relationship between research community and industry cannot be, however, understood without insight in the institutional setting and the trends in its change. Of course, institutions are alive only if they are supported by informal networks. Two comments should be added to support understanding of current relation between research and industrial communities in the CR. The institutional development in the Czech lands followed in principle the German type of S&T institutionalisation: (i) location of academic science at universities, (ii) engagement of industry in the support industrial science via establishment of in-house laboratories in firms; responsibility of branch based industrial associations for support of R&D and technology development in respective manufacturing branches (a type of organisations similar to Fraunhofer organisations in Germany), and (iii) involvement of state into support of academic and industrial science. Such institutional setting was based on both the informal networks among research community, industrialists and state administration and the accepted authority of leading persons with high professional reputation in the respective communities. Informal networks and reputation of leading personalities were helping overcome different valuation and motivation patterns of research and manufacturing. The socialist reforms attempted to change this cultural pattern by way of etatisation of academic and industrial science (and suppression of informal networks) but at any moment of its political crisis the informal networks were revived (e.g. in the periods of the 1960s and the 1980s). However, economic reform in the 1990s deconstructed informal networks between industrial and academic science since scientist from both institutions had to compete for very limited amount of R&D funding. Their relationship was mediated by severe competition for limited funds rather than by co-operative approaches.

In the second half of the 1990s the informal networks among research community, industry and executive branch were nearly suppressed. At the end of the 1990s the situation has been slowly changing. Top-down activities of government (publicly funded projects fostering co-operation of domestic research with manufacturing and public services) and *bottom-up* activities of R&D organisations & associations as well as industrial firms have been helping revive co-operative actions between academic and industrial science organisations and between research and industry. A revival of informal networks among academia, industry and government can be also observed. The following niches of such formal and informal activities can be mentioned:

- Grant Agency of the CR is requiring that the R&D projects which are funded from its (public) sources are assessed, if feasible, by their practical impact on manufacturing and services; even if the practical outcome of this measure will not be extensive it has a positive influence on the communication between research community and industrial community

(members of industrial community take part in the assessment of relevant R&D projects);

- HE faculties are extending participation of the experts from industry in teaching and particularly in preparation of diplomas and finalising projects of students; it is again improving informal climate between research and industrial communities and fostering the recruitment of new personnel by industries;
- newly established, "Research Centres" at the universities are facilitating formation of research teams for research institutes of Academy, HE faculties as well as from industrial research (see closer paragraph 1.3)
- there is slowly growing involvement of industrial sector in funding of R&D projects in all R&D sectors (government, HE, BES);
- extensive potential of bottom-up impact on the relationship between research and industrial community can be expected from the segment of foreign owned firms.

The impact of *foreign owned firms* on the growth of productivity, growth of exports and growing share of high tech products has been already described in the paragraph 1.2 Their positive impact on restructuring of domestic industrial base has not influenced so far the domestic S&T base - academic and industrial research, secondary professional training, higher education and information infrastructure. The case studies of the foreign owned companies are, however, indicating, that the studied firms are paying extensive attention to training of domestic staff and are also ready to support in-house R&D in the domestic firms (Biegelbauer P. Leuthold M., Pribersky A. at al., 2000). The outcome of interviews in the companies is also confirming that a comparatively high output and good quality of graduates in engineering and technical sciences may play a positive impact on the larger foreign companies to get involved into establishment of the R&D and product development centres in the domestic firms, including a support of linkages between the domestic industry and S&T base (Øiêaø, March 2001). Some indications of such foreign firms' activities have already appeared. E.g. IBM World Trade, and its department for strategic outsourcing delivery, is ready to invest USD 8.8 millions into establishment of an expert centre in Brno - place of advanced technical University. The centre is expected to offer IT outsourcing services for large European firms (it will employ about 200 domestic experts and some other 300 new jobs will be needed in communication and auxiliary services). Another example there is the involvement the firm Ericsson into establishment of the testing centre at Czech Technical University in Prague after it has been granted the licence for the mobile network provider at domestic telecommunication market.

The *top-down* impacts are mostly fostered by Ministry of Trade and Industry and its projects which are focused on the support of SMEs. More detailed description of the governmental support schemes of enterprising and industrial research have been already presented in the paragraph 2. Here, the additional information will be given which is reflecting (i) new measures of governments, and (ii) the outcome of the interviews.

The R&D support schemes of Ministry of Industry and Trade (Export, Centres, Stratech, Technos and Park, see closer paragraph 1.3 and Table 4) are oriented to specific outcomes which can be attained only through co-operation between research and industrial actors. They can be assessed as the top-down (executive) measures supporting the interactions between research and industrial community. In 2001 this ministry has launched a specific program CONSORTIA which is explicitly oriented to support of interactions between domestic R&D organisations and firms and has replaced the scheme „CENTERS“. The program CONSORTIA supports co-operative projects between research organisation and industrial firms which are oriented to the solution of specific R&D project, and transfer of its outcome into form of prototype, pilot equipment or semi-production in the manufacturing firm. The support is setting down priorities which will be followed by selection of the presented proposals: high tech products & services, competitiveness of domestic industry, utilisation of qualified domestic human resources, job creating, energy and environment saving technologies. The outcome of the supported project should be attained within three years. The invested outlays should be re-gained within 5 years after the project is finished.

The analysis of the relationship between research and industrial community can be also supported by the data about transfers of funds among R&D sectors. They are collected by Czech Statistical Office following the methodology of Frascati Manual and can give a comparable picture with other OECD countries. Table 12 is indicating that Government and Business enterprise sector (BES) are the main sources of R&D funding and that most of R&D funds are expanded within the sector. Also the lagging position of R&D in HE is noticeable. Table 13 is, however, giving evidence that the involvement of BES as source of R&D funding in the Government and HE sectors has been growing in the last 2-3 years. On the other hand, the R&D funding from Government sources is in general stagnating. The mentioned data are supporting the above indicated finding that the relations between R&D community and industrial actors are getting more intensive in the last years.

Table 12 - Gross expenditures for R&D by source of funding and sector of performance (CR, millions of CZK, 1999)

sector	source of R&D funds	sector of R&D performance				
		BES	Government	HE	PNP	foreign
BES	14 759	11 943	2 101	95	3	718
Government.	5 736	394	5 210	7	0.6	123
HE	2 917	36	2 709	65	6.9	99.9
PNP	129.9	64.7	55.8	0.5	5.6	3.1
total	23 542	12 438	10 076	168	16.1	944

Source: *Ukazatelé vědy a výzkumu (Research and Science Indicators) Czech Statistical Office, Prague, 2 000; BES = business enterprise sector; HE = higher education; PNP = private non-profit (sector)*

Table 13 - transfers between the sources of R&D funding and sectors of R&D performance (millions of CZK, 1995-1999)

sources of R&D funds	sector of R&D performance	1995	1996	1997	1998	1999
BES	HE	2.9	2.8	3.7	0	95
government	BES	416	851	504	481	394
BES	government	406	714	962	1 207	2 101
government	HE	2,1	1.7	4.6	5.2	7.5

Source: *Ukazatelé vědy a výzkumu (Research and Science Indicators) Czech Statistical Office, Prague, 1996 - 2 000*

Table 14 - Main Initiatives taken in favour Research-Industry co-operation

Organisation	Objectives	Target public	Funding
Ministry of Industry and Trade, program Consorcia	co-operative between research and industry leading to prototype, pilot equipment	research organisations, industrial firms	repayable subsidy
Czech Innovation Relay Centre	<ul style="list-style-type: none"> ▪ improve competitiveness ▪ domestic and foreign technology transfer ▪ diffusion of foreign / domestic R&D results 	BIC, SMEs, R&D organisations	EU funds, domestic firms
Association of industry & transport of CR	committee for R&D, promotion of industrial R&D	members of association, mostly branch unions & large firms (1 600 members)	member fees

Conclusions

- after radical economic reform was accomplished the relation between research and industrial community has been narrowed on the commercial interchanges between the privatised industrial R&D organisations and industrial firms;
- in last 2-3 years the informal contacts and communication between research community and industry are being revived as well as co-operative activities between them which are also supported by focused support of government
- the technology based and most dynamically growing segment of the domestic economy - larger foreign based companies - has still minimal impact on domestic research and education, even if its technology potential may soon contribute to more intensive interchanges between domestic research community and industry.

3.2 Support for start-ups and new technology based firms

The regular report of EC about the CR for the year 2000 (Pravidelná zpráva 2000) is mentioning the fact, that 56% of workforce is employed in the sector of SMEs and 53% of GDP is produced by this segment of domestic economy. Indeed, the strong segment of SMEs is an important economic factor for flexibility and competitive capacities of modern economic system. However, in case of the CR the SMEs are not playing so far this role. Both the size of this segment and its structure are not well adapted for such role. Closer look at the segment of SMEs is indicating that it is rather heterogeneous in terms of the economic position and perspective of the firms. The largest part of them has been established in the process of deconstruction of large state owned enterprises and are economically and technologically dependent on the precarious existence of domestic large enterprises. A part of SMEs has grown up in response to the local deficits of planned economy - they have gained capabilities to respond to local demand and are oriented to local or regional markets. In the liberalised and globalizing environment their competitive advantage has been only of short term duration. Moreover, massive form of privatisation has mobilised enterprising practices which have been oriented to re-distributive efforts rather than to productive and innovative ones. They are, of course, also of a short term nature. There is a growing part of SMEs which has already a more reliable economic and technological base. It has grown up predominantly around large foreign based companies. The network of domestic suppliers to SKODA/VW is a good example of this case. The economic position of SMEs cannot be correctly assessed since their statistical surveying is based on different classification of firms´

size (see **Table 15**). Moreover, a part of their capacities is always operating in the realm of „informal economy“. The expert assessments are indicating that the enterprises with the size of not more than 250 employees are covering 50-60% of the total employment and producing 45-55% of GDP (Benáček 2001). More detailed structure of domestic manufacturing by size of firms is given in **Table 15**.

**Table 15 - Industrial production by size of firms
(CR, 1998, current prices, number of employees, %)**

size of firm by persons	sales			average number of employees			average monthly wage	
	CZKbn	index 1998/97	share in %	thous. persons	index 1998/97	share in %	CZK	index 1998/97
upto 19	198,1	106	10,6	164	104,8	11,2	9 747	108,3
20-99	225,6	108,6	12,1	250	106,0	17,1	10 401	108,1
100-499	430,7	110,9	23,0	400	99,3	27,6	11 106	110,5
500-999	222,1	107,8	11,9	175	93,7	12,0	11 810	110,7
1000-1999	305,9	108,6	16,4	184	96,1	12,6	12 313	112,6
2000-4999	195,8	103,6	10,5	136	94,9	9,3	12 511	112,0
5000 -	289,1	105,4	15,5	149	92,5	10,2	15 213	112,6
total industry	1 867,3	107,7	100	1 458	98,6	100	11 623	110,2

Source: *Statistical Yearbook 1999, Czech Statistical Office, Prague, 2000*

Environment for a growth of enterprising and starts-up has been shaped to a great extent by the strategy of economic reform. Its impact in this perspective was ambivalent. On one hand, it gave a chance to many people to start with enterprising (by CESTAT in 1998 share of entrepreneurs in total population of the CR amounted to 13.9%, much more than in the other transitive economies). On the other hand, the financial, legal, fiscal and political support for SMEs was minimal. Even if the SMEs have nearly had same production output as the large firms their support formed a small fraction of that for large enterprises. It is assessed that in the period of the 1990s large firms received from the state budget in the forms of subsidies and relieves about 400 milliards of CZK while SMEs not more than 25 milliards CZK (Benáček 2001).

It is in the line of the above mentioned analysis presented by regular report of EC for the year 2000: it is claiming that the SME support should lay more stress on their involvement into structural funds of EC and the support of industrial research (Pravidelná zpráva 2000, p.XXI). Even if the governmental program of SMEs support (approved in 1999) has been mostly following the aim to ease the financial situation of SMEs, it has also pursued to some extent the technological objectives. Two sub-programs are of importance in this respect: (i) sub-program for support of industrial zones, and to some extent also (ii) sub-program for support of sub-contracting. The latter sub-program

will be discussed in the paragraph **3.1**. Let us pay now attention to the former one.

The sub-program of *industrial zones* was started in 1998. At the beginning it followed an objective to help by subsidies to municipal authorities in construction of the infrastructure of industrial zones. The subsidy was allowed to cover upto 60% of investment costs of the project. In 1999 the amount of subsidies reached the sum of 158 millions of CZK (4.5 millions of EURO). Since 1999 the state support to this sub-program has been radically raised. At present, Ministry of Industry and Trade is preparing a new scheme for this sub-program. The objective will be to extend the scope of funding issues: it will cover also construction and reconstruction of industrial halls in the zone. Also the target public will be wider: except municipalities also the regional authorities and private firms (developers) may be granted state subsidy. The total amount of state support has been also growing. In the year 2000 it grew upto 400 millions of CZK. The funding sources and effects of the developed industrial zones for the period 1998-2000 are indicated in the **Table 16**. New scheme of Government in this field is counting with further increase of support. For the period of next five years it should amount to 2 700 millions of CZK (77 millions of EURO). The additional support will also flow from EU funds - in the period 1991-93 in the sum of 1 420 millions of CZK (40 millions of EURO). The primary aim of this governmental effort there is the attraction of foreign firms to start up with construction of new production facilities in the CR (some industrial zones are supported after a larger foreign firm has accepted the investment in the locality). But there is an intention that industrial zones will be utilised by domestic firms as well. So far, the existing capacity of industrial zones is utilised by less than an half (see **Table 16**). Co-presence of start-ups founded by foreign firms and by domestic residents in industrial zones may bring positive effects of learning by communication or interacting. Such effects, however, need not occur and there are reasons that it is probable. Namely, foreign start-ups are representing a mere extension of large firm with advanced infrastructure while domestic start-ups are real beginner in enterprising, or firms with less advanced resources. Usually, co-operation between uneven partners has no perspective.

**Table 16 - Development of industrial zones in the CR
 (1998-2000, millions of CZK/EURO, %)**

Sum of the announced direct investments into production	47 863 / 1 367
Number of the announced new jobs	12 856
Support from state budget	602 / 17.2
Support from municipal funds	638 / 18.2
Occupation rate of industrial zones (in %)	41

Source: materials of Czechinvest

Table 16 - Main Initiatives taken in favour of start-ups

Organisation	Objectives	Target public	Funding
Czech-Moravian Guarantee and Development Bank	Programs „Start“(1), „Region“(2),	enterprising projects for persons in metallurgy (1), lagging regions (2),	repayable subsidies(1), funding of interest rate
Czech-Moravian Guarantee and Development Bank	Program „Market“	SMEs	repayable subsidies, or 50% of costs for attainment of ISO
Ministry of Industry and Trade	establishment of industrial zones	municipal authorities	subsidy for construction of infrastructure
Czech Innovation Relay Centre	improve competitiveness, domestic and foreign technology transfer, diffusion of foreign / domestic R&D results	BIC, SMEs, R&D organisations	EU funds, domestic firms
Ministry of Industry and Trade	development of industrial zones	municipalities of city and region, private firms (developers)	state subsidy, EC funds
Fund of risk capital, daughter company of Foundations for Development of Regions	support of start-ups of SMEs by venture capital	SMEs	Investors: Ministry of regional Development, EC delegation (Phare funds)
Czech Venture Partners, consulting firm in the issues of risk capital, investor of venture capital	support of start-ups with dynamic growth and clear governance pattern	domestic firms	Investors: Ministry of regional Development, private banks

A positive role in formation of new enterprises has been also played by private investors in the field of *venture capital*. Even if the amount of granted projects is not extensive they are representing well focused investment in the SMEs with reliable and promising competitive advantage. Except the private banks there are two venture capital actors which have been organised in the co-operation of CR Government with EC authorities: Czech Venture Partners and Fund of Risk Capital. Czech Venture Partners is a consulting firm controlling three venture capital funds: Regional Enterprising Fund, Czech and Moravian Enterprising Fund and Czech Private Equity Fund. Their assets are amounting to 1.7bn CZK. Fund of Risk Capital is a daughter company of Foundation for development of regions which is owned by Ministry of Regional Development and EC delegation in the CR. It is supported from Phare funds and funds of private investors. The fund is reporting that until now 11 projects have been granted to domestic SMEs (Informace, 2000).

As far as institutional framework is concerned - its legal, financial, technological and marketing factors - the foreign based firms have a competitive advantage to domestic firms. This fact has been accepted by Government in its strategy of support for new firms. At the same time the support schemes of Government have been attracting foreign firms with an assumption that their location in

the domestic production will be accompanied by capital & technology transfers (see closer paragraph 1.2). At the same time it has become clear that diffusion of technology from foreign firms to domestic ones is conditioned by many other factors which are not available in the domestic environment. Consequently, technology spin-offs of foreign firms are limited so far. Positive role is played by governmental support of domestic firms in their efforts to enter supply and technology networks of technology advanced foreign firms. The interviews with entrepreneurs have indicated that such support should embrace larger number of SMEs and more simple schemes of support should be applied.

The issue of starts-up and new technology based firms is also conditioned by type of manufacturing branch and nature of competitive factors within the respective branch. The data about export in the 1990s by technology intensity of branches (high tech, medium tech, low tech) are indicating that also the technology factor is starting to play a role in the activities of firms and their export performance. E.g. the share of export in the ISIC group 321 (consumer electronics) in the total export grew from 5.06% (1993) to 19.45% in 1999. Similarly, in the case of medium tech ISIC groups 291 (machinery equipment) and 341 (motor vehicles) a growth of their export shares can be observed. In the former case from 2.89% (1993) to 4.72 (1999) and in the latter one from 10.60% (1993) to 18,13% (1999). In the mentioned manufacturing branches foreign firms and foreign technology transfers have been playing leading role. In the case of machinery equipment and motor vehicles the mobilisation of domestic human resources has become an explicit factor of firms' restructuring and growth.

Conclusions

- in the CR there is a favourable environment for enterprising and start-ups in formal and social terms; there is comparatively high readiness of people to start up business; institutional framework is not in principle constraining such efforts but also does not offer evident and accessible support schemes;
- the institutional framework of business enterprise sector, particularly its financial, legal and cultural factors, is not so far developed enough to select and foster domestic SMEs with reliable factors of competitive advantage; for this reason the start-ups and growth of domestic technology based firms are rather constrained; start-ups organised by foreign firms have the advantage of easier access to capital, technology and advanced markets
- Government has developed recently programs for support of start-ups and new technology based firms (within framework of industrial zones); they are primarily oriented to start-ups

organised by foreign firms but also promote their impact on domestic firms and the efforts the domestic firms to enter into supply networks of foreign firms.

3.3 Business networks for innovation

In the last decade networking among the actors of business enterprise sector has undergone several periods in which different social (networking) factors have been mobilised and indicated the size and scale of existing social capital. During the privatisation period *informal networks* between the existing management and state administration were in force. Some of them grew up into formal networking among the domestic firms and investment funds and often resulted in a formation of holding type of respective firms. This type of formal networking followed, first of all, financial reasons and was a response to lack of capital and permanent financial problems of the domestic firms. Some informal business networks abandoned sole economic function, penetrated into politics and formed powerful corporate interests. As far as domestic firms are concerned no essential initiatives in the business networks for innovation have been identified.

With the growing foreign capital inflow in the second half of the 1990s the co-operative agreements (sub-contracting, joint ventures) between domestic and foreign firms and the vertical co-operation between the foreign firms and domestic suppliers formed a ground for a growth of *formal and functional networks* among firms. The evolution of these networks followed different ways and resulted in different effects (International 1998). Partly, they were used by foreign firms to monitor the situation before essential investment were made. Some of them resulted into mergers. Partly, they have grown up into a reliable joint ventures through which the domestic firms could upgrade their products and gain access to advanced markets. Looser networks have been shaped by sub-contracting agreements or vertical relations between the foreign producers and domestic suppliers.

The network of domestic suppliers to SKODA/VW is an exemplary case of positive impact of advanced foreign producer on the domestic suppliers. The obligation of foreign company to domestic suppliers was a part of the contract between the state and VW. Indeed, the firm developed a demanding scheme for domestic suppliers which had to improve radically the quality of products, observe strictly delivery terms and decrease costs. The domestic suppliers responded well to such demands; out of 416 total number of S/W suppliers the domestic ones amounted to 205, Slovak ones to 18 firms and the rest (193 firms) were of foreign origin. However, in new model of S/W passenger car (OCTAVIA) many domestic suppliers could not recover their contracts with S/W company: some of them due to limited production capacities, some of them due incompetent offer of

quality and price. On the other hand, some of them gained status of reliable component supplier and could extend their production by contracts with other foreign motor car companies (such case has been discussed in the interview with management of PAL International - see **list of interviews**). Indeed, foreign companies are promoting networking in business which is also technology driven but these networks are so far rather fluctuating and unstable.

The situation of business networking in favour of innovation is also to some extent influenced by activities of governmental and non-governmental agencies. The governmental support scheme for *sub-contracting* can be considered as a main governmental provision in this field. It is following the aim to improve environment for co-operation between domestic and foreign firms. To attain this aim the following measures are suggested by the sub-program:

- to support the deliveries of components and services of domestic firms to foreign owned firms;
- to support technological up-grading of the products and processes in domestic firms which are delivering their production to foreign firms;
- support of information exchange and formation of databases about component suppliers in the CR.

The support of sub-contracting is organised by CZECHINVEST - the service organisation of Ministry of Industry and Trade. The sub-program is running since 1999. Until now about 50 millions of CZK have been spent on the relevant projects from the budget of Ministry and the same amount from the funds of Phare. The total support for three year duration of the sub-program is amounting to 100 millions of CZK (2.9 millions of EURO).

Another governmental support scheme is oriented to direct promotion of co-operative linkages among SMEs. It is called „Co-operation“ and belongs to support program of Ministry of Industry and Trade to SMEs. Czech-Moravian Guarantee and Development Bank is taking care of the granted resources. The objective of the scheme is to facilitate co-operation among the firms in (i) establishment of information system controlling common delivery and supply of goods and training of staff in its operation; (ii) formation of common schemes for presentation and advertising of products; and (iii) support of common training of apprentices and re-qualification of workers. The subsidy for granted project is covering 50% of project costs and should not exceed 3 millions of CZK. Also this support scheme is concerning innovation issues only indirectly.

Non-governmental support of business networking in favour of innovation can be identified in the activities of *business associations*, unions of industrial community and organisations supporting

enterprising and business. Their impact on innovation is rather indirect. They are supporting participation of domestic firms in the EU programs and via this activity also innovative elements are mobilised. In this particular aspect the positive role of Association of Innovation based Enterprising (see closer **section 2**), Chamber of Commerce and Union of Industry and Transport of the CR can be mentioned.

The members of Union of Industry and Transport of the CR are composed, first of all, of branch specific unions and larger firms. It embraces 31 associations and unions and 142 individual members. In total it is associating 1 600 firms or enterprising actors. Except the section which is oriented to industrial R& D and co-operation in EU R&D programs there are other sections the activities of which could be considered as relevant to business networking for innovation: support of export, industrial policy, technical norms & certification, training in managerial skills. The networking within the Union is based rather on the ground of manufacturing branches and professional associations.

Chamber of Commerce of the CR has advantage of extensive networking by regional pattern. It has representations in all districts and many regional chambers of commerce are very offensive in their activities. Their impact on business networking for innovation is also rather indirect. They are focused on consulting, training and promotion of foreign contacts of domestic firms and all of these activities embrace some element of innovation. Recently, Chamber of Commerce has founded the Centre for European Integration in order to promote communication and co-operation of domestic firms with EU partners and their participation in the EU programs. These activities are focused first of all on growth of competitiveness of domestic producers. A scheme of Prague's organisation of Economic Chamber can serve as a good example in this respect (see closer **section 2**).

Table 17 - Main Initiatives taken in favour of inter-firm co-operation

Organisation	Objectives	Target public	Funding
Czech-Moravian Guarantee and Development Bank	„Co-operation“	associations of SMEs	50%of costs for the project are covered by bank (not more than 3 mil. CZK)
Skoda/VW	scheme for support of suppliers	first and second digit component suppliers	private
Czechinvest	up-grade sub-deliveries of domestic firms to foreign firms	domestic SMEs which are successful in deliveries to foreign firms	50% state budget, 50% Phare funds
Economic Chamber of the CR	support of regional co-operation & communication	firms	membership fees, granted projects from public and private agencies
Union of Industry and Transport of the CR	support of branch specific co-operation & communication	firms	membership fees, granted projects from public and private agencies

Main issues of national innovation policy in the CR - summarising conclusions:

In the CR in the second half of the 90s modern concept, regulatory framework and provisions of innovation policy have been slowly emerging in contradiction to traditional approach to innovation via a linear (science push) concept. Following this model the innovation policy was narrowed to a R&D policy and some additional provisions facilitating a transfer of R&D output to areas of their practical application. An impact of traditional (science push) approach to innovation is not only the outcome of practical awareness, or regulatory deficiencies. It has been reflecting a distribution of innovation resources and the strategies of the relevant actors and institutions. Indeed, structural dependency on the institutional shape and distribution of S&T capacities which were formed in the period of (dissipating) socialist regulatory regime can be observed during whole decade of the 90s.

In the situation of radical systemic transformation an implementation of a well focused innovation policy cannot be expected. The political actors are challenged by more essential issues of transformation of political and economic system. However, a question can be asked, to what extent economic and political reforms have addressed issue of innovation and mobilised its adequate resources. Taking into account strategy of political and economic reforms in the CR a reply to this question is ambivalent. On one hand the reforms re-established autonomy of S&T institutions, economic and political actors and laid down a foundation for a competitive economic and political systems. On the other hand the radical economic reform (following the concept of so called Washington Consensus) failed to establish a reliable market regulatory framework and restructure industrial resources. On contrary, it introduced a fierce competitive environment which was mostly destructive to available innovation resources (R&D capacities, industrial networks, co-operative alliances among firms, executive regulatory capacities). The concept of radical economic reform attempted, in fact, to introduce a „market pull“ concept which was expected to raise a role of market actors in a formation of R&D. Consequently, industrial R&D organisations were privatised - separated in principle from public funding sources and exposed to a very constrained demand from a side of firms. Such provision brought about rather unexpected and negative implications: competitive environment in the situation of limited R&D resources (i) reduced R&D capacities in the R&D organisations, and (ii) destructed networks among academic and industrial science, and among S&T institutions in general. Implications of economic reform on innovation resources were rather negative.

In the second half of the 90s negative impact of economic reform on restructuring the manufacturing, including a transformation in the fields of science, technology and education were reflected and provisions were taken to improve this situation. Positive role has been played by industrial, R&D and other communities and its unions which have been publicly debating issues of industrial restructuring. Series of steps have been taken to face current economic recession: support schemes of industrial research; FDI tax incentive schemes; SME support schemes (including scheme of subcontracting, export, innovation management); promotion of R&D at universities (research centres); active employment policy (with re-qualification efforts, mobility schemes for graduated persons etc.). Main lines of governmental measures in favour of innovation resources are associated with support schemes of Grant Agency of the CR (with co-ordinating role of Council of Government for R&D), Ministry of Industry and Trade, Ministry of Education, Youth and Sports (research at HE organisations), and Ministry of Labour & Social Affairs (human resources development). Ministry of Industry and Trade is following two ways of fostering of industrial research: for (several) large firms (projects STRATECH, CENTRES) and for SMEs. Support scheme of SMEs has features of well tuned strategy with short and medium term objectives, and well administered measures (projects TECHNOS, PARK). More extensive support of industrial zones has been expected to facilitate further on the inflow of FDI.

Even if the current policy approach has been still following a framework of R&D policy one can identify some improvements in the innovation based resources: growing share of foreign based companies with higher innovation capacities, revival of industrial research, support schemes for SMEs, support schemes for co-operation between industrial and research community. At the same time there are constraints for further growth of these innovation resources: sector based regulatory policy in the field of S&T (innovation oriented programs are scattered around many ministries, programs and actors); low spin-off effects of foreign based companies on domestic innovation resources; and still low propensity of firms to establish co-operative contacts alongside the innovation based opportunities for enterprising actions.

References

Analysis of Previous Trends and Existing State of R&D in the CR and Comparison with Situation Abroad, Prague, May 1999, Ministry of Education ..., and R&D Council of Government of CR, 64p

Benáček, V., 2001, Lost chances in small and medium enterprising, *Hospodářské noviny*, 15.3.2001, p.17

The Impact of FDI on the Knowledge Base of CEEC (ed. Biegelbauer P. Leuthold M., Pribersky A.), OeNB-Project No.8070, Institute of Advanced Studies, Vienna, June 2000, 193p.

Informace o Fondu rizikového kapitálu, 2000 (www/frk.cz)

International Co-operative Agreements in CEE countries, National report, ACE project Pl-95-2071-R, prepared by Müller K., 1998, 94 p.

Kubík J., Neumajer V., Müller K., Obst S., 1997, Problems of Transformation of the Industrial Research Institutions, Faculty of Economics and Management, Zlin, (introduction in Czech, case studies in English), 98p.

Müller, K. 1998, Modernizační kontext transformace, strukturní a institucionální aspekty (Transformation and modernisation, structures and institutions), SÚ AV ČR (Institute of Sociology, Academy of Sciences of CR), Working papers 98/6, Praha, 77 p. (in Czech)

Müller, K., Stedronsky, V., 2000, Transformace a modernizace společností na příkladech vybraných institucí (Transformation and Modernisation in the Cases of the Selected Institutions), SÚ AV ČR (Institute of Sociology, Academy of Sciences of CR), Sociological papers 00/2, Praha, 212 p. (in Czech)

Podpora podnikání v ČR (Enterprising Support in the CR), Ministry of Industry and Trade, Prague, 2000, 191 p. (in Czech)

Politika podpory malého a středního podnikání v letech 1999-2002 (Policy of fostering SME enterprising in the years 1999-2002), Information bulletin, Ministry of Industry and Trade, Prague, 2000, 26 p. (in Czech)

Pravidelná zpráva Evropské komise o ČR za rok 2000 (Regular report of EC about the CR for the year 2000), Praha, Ekonom, příloha 69
Technology Profile of Czech Republic, Ministry of Education, Youth and Sports, Prague, 1999

Ukazatele výzkumu a vývoje (R&D Indicators), years 1996,1997,1998, Czech Statistical Office, Prague

Uplatnění absolventů škol na trhu práce (Employment of school graduates at labour market), Ministry of Education, Youth and Sports, Praha, 2000 (in Czech)

Zpráva o lidském rozvoji - Česká republika 1999, (Report about Human resources development - Czech Republic 1999), Výzkumný ústav práce a sociálních věcí, Praha, 1999,

Vyučování a učení, cesta k učené společnosti, Praha, 1997, Gnosis (translation of EU White paper on Education & Training: teaching and Learning - towards a learning Society)

List of interviews (name of expert, institutional affiliation, time of interview):

ing. Petr Porák, Ministry of Industry and Trade (December 2000)

ing Navrátil Jiří, Ministry of Industry and Trade, Department of Support for SME (January 2001)

ing Karel Klusáček CSc, Technology Centre, Academy of Sciences of the CR (February 2001)

ing Pavel Švejda CSc, secretary general Association for Innovation based Enterprising (January 2001)

Ing Jiří Ůřeaø CSc, director general of TTC (producer of telecommunication equipment, joint venture with Marconi ltd, March 2001)

ing. Stejskal P., asistant to Director general, PAL International - Larger firm (cca 500 employees), producer of automotive parts, 75% owned by foreign partner (Canada)

ing Janeček Miroslav, director of industrial research institute (research institute of organic synthesis), Pardubice, vice-president Council of CR Government for R&D,

Summary and minutes of the workshop

„National Innovation Policy Profile: Czech Republic“

Framework of the workshop

The scheme for the organisation and aim of the workshop „National Innovation Policy Profile: Czech Republic“ was presented to the Council of Government for Research and Development which has discussed it at its 147th session on April 24th, 2001. It has stressed the significance of the issues of innovation policy, recommended the organisation of the workshop, advised its members to take part in it and pointed out that important role in the organisation of the workshop should be played by Ministry of Industry and Trade.

The organisation of the workshop was prepared in co-operation with Technology Centre of Academy of Sciences of the CR, the experience of which as the Innovation Relay Centre has been utilised in the proposal for the program and attendance of the workshop. At the beginning of May the invitation was sent to the suggested participants of the workshop. The list of invited participants entailed the interviewed persons (see the enclosure of the National report), respective members of Council of Government for R&D, directors of regional BIC, representatives of rectors' conference, representative of Academy of Sciences and the representatives of non-governmental associations (Association of Innovation Enterprising, Association of Industry, Chamber of Commerce). There were invited 15 persons and all of them received the English version of the report „National Innovation Policy Profile: Czech Republic“ (the translation in the Czech could not be prepared for the reason of short term in preparation of the workshop).

The workshop was attended by 6 invited participants (see list in the Enclosure); 3 of the invited participants have apologised and mailed their comments to the report.

The workshop took part in Technology Centre of Academy of Sciences of the CR on May 15th, 2001.

Program of the workshop:

- 1) discussion the text of the „National Innovation Policy Profile: Czech Republic“
- 2) discussion to the preliminary issues of the comparative study of innovation policies in the accession countries (as prepared by ADE in stand-by reports)

Conclusions of the discussion to the first point of the program:

The discussion to the report „National Innovation Policy Profile: Czech Republic“ concerned both the formulations in the text and the formulations and arguments of the main issues of innovation policy in the CR. The former comments have been noted by the author of the report and will be respected by him in the final formulation of the text. The latter comments concerned the assessment of the main issues in the report. There has been an agreement that the report is well reflecting the respective situation in the CR and the main factors of influence on the formation of innovation policy in the CR. However, some corrections in the relative importance of some factors/arguments have been suggested. They can be summarised as follows:

- (1) The support of SMEs, and technology based SMEs, is growing, yet its size is insufficient and also the pattern of applied provisions should be better adopted to the current situation: this claim has referred to the following arguments:
 - subsidies to SMEs should not be oriented improvement of financial position of SMEs in relation to banks (while it is taking over certain burden of high credit rate) but should be oriented to specific innovation projects of firms in which the state support scheme is sharing the costs of the project with the firm;
 - in the year 2001 the budget of Ministry of Industry and Trade for industrial R&D has been decreased by 800 millions of CZK, and in its total sum is lower than in the year 2000; it is expected that this reduction may ill affect the size of newly launched projects and so undermine a revival of niches of industrial science which has started at the end of the 90s.

- (2) within the pattern of regulatory provisions in the field of research, development and innovations the role of the indirect measures should be stressed, particularly the tax relief for the firms which are funding and implementing innovation oriented projects; this claim has been supported by the following arguments:
 - so far, the indirect support provisions have been applied in the field of investments, similar provision is advised for industrial research (with reference to regulatory practices in the western countries) even if the Ministry of Finance is reluctant to apply such measure (for the reasons of its misuse); it is argued that the efficiency of indirect measures is much higher than direct ones;
 - according to the domestic accounting principles the R&D results are considered to be the item of fixed assets, the outlays of which have to be accounted in the form of depreciations; such procedure is framed by two hindering circumstances - assessment of the value R&D results, and a long term span between outlay and effect; consequently, the firms have to fund their R&D and innovation from profit; in comparison with the average situation of industrial R&D in the OECD countries one can claim that in all manufacturing branches there is severe underinvestment into R&D; the deteriorating financial situation of larger domestic firms is signalling that one can expect reductions of the R&D outlays in BES; the existing regulatory and accounting framework is one of the factors influencing this unfavourable development;

- (3) Orientation pattern of academic and industrial research has been shaped by improper valuation framework and priorities; Academic science is driven by the criteria of excellence (publication and citation criteria), the concentration of the limited industrial science funding from public sources is constrained by non-existing debate and schemes of possible industrial priorities which would take into account the existing growth capacities of the domestic manufacturing; it has been, however, stressed that such priority choice cannot be attained without the existence of vivid communication among the crucial stakeholders of innovation process - so far some positive trends in this direction can be observed:
 - recent formation of the research centres in the sector of higher education (in the year 2000) has helped to identify some niches of R&D growth in which the co-operation of universities, R&D institutes of Academy of Sciences and industrial firms and their R&D units is fostered;

- the technology foresight exercise which has been launched by the Ministry of Education, Youth and Sports in the year 2001 is a measure the outcome of which should help identify priorities for the industrial R&D and become a useful criteria for the orientation and distribution of public R&D funding
- (4) Improvement of co-ordination among the ministries taking part in the support of R&D, or the promotion of international R&D co-operation, and the transfer of its results into manufacturing; it has been stressed that the ministries are improving their regulatory capacities in the assessment of R&D and its practical effects, many agencies have been also established to foster relationship between R&D and Industry, and between foreign and domestic R&D and the other sources of innovation; however, the co-ordination among them is rather low; consequently, the firms have been claiming that they are losing lot of time in identifying the sites of possible public support and presenting the adequate proposals; it has been argued that such co-ordination should happen in the both top-down and bottom-up activities:
- the formation of regional contact centres for 5th Framework Program, and their consulting publishing and mediating efforts can be considered as an good example of combination the top-down and bottom up initiatives

Summary of the discussion to the second point of the program

The participants have been informed by national member of project team (K. Müller) about the outcome of the comparative research of the innovation policies in the accession countries (as described in the stand-by reports prepared by the project co-ordinator). It has been stressed that in the general economic and political public still the simplified (R&D driven) concept of innovation is prevailing but the management of newly established domestic firms or successfully re-organised firms is already aware of the advanced concept of innovation which is stressing the role of diffusion and commercialisation of the innovation components. It has been appreciated that the role of legal framework is stressed in the project. In particular, the role of legal framework is important for the existence and growth of SMEs. Also a simple and efficient legal framework is important for starts-up. It has been suggested that closer attention should be paid to the spin-off effects, both in the case of domestic universities in relation to domestic manufacturing, and the case of FDI in relation to domestic knowledge and industrial infrastructure (R&D, education, vocational training, networking among producers and suppliers etc.).

List of participants and persons who sent the commentary to the report:

Name	Organisation	E-mail
Vacek Jiří	University of West Bohemia, Regional Contact Centre for 5th Framework Program	vacek@kip.zcu.cz
Misařová Věra	Association for Innovation Enterprising	misarova@aipcr.cz
Neborák Martin	Technology Centre of AS, project manager	neborak@tc.cas.cz
Klusacek Karel	Technology Centre of AS, director	klusacek@tc.cas.cz
Janeček Miroslav	Research Institute of Organic synthesis, director; vice president of Council of Government for R&D	miroslav.janecek@vuosas.cz
Müller Karel	Charles University	muellerk@fhs.cuni.cz
Albrecht Vladimír	Technology Centre of AS, project manager, editor of information bulletin „Echo“	albrecht@tc.cas.cz

Prague, June 2001