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SLOVENIA'S POTENTIAL FOR KNOWLEDGE-BASED ECONOMY WITH FOCUS ON R&D AND INNOVATION POLICY

INTRODUCTION

The key objective of transition to a market economy for the accession countries[1] had been catching up to developed economies, especially those already members of the EU. If the previous system was blamed for insufficient drive to growth, market push was expected to provide the right stimulus to national economies to bridge the gap to the developed world. Based on such expectations was the economic policy: primary attention was given to macroeconomic measures which would open and liberalise the economy, eliminate the barriers to competition and set up rules and practices commonly found in the West.

Yet at the same time, developed economies were undergoing transition towards an economic system based on knowledge and information as the key factors of growth. A tight relationship between science, innovation, creation and dissemination of new technologies was forged. The importance of appropriate human capital development was receiving increased policy-makers attention. Theory and policy practice called for a closer involvement of the state in the area of science and education to enable smooth transition to knowledge-based economy and society. The position of science had significantly shifted in this transition process to knowledge- based society, since science had moved from specialised factor in cultural scene to a dominant position in the area of economic development (Mali, 2002:308).

In more recent years, the awareness of the concept of knowledge-based economy and society increased in transition countries as well. Slovenia is no exception in this regard. A number of official policy papers address the need to actively promote development in this direction. In day-to day policies, the implementation of the basic prerequisites for knowledge-based economy does not seem to be a priority. Knowledge-based economy/society is closely linked to the transition to a more innovative economy/society. This is only achievable with a much more focused

R&D and innovation policy, which need to become a central element of development policy.

The paper attempts to analyse Slovenian research and innovation policy from the perspective of transition to knowledge-based society. While Slovenia had tried to develop a coherent and modern national innovation system by following the advice of foreign and local experts, it had not yet succeeded in putting the innovation in the heart of economic and development policy. Such narrow treatment of innovation accounts for the inadequate contribution of relatively well-developed public R&D to the economic growth, for slow reforms of the education sector and insufficient technological restructuring of the business sector. All together, such trends seriously threaten the long-term economic growth and restrict Slovenia's possibilities for catching-up with the developed countries.

The transition to the knowledge- based economy/society is basically not a technological issue, but above all, a development issue with strong economic, social and cultural dimensions (Stare, Bučar, 2001). A transition to knowledge-based economy/society requires, among other elements, a well developed and efficient national innovation system and a horizontally integrated innovation policy. As we will show in the paper, current understanding of innovation and conception of the innovation policy are not in line with the requests of knowledge-based economy/society.

THE KEY ELEMENTS OF KNOWLEDGE BASED ECONOMY AND SOCIETY

According to the World Bank KAM project (WB, 2002, p. 8-9), "there are four essential, and interrelated, elements of any strategy for building a knowledge economy:

1. *Creating an appropriate economic incentive and institutional regime* that encourages the widespread and efficient use of local and global knowledge in all sectors of the economy, that fosters entrepreneurship, and that permits and supports the economic and social transformations engendered by the knowledge revolution;
2. *Creating a society of skilled, flexible and creative people*, with opportunities for quality education and life-long learning available to all, and a flexible and appropriate mix of public and private funding;
3. *Building a dynamic information infrastructure*, and a competitive and innovative information sector of the economy, that fosters a variety of efficient and competitive

information and communications services and tools available to all sectors of society. This includes not only "high-end" information and communications technologies (ICTs) such as the Internet and mobile telephony but also other elements of an information-rich society such as radio, television and other media, computers and other devices for storing, processing and using information, and a range of communication services;

4. *Creating an efficient innovation system* comprising firms, science and research centres, universities, think tanks and other organizations that can tap into and contribute to the growing stock of global knowledge, adapt it to local needs, and use it to create new products, services, and ways of doing business."

In this paper, we shall focus especially on the last point, *creation of efficient national innovation system*. We apply a "broad" approach to national innovation system where the "narrow" directly innovation-related institutions (the institutions, which promote the acquisition and dissemination of knowledge and are the main sources of (technological) innovation) are embedded in a much wider socio-economic system in which political and cultural influences as well as economic policies help to determine the scale, direction and relative success of all innovative activities (Freeman, 2002:194). Thinking of national innovation system in these terms necessarily makes the policy approach a much more complex undertaking (Stare and Bučar, 2002), but at the same time only such complex approach is suitable when discussing the knowledge economy/society.

Current economic theory and findings from most innovative economies in the world confirm the importance of innovation system and innovation policy. Empirical evidence from developed market economies shows that the ability of countries to innovate determines significantly the rate of economic growth as well as their international competitiveness. The findings of economic theory (Freeman and Soete, 1997; Stern et al., 2000; Baumol, 2002 and many others) and especially economic policy in developed countries of treating innovation as a key factor of economic growth (OECD, 2001a) resulted in the increased governments' attention and (direct and in-direct) intervention in developing a proper innovation environment. OECD (2001a) study on factors of growth in the nineties concludes, *"Innovation[2] is a major driver of economic growth"*. It influences growth at both the microeconomic and macroeconomic levels. At macroeconomic level, innovation

contributes to the three drivers of output growth: capital, labour and multifactor productivity (MFP)[3]. A number of analysis and documents discussing national innovation system/policy, national innovative capacity, and the measures to promote innovation, R&D policies in favour of innovation etc., has proliferated in recent years. Also at the level of EU, many activities are being developed[4]. A new EU innovation policy approach was presented in March 2003, putting innovation in a forefront of designing all other policies. This is reflected in the following definition of innovation: *"Innovation is viewed as a multi-dimensional concept, which goes beyond technological innovation to encompass, for example, new means of distribution, marketing or design. Innovation is thus not only limited to high-tech sectors of the economy, but rather is an omnipresent driver for growth."* (EC Communication on Innovation Policy, March 2003).

Innovation has been developed as a policy issue at different paces throughout the transition countries. As a result, the longevity, coherence and coverage of the policy frameworks varies. Even where policy exists there remains a large gap between declarations in support of innovation and actual implementation (INNO, 2001). Levels of funding to support innovation are extremely low and the scope of intervention is limited. Since narrow approach to innovation system is prevailing, the policy is mainly focused on research institutes or on the few R&D performing firms in the economy. Innovation is understood as a new product/process based on new technology in a strictly technical sense. Accordingly, improvements in organisational methods or managerial style or new ways of marketing are usually not seen as innovation activity. Little attention has been paid to raising awareness of innovation, improving innovation management capacities in companies, and ensuring that companies have access to competent advisory services. Funding programmes for collaborative, market-oriented R&D are small. The main focus of attention is on infrastructure linked to universities in the form of science and technology parks. There are few examples of universities developing commercialisation activities. (Reid, 2003)

Many of the instruments and measures introduced in transition countries are in fact copies of the measures and instruments, which functioned in more developed EU countries (innovation agencies, technology centres and parks, innovation relay centres, regional development offices, technology or SME funds, etc.). Simple transfer to a still very different business environment doesn't vouch for their success. Little has been done so far to adjust them to the local conditions. (Bučar, 2003)

Indicators included in the Innovation Scoreboard reflect a gap between the transition countries, covered by the Scoreboard and the EU. It shows a very different situation among the transition countries themselves as well as significant differences of the group with the EU average.

No 1	Indicator	EU	MT	BG	CY	CZ	EE	HU	LT	LV	PL	RO	*SI*	SK	TR
1,1	New S&E grads	100	60	46		39	67	44	91	54	58		*128*		53
1,2	Pop with 3rd education	100	33	100	126	55	139	66	212	86	55	47	*67*	50	38
1,3	Life-long learning	100	114		36		62	35	44	192	61	13	*44*		38
1,4	Empl med/hi-tech manufacturing	100	94	73	14	121	63	116	42	23	100	65	*115*	89	16
1,5	Empl hi-tech services	100	85	75	51	89	94	90	56	61		40	*75*	84	
2,1	Public R&D / GDP	100		70	30	81	79	67	79	43	67	15	*101*	36	79
2,2	Business R&D / GDP	100		9	4	63	12	28	5	16	20	23	*65*	35	21
2.3.1A	EPO patents / pop	100	*2*	2	4	8	5	11	1	*2*	2	1	*13*	4	
2.3.2	USPTO hi-tech patents / pop	100	21	1		5		2	4		0	0	*4*	2	0
3,1	SMEs innov in-house	100	35				75		116		9		*38*		56
3,2	SMEs innov co-op	100	44				116		107						161
3,3	Innovation exp	100					65				111		*105*		
4,1	Hi-tech venture capital / GDP	100				9		14	372	258	19		*62*		54
4,2	New capital	100	213								13				40
4,3	New-to-market prod	100	582				92								145
4.4A	Internet access / pop	100	81	24	70	43	96	47	*22*	23	31	14	*96*	53	12
4,5	ICT expenditures / GDP	100	51	48		116	120	111	74	99	74	28	*59*	94	45
4.6A	Inward FDI / GDP	100	280	87	78	141	176	143	68	96	70	58	*51*	80	16

Source: Calculated based on EC (2002a), 2002 European Innovation Scoreboard: Technical Paper No. 2, Candidate Countries, November 26, European Trend Chart on Innovation, DG Enterprise. www.cordis.lu/trendchart

Table 1
Candidate Countries Scoreboard 2002 (EU=100)

How does current state of affairs in innovation matters influence the ability of transition countries to move towards knowledge-based economy/society? Let us examine this on the case of Slovenia, which has scored above or close to EU average in 5 indicators out of 18 and is ranked fourth among the candidate countries as to its innovation capability (Nauwelaers and Reid, 2002). It is interesting to note that the largest gaps identified are in the indicators related to business sector (the ratio of BERD to GDP, high tech venture capital to GDP, SMEs innovation activity, employment in high tech services, etc.) and in measures, which indirectly reflect the business focus of science community (the number of patents). This would indicate potentially neglected areas in current Slovenian innovation system.

NATIONAL INNOVATION SYSTEM IN SLOVENIA

Institutional setting

The institutional framework of innovation policy had since independence gone through several changes, reflecting in part the search for the most efficient division of tasks among different ministries and in part the influence of both, science and business communities. Observing the practice in other developed countries and following the recommendations of EU, Slovenia introduced several measures, instruments and legal documents to support innovation, entrepreneurship and technological development. Initially, innovation policy was a segment of the R&D policy and under the management of the Ministry of Science and Technology. Within the Ministry, the people responsible for technology development and innovation fought for a more visible position, feeling that their programmes were not given the same attention as those in the support of public (scientific) research. Several analysis, both national and international, called for strengthening of the technology and innovation dimension of the Ministry's focus and eventually two separate departments were formed, both at the level of State Secretaries: one for science and the other for technology.

This was not the end of changes in the organisational set-up. As the result of the reorganisation of the government after the end-1999 elections, the Ministry of Science and Technology was dismantled, and assimilated by two Ministries. The Ministry of Economy now hosts the "technology" section of the ex-MZT, while the Ministry of Education, Science and Sport adopted its "science" part. Most of the issues dealing with technology and innovation are now under the Ministry of Economy (ME). The Entrepreneurship and Competitiveness Department of the ME, in charge of the innovation policy and technology development-reorganised its programmes for the period 2002-2006 (some inherited and some newly developed), but more changes are being planned with regard to organisational structure. In Nov. 2002, a new Law on Research and Development was adopted, under which two separate agencies are to be established within a year from passing of the Law: Agency for Scientific Research and Agency for Development and Technological Research. The idea behind such institutional setting is that the agencies (each in its sphere) would be responsible for permanent, professional and independent selection process of projects and programmes, which are to be financed from public re-

sources. Each agency is to have its board of directors, a manager and a scientific (expert) council, as set forth by the law.

The numerous changes in the institutional setting of the innovation system reflect a search for the optimal allocation of tasks and instruments among different government's ministries and offices. The negative side effect is that the people involved in these processes are preoccupied with the changes of the system instead of focusing more on the delivery side. Also, little was done in the area of evaluation of past set-up, which could point out some good practices, but also most common criticisms in terms of low level of policy coordination and integration. What is noticeable though are the expectations and continuous optimism in policy documents that the planned new measures will bring about the change in government's attitude towards innovation. With each legal change to come, a policy shift towards more active support to innovation was expected, much the same as at current moment with forthcoming formation of the two Agencies. The actual change in attitude towards the role of innovation and R&D has been developing at a much slower pace with only gradual increase in budget allocations for innovation and R&D support. One could say that while at the declaration level, Slovenian government has always been in favour of innovation policy, the actual awareness of the impact and of the importance of coherent national innovation and R&D system was second (or third) only to the process of joining the EU (negotiations, legal harmonisation, macroeconomic policy adjustments, etc.).

Research and Development System as an integral part of Innovation System

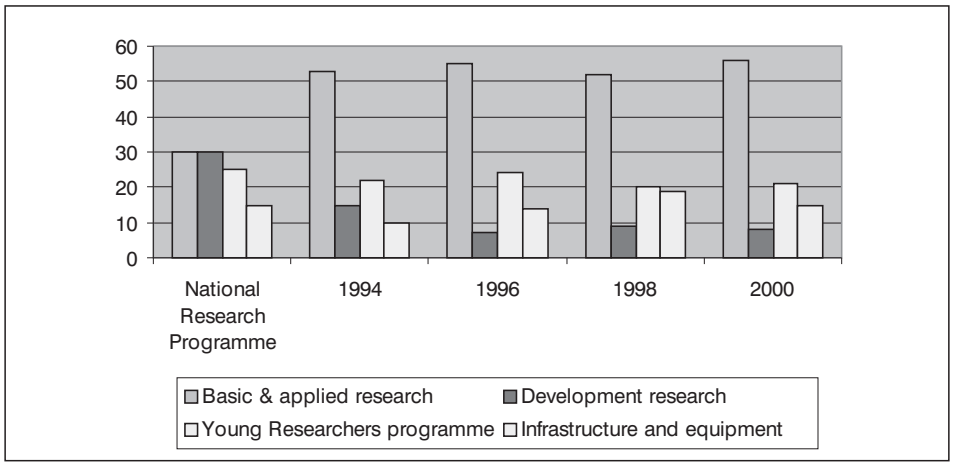
Slovenia was rather successful in preserving its R&D system after the transition (Bučar and Stanovnik, 2001). Some decrease of funds was experienced only in the first years (beginning of 1990s) due to collapse of large industrial conglomerates. The state picked up the financing of R&D, which allowed survival of most of the major research units. The side consequence of increased share of public funds for R&D was reorientation of academic and public research organisations in direction of a more fundamental research (see Graph 1) and looser ties with business sector. The negative implication of these trends is often criticised poor link between relatively well developed public research sector and business community needs: the latter is not satisfied with the level of response or the type of knowledge available in public R&D.

In recent years the investment of business sector in R&D is growing and accounts for more than a half of total funds, yet little of that money finds its way in the public research sector. The trends are not dramatically different in other countries, but still in the moment, when a more dynamic growth is called for, it is hard to accept that majority of the research potential of a small country is not involved in activity, which would support the needs of its economy.

Table 2
R&D expenditures by source of financing, 1993-2000 (in EUR million*)

	1993	1994	1995**	1996	1997	1998	1999	2000
Business	66.0	86.5	112.8	106.6	122.9	135.5	162.2	159.8
Government	101.9	121.8	125.7	104.0	86.7	104.9	106.6	121.1
Private, non-profit	0.2	0.3	0.2	0.8	0.5	0.1	0.2	0.1
mult1Foreign	5.5	5.5	7.2	5.8	18.9	17.3	16.0	18.6
Total	173.7	214.11	245.9	217.2	229.0	257.8	285.0	299.6
As % of GDP	1.61	1.77	1.71	1.44	1.42	1.48	1.51	1.51

** Calculated from SIT using average annual exchange rate.*
** In 1995, the figures for R&D expenditures were overvalued due to a statistical error made in higher education.
Source: Statistical Office of the Republic of Slovenia, Rapid Reports on R&D for consecutive years



Source: Ministry of Science and Technology, 1995 for NRP, where the planned ratio between different types of activity was set; Min. of Education, Sport and Science, 2002: actual budget figures for corresponding years

Graph 1
The structure of public funds for R&D in percentages

As, mentioned the business sector is investing increasingly into R&D, but most of the resources remain within the sector. Several studies of the research in business were carried out by different authors, pointing to the concentration of R&D efforts in manufacturing and further, within selected number of manufacturing branches. The pharmaceutical industry remains the most important R&D

performer, followed by electrical machinery, medical and precision instruments, TV and communication equipment, transport equipment, rubber industry, etc. The share of services in R&D is disproportionably low, comparing to the increasing share of service sector in GDP. Larger business seems to be much more aware of the need to invest in innovation and R&D, but has low expectations as to the cooperation with public research sphere.

A critical element, which deserves more attention in innovation policy planning, is relatively low absorption capacity of the business sector if measured by current status of R&D units in industry. The research units in business are usually small and employ on average 10 engineers. Education structure of researchers in business sector is substantially lower than in public research units (of 2535 researchers with Ph.d. degree, only 172 work in business sector). This would imply that with the exception of few, the research conducted in these units is focusing primarily on development or adaptation of imported technical solutions.

Several events have triggered off a more lively debate on R&D and innovation policy during the last year. First, the Law on R&D with its expected operational legal acts opened the question of how the two Agencies should be designed and what their interaction with respective communities (science, business) should be. Parallel to this, the Guidelines of the National Research and Development Programme (NRDP) were being discussed (mostly in research and academic circles, but also at Chamber of Economy), where a heated debate on priorities was started.

Two different sets of priorities were discussed: the type of research (basic vs. applied and developmental) and the scientific field (natural science vs. social, etc.). The business sector was rather critical of public R&D as insufficiently motivated for cooperation, slow in response time and unwilling/unable to provide the type of knowledge/technology the business needs. They argued for a changed regulative framework with stronger focus on economic relevance of research. Many representatives of academia and public R&D institutes object to dramatic change of conditions of financing and evaluation criteria. Several arguments were made on account of basic research being of utmost importance for the survival of a nation. In the eyes of some scientists, the only approach is provision of more money for research, with no or little attached conditions. Their focus is on science policy and little concern is given to innovation policy. Innovation is a matter for business sector with no direct link to science policy/funding. As

the reasons for low cooperation with industry some quote non-interest on behalf of industry, insufficient financial means of the industry, evaluation criteria of the Ministry of Education, Science and Sports (MESS) for the programmes they currently fund, etc.

This and several other policy debates revealed inability of the two sectors to carry out constructive dialog and a need for the government to act as an in-between. This was reflected also in adoption of the Guidelines for the NRDP. The negotiations on the exact wording of the Guidelines were prolonged and involved several groups: the government, science community, business sector with different associations and Chamber of Industry and Trade, both Universities and Academy of Science and Arts. At the end, several policy directives were agreed upon, but the document remained at descriptive level with more specific measures to be developed by NRDP. The Guidelines suggest that public funding of R&D should follow priorities, decided in cooperation with both business and science community. In the selection process, EU VIth Framework priorities can be used, complemented with national needs and capabilities. The Guidelines suggest a need for socio-economic and technology foresight, which could be used as the basic criteria for priority setting. Also, the structure of public funding should move in the direction of applicative and developmental research and stop the domination of basic research. But the suggested ratio of 30% basic, 30% applicative and 40% developmental projects was not accepted by the Science and Technology Council, and the decision is left with the government. The document however mentions several times a need for research to be more focused, better coordinated with economic and developmental needs of the country, more cost-efficient, etc. It is expected that these directives will be build into future evaluation system for public R&D financing. Already in the documentation requested by MESS for the next period of financing of research groups (June 2003 call), a special segment on the relevance of research was included (relevant for economic and social development, for technological development, for the national identity and sovereignty).

Slovenia is at the moment in a position to choose between a vicious and vitreous circle in its R&D policy. The first option, closer to reality today, is the continuation of the publicly funded research, focusing on science citation index and scientific excellence and having little, if any, concern for the needs of the surrounding and the growing demand of the business sector. Business continues to rely

on technology solutions from abroad and/or innovates at a much slower pace, resulting in reduced competitiveness. The consequence of lower competitiveness is lower economic growth. This, in turn, limits the ability of the government to fund public R&D. With fewer funds available, the quality and quantity of public R&D is diminished. On the other hand, a closer link with business sector and more focus both in academic and R&D institutions on the business needs could channel some of the business sector R&D investment in the public sector and help in more dynamic technological restructuring. This would contribute to higher growth and revenue, both for business and R&D sector, as several cases in developed countries confirm. This interlinkage is still poorly understood in science circles, at least judging by the current policy discussions.

Innovation activity

According to numerous data and analyses (Ministry of Economy, 2000), the existing level of technological and managerial capabilities in Slovenia is not yet at a level where market forces alone would be sufficient for its dynamic and integral restructuring. Slovenian enterprises are too slow in changing and innovating their production programmes, techniques, products and/or services. Wholly Slovenian owned companies introduce some sort of innovation to only 37% of their programmes over a five-year period, those with majority foreign ownership 55%, while the most competitive companies in the developed market economies change 75% of their programmes during the same time period (Sočan, 1998).

Can it be assessed that such slow reaction time of Slovenian companies is a reflection of market conditions, meaning that current level of competition does not yet stimulate innovation? There is some truth in this. The loss of ex-Yugoslav market right after the declaration of independence and parallel changes of Eastern markets led to serious cuts in production, in staff lay-offs, to the rationalisation of the expenses (passive restructuring). Very seldom and in a very limited scope enterprises restored to the introduction of organisational, technological or other innovative changes (active restructuring), which could lead to increased competitiveness in the long run. This of course cannot be taken across the board since there are several cases of successful technological restructuring with the introduction of information-communication technologies, but not enough to dominate the scene as yet.

The recent results of Innovation Survey (see Table 3) were not encouraging in view of innovation policy. Data (while not fully comparable with previous surveys dues to somewhat changed sample) reflects no positive trends, except for small increase in the share of innovative enterprises in the service sector. If less than one third of Slovenian enterprises qualify as innovative, the transition to knowledge-based society is not going to take the shape of catching up, but becoming a "second-tier" partner at the best.

Table 3
Innovation activity in manufacturing in 1994-1996, 1997-1998 and 1999-2000

	1994-1996	1997-1998		1999-2000	
M-manufacturing S- services	M	M	S	P	S
Share of innovative enterprises		33.0	11.5	28.3	13.8
Share of innov. expenditure in GDP(%)	1.2	1.5	–	1.4	–
Share of large enterprises in innovation expenditure (%)	80.1	75.3	90.8	74.0	
Innovation intensity (%)*	3.3	3.9	–	3.4	2.2

* Innovation intensity is the share of innovation expenditure in the sales revenues of an enterprise.

Source: SURS Innovation Survey, 1998, 2000, 2003

Slovenia's government has so far followed (consciously) the strategy advocated by orthodox economists, where technological restructuring is to be led by market forces. The increased competition due to open and liberalised trade policy would by itself force the enterprises to act innovatively and rapidly introduce necessary technological and organisational changes. The role of the government is therefore to focus on elimination of obstacles to full competition (liberalisation, de-regulation). Such macroeconomic policy (which is not a development strategy, as stressed by number of domestic experts) does not guarantee the basic conditions for a radical leap-frogging and catching-up of the more developed countries. Even in the most developed countries we can see the governments systematically support the transition to knowledge society via investments into R&D, education and infrastructure. Active innovation policy is not considered as contradictory to market-based economy. In fact, the governments play an important role in creating the environment, favourable to growth, innovation, entrepreneurship and industrial restructuring. This includes the level and type of government funding of R&D, an appropriate education and human resources policy, creation of favourable entrepreneur-

ial environment, infrastructure investment, competitive market for financial services, fiscal and monetary policies in favour of R&D and venture capital, etc.

There are several positive indices in this regard in Slovenian innovation policy. Besides the already mentioned changes in the organisational set-up, Slovenia has put the creation on an innovation supportive environment as the top priority in the Single Programming Document, prepared for the channelling of EU structural funds. Several activities are going to be supported, focusing on creation of technology networks, research and development cooperation, innovation training, etc. The SPD needs to be negotiated with the EU Commission on one hand and on the other, since it requires local financial participation, the budgetary provisions for 2004 need to be made for local shares in each proposed activity. To succeed in placing innovation so highly on priority list was a major achievement of the ME and is a reflection of gradual change in attitude towards innovation in the overall government policy. Yet one of the key problems with Slovenian innovation policy so far has been the gap between declared and implemented (see in more detail in Bučar and Stare, 2002) and one can only hope that this faith is not going to repeat itself again with SPD.

ASSESSMENT OF SLOVENIA'S INNOVATION POTENTIAL FOR THE TRANSITION TO KNOWLEDGE ECONOMY/SOCIETY

The on-going discussions and policy debates reflect the growing awareness of the importance of coherent national innovation policy for further economic growth and competitiveness. Yet on the other hand, several indicators show that the gap between policy and actual practice remains wide. Some of the key characteristics of a innovation system in a knowledge-based economy are still poorly understood by the stakeholders, especially within the science community. Arguments in favour of status quo are still made by people of significant authority in public R&D sector. The centrality of innovation policy is not yet accepted concept by those who design economic policy at the national level.

Business sector R&D expenditures reflect a high degree of concentration in only very few industrial branches and can be assigned to a small number of individual large companies active in a limited number of industries. These few companies are all export oriented and therefore facing global competition. So it would be premature to conclude that the rising business expenditures on R&D already re-

flect the positive outcome of macroeconomic policies of open market economy, since majority of these companies were in the forefront of investments in R&D and innovation in the past as well. INNO study provided broader insight, finding a dual picture in all candidate countries where "a few firms are heavily investing in innovation activities, while the overwhelming majority of other companies, especially SMEs, are not undertaking innovation." This duality is especially worrisome since one of the supposed policy focus of transition countries during the last decade was the promotion of SMEs and at least in terms of number of creation of new enterprises the goal was achieved in all observed countries. What it signals (but requires a more detailed analysis) is that the new enterprises are not innovative enough and are seldom the result of entrepreneurial effort to turn invention to innovation.

While a wide range of instruments and support measures was put in place during the transition period (see in more detail in Bučar and Stare, 2002b), the impact of these on innovation has been limited. This opens a question of their design and implementation. Major difficulties pertain to non-securing sufficient funds even for approved government initiatives and programmes aimed at supporting innovation, to non-transparency in the allocation of funds and to poor coordination among different governmental bodies regarding the funds/mechanisms. Sometimes it seems there is more interest in the number of instruments (the more, the better) than in their actual efficacy. This leads to insufficient financial and human resources devoted to the implementation of the measure/instrument.

A serious handicap of current innovation system is the lack of systematic monitoring and evaluation system. Insufficiently developed monitoring of the impact of the introduced measures sometimes resulted in their abandoning or in introduction of new (alternative) mechanisms without a prior evaluation of reasons for failure. A systematic monitoring of all the measures in a manner, which would show the impact and reflect the difficulties in the implementation process, was never introduced. This lack of continuous evaluation of policies and instruments makes it impossible to learn from one's mistakes and therefore work on improving certain mechanisms. Instead, a transfer of something, which worked in Finland or Ireland to Slovenian environment is practiced, expecting it to have the same impact as in its country (ideas of clusters or incubators could be examples of such). The only adjustment, is the financial one: measures are expected to work in Slovenia with a much smaller financial support.

The awareness raising is one of the areas of innovation policy, which should be given a more systematic attention. While several different activities in the field of R&D and innovation took place, there is no centrifugal force, bringing the efforts of different institutions or individuals under the common framework. This can be singled out as one of the key deficiencies of the Slovenian innovation policy. In principle, the need to raise public awareness of the importance of innovation policy was considered by the government as an important area, but the fact remains that few coordinated activities were organized in this regard. Especially lacking was the awareness raising among the general public, since at most events "the convienced are convincing themselves" (Bučar, 2003, SLORITTS). Putting innovation and entrepreneurship at the centre of economic development policy calls for significant increase in activities related to awareness raising on the importance of innovation and entrepreneurship as two of the main factors of growth and competitiveness. This is needed both within the government and business community as well as within the general public.

CONCLUDING THOUGHTS

Knowledge-based economy/society opens many challenges to the transition countries. Essentially, macroeconomic policy in many of them, and in candidate countries especially, evolved around making national economy compatible with the EU standards. Macroeconomic stabilisation and liberalisation were the absolute priority. Such macroeconomic policy (which is not a forward-looking development strategy) does not guarantee the basic conditions for catching-up of the more developed countries or is sufficient for the transition to knowledge economy/society. The "exploitation" of national innovation system as one of the key elements of knowledge based economy for economic growth is not envisaged. As found out by Mickiewicz and Radošević (2001:10) for transition countries as a group: "In the past ten years innovation policy was considered secondary to the transition related concerns. However, the exhaustion of growth and productivity improvements based on non-investment related reallocations will bring the issues of innovation and industrial upgrading into the policy focus."

Countries in transition should therefore realise that "Neither wholly free-market led nor wholly government –led development of market institutions and technology infrastructure will deliver transformation towards knowl-

edge-based economy." (Dyker and Radošević, 2000:64) Current focus on price and trade liberalisation and privatisation are maybe essential to transformation from socialist to market-based economies, but not sufficient conditions for transformation to innovation-based economy. If, as evidence from OECD countries show, long-term growth depends increasingly on innovation, developing and implementing sound national innovation policy is an essential ingredient of macroeconomic policy. Reforming national innovation system and setting forth a clear innovation policy was expected to be one of the elements of transition process as well, but so far the macroeconomic policy makers in transition countries have not changed significantly their attitude towards innovation policy (Bučar, Stare, 2002) and technological restructuring. Current approach neglects certain key characteristics of business sector as well as of general business climate in transition countries.

One of the key tasks in front of transition countries is therefore to establish productive links with the research sector and national economy and put the science into the service of economy.[5] As Perez and Soete (1988:459) warn: "The real catching-up process can only be achieved through acquiring the capacity for participating in the generation and improvement of technologies as opposed to the simple "use" of them." This means being able to enter either as early imitator or as innovators of new products or processes. To do so, a strong science and technology capacity must be developed. While strong arguments can be put forward in favour of scientific autonomy, science community in transition countries should be also considering the need and indeed responsibility of a more substantial contribution to national economic development. After all, the funds to support scientific research (even the one based on sole curiosity) come from the taxpayers (business + individuals): and the more successful and competitive business sector will be, more financial resources (and autonomy) the science may have in the future.

The analysis of the countries that in the history were successful in catching-up with technologically and economically more developed countries by leap-frogging certain development stages shows that this was never achieved without a conscious action of the government[6]. Along with a modern economy, a modern government with a vision and efficient institutional environment is needed to enable a dynamic and qualitative economic and social development. Already stressed key role of innovation in knowledge society requires the establishment of coherent

modern and future-oriented innovation system (Bučar and Mulej, 1999). This should be one of the key priorities for the government. The contemporary role of the state is not in providing direct aid to individual economic actors, but in establishing the framework leading to sustainable and stable development. The government should not underestimate the importance of creation of general awareness and support for change. As can be seen from examples in more developed environments[7], bringing public in policy debates is essential. This is a segment little developed in transition countries.

Even in the most developed countries the governments systematically support the transition to knowledge society via investments into R&D, education and infrastructure. These countries have their national innovation policy with well-elaborated mechanisms of support of innovation activities. Simply copying these would not do, though, because there are too many specifics in innovation environment in transition countries. But ignoring the fact that a coherent national innovation system is needed is even more dangerous. Transition countries need to upgrade their national innovative capacity (Stern et al., 2001). National innovative capacity depends on the presence of a strong common innovation infrastructure, or crosscutting factors that contribute broadly to innovativeness throughout the economy. It includes a country's overall science and technology policy environment, the mechanisms in place for supporting basic research and higher education, and cumulative "stock" of technological knowledge.

Let us take here a quote from Abramovitz (1991:32): "Our ability to advance the frontiers of technology and to exploit its possibilities depends in some way on our political institutions, on level of general and technical education, and on the development of forms of industrial organisation and business practice that are adapted to the needs of emerging technologies and consumer demand." What has to be kept in mind, though, is a historic moment of building information or a knowledge society, which is taking place globally. The implications of lagging behind can be detrimental for transition countries. We are catching a moving target, a one where many private and public efforts, backed by comprehensive programmes and immense funds are concentrated on achieving a successful transition to new society. This calls for full integration of innovation in development policies and strategies and a radically different level of innovative thinking in the governments, business and each citizen in the transition countries.

FOOTNOTES

[1] Accession countries: term used to depict ex-socialist countries of Central and Eastern Europe who are to join EU in 2004.

[2] Defined as: development, deployment and economic utilisation of new products, processes and services. (OECD, 2001b:51)

[3] MFP, as has long been recognised, is driven by technological and non-technological innovation- improved management practices, organisational changes, and improved ways of producing goods and services.

[4] Among activities designed at EU level is the Innovation Scoreboard and Innovation Trend Chart Reports, both regularly involving candidate countries. A list of EU publications and studies on innovation is also wide.

[5] This is often strongly opposed by basic scientists, who argue for scientific freedom to choose the object of their research. In fact, it is a sensitive political issue, often "spiced" with questions of national pride and identity.

[6] Freeman (1989) points out the complexity of such undertakings: The success of any country to catch-up within next decades depends crucially on their ability for institutional innovation, infrastructure, investment in education, S&T and last, but not least, on the international economic system.

[7] This is quoted from a document "Innovation system (EU) five priority objectives EU:..." society is often being reticent about innovation. We need to make both the opportunities and the risks of new technologies as transparent as possible in a broad dialogue with science, business and the general public, taking account of the potential economic and social costs of non-innovation... countries with a strongly consensual approach, supporting quality debate on innovation issues, also produce strong figures for innovation-related indicators." (Innovation in a knowledge driven economy: Communication from the Commission to the Council and the European Parliament, Brussels, COM, 2000).

LITERATURE

Abramowitz, M. (1986), Catching up, Forging Ahead and falling Behind, *Journal of Economic History*, XLVI, No. 2, June, 385-406.

Bučar, Maja (2003), Innovation performance, SMEs and candidate countries – some comments from Slovenia, background paper for Conference on implementation of the European Charter for SMEs in the CCs, Tallin, Oct. 1, 2003.

Bučar Maja (2003), Awareness raising and innovation; SLORITTS project, mimeo.

Bučar, Maja and Stare, Metka (2003), From Quantity to Quality: Critical Assessment of Slovenia's Potential for Knowledge-based Growth. Paper presented at the conference The Knowledge-Based Economy in CEEC: Exploring the New Policy and Research, SSEES, London: University College, April 28-29, 2003.

Bučar, Maja and Stare, Metka (2003), *Inovacijska politika male tranzicijske države*, FDV.

Bučar, Maja and Stare, Metka (2002a), Macroeconomic policy vs. innovation policy in the transition countries. Working Group on Science and Technology for Development, EADI 10th General Conference, 19-21 Sept., 2002, Ljubljana.

Bučar, Maja and Stare, Metka (2002b), Slovenian Innovation Policy: Underexploited Potential for Growth, *Journal of International Relations and Development*, 5(4):427-448.

Bučar, Maja (2002), Družbenoekonomska vpetost raziskovalne dejavnosti, in: S. Sorčan (ed.), *Raziskovalna dejavnost na slovenskem v 90. letih dvajsetega stoletja*, 135-154, Ljubljana: Slovenska akademija znanosti in umetnosti.

Bučar, Maja and Stanovnik, Peter (1999), Some Implications for the Science and Technology System in a Transition Economy: the Case of Slovenia, in: Brundenius et al. (eds.), *Reconstruction or Destruction? S&T at Stake in Transition Economies*, Hyderabad: Universities Press (India) Ltd.

Bučar, Maja and Stare, Metka (2001), National Innovation Policy Profile: Slovenia. Innovation Policy in Six Applicant Countries: The Challenges, INNO-99-02, ADE. ftp://ftp.cordis.lu/pub/innovation-policy/studies/studies_six_candidate_countries_slovenia_2001.pdf.

Bučar, M. and Mulej, M. (1999), Innovation systems in Countries in Transition – the case of Slovenia, NECSTS 99 Conference: Regional Innovation systems in Europe, San Sebastian.

Dyker, D. A. and Radošević, Slavo (2000), Building the knowledge-based economy in countries in transition – from concepts to policies, *Journal of Interdisciplinary Economics*, Vol. 12, No. 1, 2000, pp. 41-70.

European Commission (2003), Innovation policy: updating the Union's approach in the context of the Lisbon strategy, COM (2003) 112 final, March 11.

European Commission (1995), Green Paper on Innovation.

European Commission (2001), Innovation Policy Issues in Six Candidate Countries: The Challenges. Directorate-General for Enterprise.

European Commission (2002a), Report on Research and Development. Economic Policy Committee; Working Group on R&D, EPC/ECFIN/01/777-EN Fin. Brussels: European Commission.

European Commission (2002b), More Research for Europe. COM (2002) 499.

European Commission (2002c), European Innovation Scoreboard. Special issue CORDIS.

European Commission (2002d), European Innovation Scoreboard: Technical Paper No. 2, Candidate Countries, European Trendchart on Innovation. http://trendchart.cordis.lu/Reports/Documents/report2.pdf.

European Commission (2002e), Towards a European Research Area: Science, Technology and Innovation-Key Figures 2002. European Commission (2000), Innovation in a Knowledge Driven Economy. Directorate General Enterprise, Luxembourgh, Office of Official Publications of the European Communities. http://www.cordis.lu/innovation-smes/communication2000/home.html.

European Communities (2001), Statistics on Innovation in Europe, Data 1996-1997. 2000 Edition.

European Communities (2003), Innovation Tommorrow. Innovation papers 28, Directorate General for Enterprise, Luxembourg, Office for Official Publications of the European Communities.

Freeman, C. (2002), Continental, national and sub-national innovation systems – complementarity and economic growth, *Research Policy*, 31:191-211.

Freeman, Chris (1989), New Technology and Catching Up, *The European Journal of Development Research*, No. 1, pp. 85-99.

Freeman, Chris and Soete, L. (1997), *The Economics of Industrial Innovation*, Third edition, London, Frances Pinter.

Ministry of Education, Science and Sports (2002), internal data: background material for New Research Programme.

Ministry of Science and Technology (1995), *Nacionalni raziskovalni program* (National Research Programme). Ljubljana: MST.

Ministry of the Economy (2000), *Programme of Support to Business Enterprises in the development of new technologies and establishment and operation of their R&D units 2000-2003*. Ljubljana: Mimeo.

Nauwelaers, Claire and Reid, Alasdair (2002), Learning Innovation Policy in a Market-based Context: Process, Issues and Challenges for EU Candidate Countries, *Journal of International Relations and Development*, 5(4):357-379.

OECD (1999), Managing National Innovation Systems, Paris: OECD.

OECD (2001a), Science Technology and Industry Outlook: Drivers of Growth: Information technology, Innovation and Entrepreneurship, Paris: OECD.

OECD (2001b), Science, Technology and Industry Scoreboard: Towards a Knowledge-Based Economy, Paris: OECD.

Poročilo o razvoju (2003), Analitična priloga, Ljubljana: Urad za makroekonomske analize in razvoj.

Sočan, Lojze (1998), Odločilno je strateško zaostajanje, *Gospodarski vestnik*, 46(1998), p. 25, Ljubljana.

Stare, Metka and Bučar, Maja (2001), The Challenges of Transition to a Knowledge Society, *IB Journal*, No. 1 (XXXV), 98-108.

Stare, Metka and Bučar, Maja (2002), Innovation in Services in Accession Countries: Double Trouble. 12th International Conference of RESER, Services and Innovation, Manchester, 26th-27th September 2002.

Stern, Scott; Porter E. Michael; Furman L. Jeffrey (2000), The Determinants of National Innovative Capacity. NBER Working Paper Series, WP 7876. Cambridge: National Bureau of Economic Research.

SURS (2000), Statistične informacije, *Raziskovanje in razvoj, znanost in tehnologija*, No. 81 and 96.

SURS (2002), Statistične informacije, *Raziskovanje in razvoj, znanost in tehnologija*, No. 182.

SURS (2003), Statistične informacije, *Raziskovanje in razvoj, znanost in tehnologija*, No. 307.

The World Bank (2002), Building Knowledge Economies: Opportunities and Challenges for EU Accession Countries; Final report of the Knowledge Economy Forum, Paris, Feb. 19-22, 2003; The WB and the World Bank Institute, mimeo.