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IN A TRANSITION COUNTRY?

THE CASE OF HUNGARY

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Does Innovation Policy Matter in a Transition Country? – The case of Hungary

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ATTILA HAVAS

DOES INNOVATION POLICY MATTER IN A TRANSITION COUNTRY?
THE CASE OF HUNGARY

Abstract

The political and economic transition posed a complex, tremendous challenge in Hungary in the beginning of the 1990s. Not only macroeconomic stabilisation was required, but fundamental organisational and institutional changes were also needed to transform the country into a stable, middle-income economy, capable of catching up with the more advanced ones in the longer run. Having completed the first round of transition, Hungary has again reached a cross-roads. While the one-party system has been replaced with a multi-party parliamentary democracy and the planned economy with a market economy based on private ownership, the world has significantly changed during this historically short period of time.

Hungary now has to consider what role to play in the globalising learning economy, i.e. what future it envisions for herself. To be more specific: does the country passively accept the fate of a mere surviving economy, drifting without having its own strategy? Or, by implementing a clear strategy, does Hungary intend to be prosperous country, where in 15-20 years most citizens will enjoy high living standards, good health and a clean environment? The paper argues that a sound, coherent innovation policy is one of the cornerstones of an overall development strategy, required if a country is to excel. Yet, in spite of a number of efforts/ trials in the 1990s, no such policy document was approved in Hungary.

The article first provides a brief overview of the transition process, emphasising the simultaneous need for systemic (institutional) changes and macroeconomic stabilisation in order to improve (micro)economic performance. Its core section analyses recent changes in the S&T decision-making system, various efforts to draft S&T and innovation policy documents, as well as the inputs and outputs of R&D and innovation. It concludes that the lack of an explicit innovation policy may hinder long-term development as such a policy is required to signal the main policy directions and commitments of the government, to strengthen the national innovation system – thus anchor FDI – and to align all public and private efforts, resources for development.

HAVAS ATTILA

PIACGAZDASÁGI ÁTALAKULÁS ÉS INNOVÁCIÓPOLITIKA
MAGYAR TANULSÁGOK

Összefoglaló

A társadalmi-gazdasági átalakulás első szakaszán sikeresen túljutva, a XXI. század elején ismét válaszúthoz érkezett Magyarország. Az egypártrendszert többpárti parlamenti demokrácia, a tervgazdálkodást pedig a magántulajdonon alapuló piacgazdasági rendszer váltotta fel. A rendszerváltás lekötötte a felhasználható szellemi és anyagi erõforrások döntő többségét, közben viszont – történelmi léptékkel mérve rövid idõ alatt – sokat változott a világ.

Most azt kell eldönteni, hogy milyen szerepet akarunk betölteni a tudás vezérelte, globalizálódó világgazdaságban, milyen jövõt képzelünk el magunknak. Sarkítottan fogalmazva: beérjük a túlélésre berendezkedõ, önálló stratégiával nem rendelkezõ, sodródó ország szerepével, vagy adottságainkat és a nemzetközi környezetet felmérve tudatosan, jól megalapozott stratégia megvalósításával arra törekszünk, hogy 15-20 éven belül a magyar lakosság döntõ többsége jólétben, magas életminõséget elérve, egészségesen, tiszta környezetben élhessen? A tanulmány alaphipotézise az, hogy koherens, az erőforrásokat összehangoló innovációpolitika nélkül nem lehet sikeres hosszú távú fejlesztési programot megvalósítani. Az elmúlt évtizedben azonban egyetlen magyar kormány sem fogadott el innovációs strategiát.

A tanulmány első része röviden összefoglalja az átalakulás eredményeit, nehézségeit, hangsúlyozva, hogy egyszerre kellett mélyreható szervezeti-intézményi változásokat végrehajtani és stabilizálni a gazdaságot annak érdekében, hogy érezhetően javuljon a vállalatok – s végsősoron – a magyar gazdaság versenyképessége, teljesítménye. Ezután részletesen elemzi a K+F-politikáról döntő szervezetek (többszöri) átalakítását; az elmúlt években készített K+F és innovációpolitikai dokumentumokat, elfogadásuk és/vagy elvetésük lehetséges okait; és hipotéziseket fogalmaz meg arról, hogy miért nem születhetett átfogó, a kormány által is elfogadott innovációs stratégia. Felhívja a figyelmet az elmúlt évtizedben először zuhanó, majd stagnáló K+F-erőforrások és az export szerkezetében is tükröződő sikeres, gyors vállalati megújulás (termékszerkezet-váltás) közötti,

rövid távon látszólagos, hosszabb távon azonban súlyos következmények-kel fenyegető ellentmondásra. A tanulmány fő gazdaságpolitikai következ-tetése, hogy a kormány által elfogadott, explicit innovációs stratégia több okból is elengedhetetlenül szükséges a felzárkózás sikeréhez: (i) ezzel le-hetne egyértelműen, meggyőzően deklarálni a kormány hosszú távra szóló céljait és elkötelezettségét; (ii) megerősíteni a nemzeti innovációs rendszert – s ezzel "lehorgonyozni" a magyar gazdaság fejlődését elősegítő, magas hozzáadott értéket termelő tevékenységet folytató (azaz nem pusztán rövid távú előnyöket kereső) külföldi befektetőket; és (iii) összehangolni egyrészt a különböző minisztériumok jelenleg szétforgács-solódó erőforrásait – hogy hatékonyabban szolgálják a természetéből adódóan komplex, sokrétű, s ezért többféle eszközzel egyidejűleg támoga-tandó innovációs folyamatot –, másrészt az állami és magán erőforrásokat (egymást erősítő szándékok, fejlesztési irányok alapján, de a döntések iránti felelősséget nem összekeverve).

1. INTRODUCTION

Having completed the first phase of transition, Hungary has again reached a cross-roads. While the one-party system has been replaced with a multi-party parliamentary democracy and the planned economy with a market economy based on private ownership, the world has significantly changed during this historically short period of time. Practically all of Hungary's intellectual and material resources have been used to accomplish the fundamental social and economic transformation process as quickly as possible, so the focus has been on 'burning' issues, e.g. budgetary pressures, current account and trade imbalances, foreign debts, inflation, privatisation. A number of new political and economic institutions, required for long-term development, have also been (re-)introduced. Yet, most of the efforts have had to be devoted to solve short-term problems, and thus it has been hardly possible to pay sufficient attention to the emerging global trends, and devise an appropriate strategy to improve Hungary's long-term competitiveness in these new settings.

Thanks to significantly improved economic performance and given major European and global developments (e.g. enlargement of the EU envisioned by 2004, structural changes in a number of industries), a longer-term approach is now needed. Hungary has to consider what role to play in the globalising learning economy, i.e. what future it envisions for herself. To be more specific: does the country passively accept the fate of a mere surviving economy, drifting without having its own strategy? Or, by implementing a clear strategy, does Hungary intend to be a prosperous country, where most citizens will enjoy high living standards, good health and a clean environment in 15-20 years?

A sound, coherent innovation policy is one of the cornerstones of an overall development strategy, required if a country is to excel. Yet, in spite of a number of attempts in the 1990s, no such policy document was approved in Hungary. Therefore, efforts were not concerted, either among various government departments or between public and private investments. Without that co-ordinating framework what a consistent, broad innovation policy can offer, resources could not possibly be used in the most efficient way.

This article follows an evolutionary economics of innovation framework.[1] One of the most important policy implications of this school is that

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[1] See, e.g., works listed in the References by Borrás, Dosi, Edquist, Ergas, Foray, Freeman, Georghiou, Gibbons, Grupp, Lundvall, Metcalfe, Nelson, Soete and Winter, as well as OECD publications.

public policies should be aimed at promoting learning in its widest possible sense, in other words competence building at individual, organisational and inter-organisational levels. Co-operation and networking among a host of actors, including not only researchers and producers but users, too, is a vital element in generating and disseminating knowledge.[2] A system-approach is required whereby "policies recognise the division of labour in the generation of innovation-relevant knowledge, that no individual firm is self-sufficient in its knowledge and skills and that there are corresponding gains from linking firms with the wider matrix of knowledge-generating institutions" (Metcalfe and Georghiou, 1998, p. 84). Indeed, a recent trend in science and technology policies of advanced countries is a shift from direct R&D support to promoting linkages, communication and co-operation among the players in the innovation process and thus building an appropriate organisational and institutional infrastructure for that.[3]

Other policies, such as investment, privatisation, industrial, regional development, competition, trade, monetary, fiscal, education, labour market and foreign policies, also have certain bearings on innovation and diffusion, and thus should be co-ordinated as well.

One of the underlying postulates of evolutionary economics is that 'History does matter'. Indeed, the legacy of planning, and especially those of the reformed economy, still has non-negligible impacts on the political and consumer 'tastes' of people, workers' norms, managers' behaviours, as well as on policy-makers' thoughts (e.g. because of the old dilemma of growth vs. stability, the burden of foreign debts since the late 1970s). These experiences, expectations, attitudes and behavioural norms – together with the inherited economic problems, of course – constitute a rather controversial legacy for the transition process. Hence, they are, directly or indirectly, important factors for the innovation process, too. Space limits would not allow discussing them here in detail, but some of these factors are used at various points of this paper as explanatory variables.[4]

The article first provides a brief overview of the transition process, emphasising the simultaneous need for systemic (institutional) changes

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[2] Freeman, 1995 provides a thorough literature survey, see also Lundvall and Borrás, 1998, the October 1991 and February 2002 issues of *Research Policy*, OECD, 2001, as well as the 'innovation system' approach, e.g. Edquist (ed.) 1997, Lundvall (ed.) 1992 and Nelson (ed.) 1993.

[3] Metcalfe and Georghiou, 1998 provides an overview of S&T policies in EU member countries (pp. 85-93), see also further contributions in the special issue of *STI Review* on *New Rationale and Approaches in Technology and Innovation Policy* (1998, No. 22), the June 2001 issue of *Research Policy*, as well as Lundvall and Borrás, 1998.

[4] For a more detailed analysis, see e.g. Havas, 2002a.

and macroeconomic stabilisation in order to improve (micro)economic performance. Its core section analyses recent changes in the S&T decision-making system, various efforts to draft S&T and innovation policy documents, as well as the inputs and outputs of R&D and innovation. It concludes that given the strong need for aligned public and private efforts, the present 'implicit' innovation policy cannot provide appropriate answers to the current challenges.

2. TRANSITION PROCESS: SYSTEMIC CHANGES AND STABILISATION

Given the heritage of planned economy, not only a 'usual' macroeconomic stabilisation was required in Hungary in the beginning of the 1990s, but a much more challenging, more complex modernisation programme, introducing fundamental structural, institutional changes, had to be implemented. In other words, systemic changes were required in order to make Hungary a viable economy. This difficult enough task was further exacerbated by an additional political – socio-psychological – factor, too. Most Hungarian citizens (like in other transition countries) associated the economic and socio-psychological hardship of the 1990s with the new socio-economic (political) system, although the harsh austerity measures were necessitated by the legacy of the former system.[5] Policy-makers and politicians, therefore, were reluctant to devise and implement a 'textbook-case' stabilisation programme. They were inclined to 'soften' macroeconomic policies as soon it seemed to be possible, usually earlier than it was really feasible and reasonable from a strict economic point of view: the concomitant 'oscillation' in macroeconomic indicators can be easily detected in *Table 1*.[6]

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[5] The population in general used to be accustomed to stability, especially in terms of job security as well as extended social services: health, education, pension, seemingly at no cost. In reality, of course, all these services were financed by the population in the invisible way of retained salaries, rather than through 'visible' income and sales taxes. On the whole, relatively high standard of living was maintained in Hungary, especially since the late 1960s, compared to other CEE countries, but to a large extent financed by foreign loans, and to be serviced in the transition period, too.

[6] A detailed description and analysis of these 'stop-go' type cycles can be found e.g. in Antal 1998a, 1998b, Farkas, 1998, Halpern and Wyplosz, 1998, and TEP, 2001.

2.1.   Legal and Institutional Framework

The first phase of the transition process in Hungary is over by now. The most important political and economic institutions have been re-established, e.g. a parliamentary democracy based on a multi-party system, private ownership of assets, free factor and commodity markets and the stock exchange.[7] Some crucial economic institutions – e.g. a two-tier banking system, a 'Western-type' taxation system (VAT, personal income tax) – were introduced as early as 1987, that is, preceding the systemic changes. Most firms and banks have been privatised by the mid-1990s, mainly by foreign investors, that is, by genuine owners (as opposed to 'artificial' ones created by various voucher schemes in other transition countries).

In 1990, the proportion of state ownership was over 90 per cent in the Hungarian economy. By 2000 this had reached almost the opposite end of the scale with private ownership representing almost 80 per cent. A similar change took place in the structure of GDP: the contribution to GDP of the private sector was some 25 per cent in 1990, increasing to 90 per cent by 2000.

The institutional structure of economic policy-making and its implementation have been significantly re-organised. The independence of the Hungarian National Bank is guaranteed in law. The state budget has been reorganised into independent sub-systems, and its deficit is now funded by the capital market. The financial sector has been restructured. Competition has emerged in the commercial banking and insurance sectors, and a large number of consultancy and brokerage firms have been established. The Competition Office is now in operation and extensive reforms have been introduced in the social security system.

A number of important tasks still remain, however, including the achievement of legal harmonisation with the EU and the continuation of state budget reforms.

2.2.   Macroeconomic Performance and Microeconomic Adjustment

Hungary has inherited an unviable economic system. Most companies became complacent in the period of the planned economy: they accustomed to enjoy quasi-monopoly in the domestic market and a huge, 'hungry', therefore not too demanding export market, that is, the former CMEA (mainly the former Soviet Union). They could also count on regular bail-outs, whenever it was necessary. Size distribution of firms was distorted (lack of SMEs; dominance of inflexible, large firms, yet, lacking economies of scale as they had been created artificially, by merging medium-

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[7] The stock exchange was re-opened in 1989, i.e. before the political transition.

sized firms located in different parts of the country). Foreign trade was mainly conducted with other CMEA-members. To keep afloat this sinking boat, i.e. to prevent an open economic and political crisis, excessive foreign debts have been accumulated by the late 1980s. With the collapse of CMEA practically all large firms lost their markets overnight, their domestic suppliers, in turn, collapsed, too. That was a 'recipe' for the most severe economic crisis in the history of Hungary; its consequences were at least as severe as the impacts of the Great Depression in 1929-33. In the first 3 years of the transition process more than 1.5 million jobs were lost, and the GDP dropped by almost 20%.

After that sharp decline in the early 1990s the Hungarian economy is now 'bouncing back': decreasing inflation and unemployment rates together with accelerating GDP growth characterised the last 4-5 years. *(Table 1)* GDP has reached the 'pre-transition' level, that is, 1989, by 1999. Economic growth is almost twice as much fast as in the EU (2.5% and 3.4% for the EU15 in 1999 and 2000, respectively). Stock of foreign direct investment per capita is the highest – since 2000 'neck-and-neck' with the Czech Republic – compared to other Central and Eastern European countries (over 2000 USD).

A strict macroeconomic management regime (since 1995-96) has undeniably contributed to the successful macroeconomic performance. Behind these figures, however, another crucial factor can also be identified, namely the costly and painful microeconomic adjustment. Most companies have been privatised, and fundamentally restructured in terms of their products, markets, production processes, organisational forms and managerial techniques applied. In short, gales of creative destruction have been strong and effective - but at a high social cost.

Industrial productivity has shown considerable growth since 1993, around 10% a year. Real wages did not follow this trend; international competitiveness of the economy, therefore, has significantly improved since 1995.

A major positive trend has been the strong export-orientation of the industrial sector, largely due to the fact that quite a few Hungarian firms – especially those in automotive and electronics components, as well as in telecom equipment manufacturing sectors – have been re-integrated into the international production networks, either as subsidiaries or independent suppliers of multinational corporations (MNCs).

Table 1.

Main economic indicators, 1990-2000 (previous year = 100)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
GDP	96.5	88.1	96.9	99.4	102.9	101.5	101.3	104.6	104.9	104.2	105.2[b]
Exports	95.9	95.1	102.1	89.9	113.7	113.4	107.4	129.9	122.5	115.9	121.7
Imports	94.8	105.5	100.2	120.2	108.8	99.3	105.7	126.4	124.9	114.3	120.8
Consumer price index	128.9	135.0	123.0	122.5	118.8	128.2	123.6	118.3	114.3	110.0	109.8
Trade balance ($ bn)	0.9	-1.2	-0.4	-3.6	-3.9	-2.6	-2.4	-2.1	-2.7	-3.0	-4.0
Current account balance (Euro bn)	0.1	0.2	0.2	-3.0	-3.3	-1.9	-1.3	-0.8	-2.0	-1.9	-1.4
Foreign direct investment[a] (Euro bn)	..	1.2	1.1	2.0	1.0	3.5	1.4	1.6	1.3	1.5	1.5
International reserves (year end, Euro bn)	..	3.0	3.6	6.0	5.5	9.4	7.8	7.6	8.0	10.9	12.1
Registered unemployed (year end, thousands)	80	406	660	632	520	496	478	464	404	405	372
Budget balance/GDP (%) (without privatisation proceeds)	0.3	-2.9	-7.0	-5.6	-8.4	-6.8	-3.1	-4.6	-6.3 (-4.6[c])	-3.7	-3.4
Net foreign debt (including loans provided by parent firms for subsidiaries, Euro bn)	11.8	10.9	10.8	13.4	15.4	12.7	11.7	10.7	11.0	11.2	12.2

Source: CSO, Ministry of Finance, National Bank of Hungary

[a] Equity capital

* Without extraordinary, consolidation-type expenditures

[b] Preliminary data

[c] Without extraordinary, consolidation-type expenditure

Yet, there is still a considerable gap between two groups of manufacturing firms. On the one hand, large, mostly export-driven, efficient and profitable foreign-owned firms, operating high-tech equipment, account for the impressive microeconomic statistics. Most of their local suppliers – either foreign-owned or domestic – are also successful, and have promising prospects. On the other hand, a large number of indigenous, mostly small or medium-sized enterprises can be found, usually lacking capital for development, applying obsolete technologies, and thus facing the threat of bankruptcy, or stagnation with constant, hard struggle for survival – at best a rather risky future with low growth potential.

3. S&T AND INNOVATION

Reflecting the recent policy approaches in evolutionary economics of innovation, Dodgson and Bessant, 1996 have proposed a clear distinction between science, technology and innovation policy. They define *science policy* as "concerned with the development of science and the training of scientists", while *technology policy* "has as its aims the support, enhancement and development of technology, often with a military and environmental protection focus". *Innovation policy*, however, "takes into account the complexities of the innovation process and focuses more on interactions within the system". These definitions are applied in the remaining sections of the paper.

A number of important legal and organisational changes occurred in the S&T system since the early 1990s, especially concerning intellectual property rights, higher education, as well as the Hungarian Academy of Sciences.[8] As space limits prevent even a short description of these changes, this section only discusses the reorganisation of S&T policy-making bodies, the major policy documents devised in the last decade, and their implementation. Finally, it highlights an apparent paradox between severely cut R&D resources and a relatively successful innovation performance.

3.1. Reorganised S&T government bodies

Major S&T government bodies have been constantly reorganised throughout the 1990s, but pointing to the same direction. They strongly suggest

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[8] For a more detailed account of these changes, see Balázs, 1994, Havas 1999, 2001, Inzelt 1996.

that innovation has not been on the top of the agenda of any government since 1990. While OMFB, the National Committee for Technological Development used to be headed by a deputy prime minister until 1990, since then it has been constantly 'demoted' in that respect: in 1990-94 its President was a minister without portfolio, in 1994-99 a secretary of state, 'supervised' by another minister, and from January 2000 a deputy secretary of state, as OMFB itself was 'relegated' from being a government agency to a division of the Ministry of Education.

The most worrying consequence of this latest reorganisation is a major change in the decision-making system. Until the end of 1999, strategic issues were decided upon by the OMFB Council. It was a 15-strong committee appointed by the Prime Minister, consisting of high-ranking representatives of six interested ministries and the research community, as well as business people and an innovation policy expert. Given the nature of the innovation process, and the concomitant need to co-ordinate resources of various ministries as well private efforts, this seemed to be a reasonable organisational framework for making strategic decisions. Since January 2000, however, the former OMFB Council is not a decision-making body any more; it is an advisory board for the minister of education.[9]

The various bodies responsible for science or science and technology policy have shared a somewhat similar fate; their political status has also been constantly eroded since 1990. (Havas, 2001) The failed attempts to obtain government approval for technology and innovation policy documents, discussed in the next subsection, as well as the downward trend in government funding of R&D *(Table 5)* can only reinforce the above observation. [10]

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[9] Yet, its members are still appointed by the prime minister as it has been stipulated by the former legislation. It clearly shows that (i) it was a rather hasty decision – without the due professional and even legal preparation – to 'downgrade' the status of the former OMFB from being a government agency to become a division of a ministry, and (ii) the government most likely wanted to avoid a proper parliamentary debate required to pass any amendment of the legislation concerning the former OMFB and OMFB Council. Thus the name of the Ministry of Education has not been changed either – it would have also required to amend another law, and hence parliamentary debates – despite its considerably extended responsibilities.

[10] Somewhat contradictory signals of yet another reorganisation were emerging in November 2002 when this article was revised. Of course, it would be too early to speculate on those signals, let alone to assess the proposed changes.

3.2.   S&T and Innovation Policy Documents

Transition has brought about a number of crucial political and economic changes affecting the S&T system. A number of S&T policy documents have also been drafted. Yet, until 2000 no systematic technology or innovation or policies have been 'rubber-stamped' – let alone implemented – by the government.

In 1995, OMFB (National Committee for Technological Development) drafted a policy document entitled *The Government's Concept for Technical Development*, providing a vision and listing government tasks both in the short and long run. The OMFB Council discussed it and gave its full support. This document even summarised the most common arguments put against a more pro-active S&T policy, together with counter-arguments, in an attempt to convince politicians and government officials that OECD and EU member countries are not following an extreme 'laissez-faire' ideology. Further intra-ministerial discussions were blocked by the Prime Minister's Office, and hence the document never reached the cabinet.

In 1996, a *Modernisation Programme* of the then government coalition was formulated, 'recycling' some elements and ideas from the above-mentioned document (OMFB, 1995), but again, there was no political will and support for an innovation policy. Given the drastic stabilisation programme launched in 1995 there were no extra funds available to promote R&D and innovation. In fact, finance for R&D reached its lowest level ever in these two years (1995-96). Apparently, policy-makers can only think of a new policy, when they have additional resources. Probably it would be too difficult for them to re-allocate the same – or shrinking – funds for new priorities, as it would hurt a number of groups with a strong bargaining position.

Yet another policy document was drafted by OMFB staff by November 1999, entitled *Innovation strategy for competitiveness*. Before any attempt to implement this strategy, OMFB was merged into the Ministry of Education, as already discussed. The new political leaders who took control of R&D and innovation policy have not considered that document at all.[11] It was printed in December 1999, but its circulation was stopped in early January 2000.

The latest R&D policy of the government is set out in a document entitled *Science and Technology Policy – 2000*. This document first was ap-

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[11] Civil servants – who wish to remain unnamed – also recall that even the term of 'innovation' was 'banned' in the first few months in 2000, just after the absorption of the former OMFB into the Ministry of Education.

proved by the Science and Technology Policy Council (TTPK) in March 2000, and then confirmed by a government decree in August 2000. Despite of its title, it is mainly a science policy document, identifying 5 'national R&D programmes' on:

- improving the quality of life (i.e. biomedical, pharmaceutical and related projects);
- information and communication technologies
- environmental and materials research
- agribusiness and biotechnology
- national heritage and contemporary social challenges.

There are two major shortcomings of this document. First, it would be hard to find any experienced researcher who could not 'package' his or her project under the label of one of these 5 'national programmes'. Second, it can be seen as a sharp return to the 'good old' linear model of innovation, indicating the strength – as well as the way of thinking – of the 'science' lobby. The systemic, complex nature of innovation, even the basic concept of demand for innovation, is not considered at all.

Research, development and innovation is one of the seven programmes outlined in a recent national development strategy, the *Széchenyi Plan*, launched also in 2000. It consists of 3 sub-programmes of/for:

- national R&D programmes (the above 5 ones)
- "the extension of existing R&D support schemes and promotion of the R&D institutional network"
- "increasing the absorption capacity of the R&D institutional network".

As it is not easy to understand even the Hungarian titles of the latter two sub-programmes,[12] their official translation is used here.[13] Their rather short explanation – in either case just a few lines – suggests that the main aims are to strengthen the R&D institutes' capabilities as a pre-requisite to conduct the 'national R&D programmes' and increase the number of R&D personnel both in the public and private sectors. Again, an overriding emphasis is put on the 'supply' side, while quite a few important players and elements of the innovation process are eclipsed.

Participants of TEP, the first *Hungarian Technology Foresight Programme*, launched in 1997, however, took a broader analytical frame-

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[12] Especially the third one is puzzling: one can think of the absorptive capacity of businesses – either in terms of investment or innovation – but not that of R&D institutes.

[13] http://www.gm.hu/kulfold/english/angol/2_4.htm

work.[14] Their main concern was to identify major tools to improve quality of life and enhance international competitiveness, and thus they emphasised the significance of both knowledge generation and exploitation and diffusion of knowledge. It is clearly reflected in all types of TEP results (Delphi-survey, long-term visions and policy recommendations).

Statements for a two-round *Delphi-survey* were formulated by some 200 panel members of TEP. If anything, the almost exclusively science and technology-oriented Japanese and British questionnaires could possibly affect them when formulating their statements for the Hungarian Delphi-survey. Moreover, most of them were not policy analysts or social scientists, but research scientists and engineers or managers. Yet, the number of statements dealing with non-technological issues exceeded that of the S&T ones (177 and 172, respectively).[15] Moreover, this approach has been validated by the respondents: half of 'top 10' Delphi-statements – those deemed to be the most favourable ones by the respondents, i.e. with the highest combined socio-economic and S&T impacts – were non-technological in their nature. It proves beyond doubt the importance of human resources, regulation and institutions, that is, the salient relevance of an innovation system approach in a transition country: even those who have not been influenced by the panel discussions, answered the questionnaire by realising the significance of these issues. The majority of respondents – mostly technical experts (Havas, 2000a), and not social scientists attracted to some 'fluffy' theories on the importance of networks, co-operation and institutions, etc. – put as much weight on these non-technological issues than on the technological ones.

Long-term visions and *policy recommendations* of the 7 panels were formulated as well in the broader context of innovation. It is also telling

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[14] TEP results were published electronically in 2000. (http://www.tep.hu) The Steering Group and the 7 thematic panels assessed the current situation, outlined different visions (scenarios) for the future, and formulated policy proposals. The thematic panels analysed the key aspects of the following areas: Human resources; Health and life sciences; Information technology, telecommunications and the media; Natural and built environment; Manufacturing and business processes; Agribusiness and the food industry; Transport. As for aims, methods and other details of TEP see Havas, 2002*b*.

[15] It was only possible to categorise five panels' statements (out of seven), using the British typology (elucidation, prototype, first practical use or widespread practical use of a product) as a starting point. Even in these cases a number of categories had to be added, e.g. human resources, organisational innovation, regulation and institutions. For further details see Havas, 2002*b*.

that the Steering Group (SG) grouped its 22 recommendations under 3 main headings:

- educated, co-operative, flexible and healthy population, adaptable to the ever-changing surroundings, ideas, solutions and value systems
- a clean and healthy environment and
- appropriate, strong and effective national system of innovation.

This different approach, albeit broadly shared by the contributors to the foresight process – either as panel and Steering Group members, respondents of the Delphi-survey or participants at more than a hundred workshops – has not had any significant effect on the policy framework until May 2002.[16]

To sum up, a coherent policy framework for innovation is yet to be developed in Hungary. To achieve that, it might be useful to explore why all these attempts have failed so far. One might argue that lack of adequate funds, at least until 1996–1997, has not permitted to devise and implement 'costly' policies. Indeed, most long-term policies, such as education, infrastructure, innovation, industrial, SMEs, regional, health care, and environmental ones, would require substantial investment projects and/or generous subsidies. The transition process, however, has hit Central European countries hard: they have to cope with significant budget deficits plus find means to tackle more urgent needs, such as rocketing unemployment.[17] However, money is always a scarce resource, and when a country is in a particularly difficult situation then there are even more pressing reasons to devise and implement a sound strategy (be it innovation or any other strategy). If policy-makers only focus on 'crisis management', neglecting the fundamental, structural factors, then the 'roots' of the problems remain intact, causing more difficulties in the near future, and hence necessitating yet more 'crisis management'. In the worst case, even vicious circles may develop, draining all the material and intellectual resources, i.e. never allowing to find a long-term solution.

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[16] The limited results are reported in Havas, 2002*b*. The new government, taking office in June 2002, seems to pay more attention to TEP results. A new National Development Plan (NDP), drafted as part of the EU-accession, heavily relies on TEP visions, and perhaps more importantly, the underlying principles of this new document are rather close to the ones advanced and advocated by the Steering Group report. However, the devil is in the details. Thus, one should wait and see the so-called operative programmes of NDP and their implementation before rushing into a premature, superficial assessment.

[17] For data and more detailed analyses on these issues see Havas, 1999, 2001, Inzelt, 1995, OECD, 1993, Pungor and Nyiri, 1993 and TEP, 2001.

From a broader perspective, one might identify further – and somewhat more 'soft', yet more convincing – reasons. The former socio-economic system – especially the poor economic performance in spite of the plethora of the so-called central development programmes in the 1970-80s – discredited government-led efforts in general, almost regardless of the substance and quality of such strategies.[18] More 'abstract' ideological stands against an apparently increased role of government were also at work to abort an overarching innovation strategy, especially in the early 1990s. Moreover, there have been vested interests against concerted efforts in Hungary, too, just as in many other countries: government departments and agencies usually prefer not to share their resources with each other even if their co-operation may lead to more efficient public spending.

Further, in the first ten years of transition there were strong illusions and misconceptions concerning R&D and innovation activities and policies. One of these was that scientific knowledge would automatically become technological capability; hence, no specifically designed schemes would be needed to facilitate this process. Also, in the first half of the 1990s, policy-makers apparently did not realise the link between economic development and S&T efforts. It might have not been a deliberate policy. Yet, their (non-)actions imply that at least at a sub-conscious level they assumed that R&D expenditures could be cut without severe socio-economic consequences. The irony is that this view was not without foundations in the specific Hungarian circumstances for two reasons. First, given the poor economic performance during the planned economy period, return on R&D expenditures was a largely neglected issue on the whole. Second, new technologies brought in by foreign investors 'in bulk' in the early 1990s facilitated a quick industrial re-structuring and market re-orientation without much local R&D inputs, indeed.

There is a major policy problem with this view, however. Economic development can be maintained, or even accelerated, without indigenous R&D and innovation efforts in the short run, indeed, thanks to foreign direct investment. Yet, a country opting for this 'development' path becomes not only overly dependent on foreign technologies, but would most likely

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[18] Another severe weakness of this type of reasoning – purely from a professional point of view – is the neglect of the overall framework: even fairly similar projects, say upgrading of production equipment in certain industries, would lead to rather different outcomes in distinct economic systems. Real decision-making processes, however, rarely rely exclusively on rational, professional considerations; they are 'coloured' with value-judgements and a host of other subjective determinants, and it would be a serious mistake of any analysis not to realise that fact of life.

to lose its attractiveness, too: at best becoming the 'dumping site' of out-dated technologies, or even abandoned by foreign manufacturing firms altogether. From a different angle, this way of thinking clearly cuts innovation from R&D, considering the latter one to be a luxury, or a privilege for a narrow elite – ignoring the abundant evidence accumulated by the economics of innovation and all the policy implications. (EC, 1995, Ergas, 1987, Freeman and Soete, 1997, Levin *et al.*, 1987, Lundvall and Borrás, 1998, Nelson, 1993, OECD, 1992, 1998a, 1998b, 2000)

3.3. Implementation

3.3.1. *Science policy tools*

Science policy has been implemented through the annual government grant to HAS, the Hungarian Academy of Sciences – and its subsequent allocation among the HAS institutes – and OTKA, the National Scientific Research Programmes.[19] Hungarian scientists can also apply for government-funded grants to finance their research activities in Hungary for a 4-year period[20] or abroad (usually for a few months). Funding through the new 'national R&D programmes' started in 2001, administered by a newly established Programme Office. FEFA, the Higher Education Development Programmes can be also be regarded as an indirect science policy tool.[21]

3.3.2. *Technology policy with elements of innovation policy*

Technology policy schemes used to be devised and administered by OMFB, the National Committee for Technological Development until 1999. Schemes were revised annually, and approved by OMFB Council, as well the funds earmarked for them. Since January 2000, when OMFB was taken over by the Ministry of Education, the minister takes the decision.

Firms, universities and other R&D units can apply for favourable loans or grants under these schemes. Some of them are aimed at supporting certain technologies, while others can be regarded as innovation policy tools

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[19] OTKA was established in 1991 to support basic research projects, young researchers' projects and R&D infrastructure development.

[20] The goal of these schemes – called Széchenyi and Bolyai grants, aimed at different age groups – is obviously to curb brain drain.

[21] FEFA promotes the development of new higher education curricula and infrastructure, especially hardware, software and network investments. It is supervised by the Ministry of Education.

(following the definition by Dodgson and Bessant, 1996). The former ones are listed below (as of 2000–2001[22]):

- information and communication technologies
- biotechnology
- environmental technologies.

Some schemes have been specifically designed with a systemic approach in mind, i.e. to facilitate network building, communication and co-operation among various players of the national innovation system. Hence, these can be regarded as implicit innovation policy tools. Their main characteristics are described below.[23]

The *Co-operative Research Centre* (CRC) scheme was launched in 1999, to foster strategic, long-term co-operation between higher education institutions, other non-profit R&D units and businesses, by establishing CRCs. The overall goal, on the one hand, is to promote innovation and competitiveness and, on the other, 'inject' practical, business considerations into research carried out at higher education institutes, and indirectly to enrich the curricula, too, with these aspects. It is needless to stress that both of them are crucial in Hungary.

The *Integrator* programme is another important 'innovation-minded' scheme, designed to support inter-firm co-operation. This scheme was initiated by large companies in early 1999, and launched already in the same year. Its major aim is to improve Hungarian SMEs' innovative capabilities and competitiveness, promote their networking activities to conduct technological development projects, and as a result, to help them becoming suppliers of large firms. Large firms and their potential suppliers can only apply jointly, as a consortium.

Yet another set of schemes is aimed at developing the physical and institutional infrastructure of R&D and innovation, and hence it would be hardly possible classify them as 'pure' technology or innovation policy tools. In other words, their likely impact is twofold: enhanced development of certain technologies (products, processes) but in the meantime more intense and deeper interactions among the players of national and international innovation systems – as their objectives, summarised in *Table 2*, reveal.

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[22] Some of these tools were available only either in 2000 or 2001, for lack of funds. However, the aim of this sub-section is just to give a 'flavour' of the various schemes applied, i.e. not to provide a rigorous 'financial audit'. For previous years, when somewhat different underlying principles were followed, see e.g. Havas, 1999.

[23] For a more detailed account, with some preliminary assessment, see Havas, 2001.

Further schemes funded by KMűFA (1999-2001)

Scheme	Objectives of scheme
Applied R&D Programme	Fostering the development of new products, services and processes
Competitive Product Programme	Improving the competitiveness of existing products by R&D
"Maecenas" Programme	Supporting participation at, or organisation of, conferences, paying membership fee in international S&T organisations
Regional Innovation Programme	Promoting R&D by SMEs through projects devised by county Chambers of Commerce or their consortia
Special Innovation Programme for three counties	Improving the innovation skills of SMEs in 'cohesion' areas
TECH-START Programme	Promoting the growth of innovative SMEs
Liaison Office Programme	Assisting Hungarian participation in the EU 5th RTD FP
Consortium Building Programme	Assisting Hungarian participation in the EU 5th RTD FP
Participation in the NATO Science Programme	Fostering international S&T co-operation
Private Investment in Applied R&D	Fostering private investment in R&D (extending existing R&D units or establishing new ones, and thereby creating new R&D jobs in the business sector)

3.4. R&D and Innovation Performance: an apparent paradox

Available data suggest an apparent paradox between declining R&D activities – more specifically R&D inputs – and strong, successful innovation performance. A closer look, however, reveals that it is a somewhat deceiving paradox as the strong innovation performance is mainly due to foreign direct investment, other forms of technology acquisition, as well as local innovative – but not formal R&D – activities.

3.4.1. *Severely cut R&D funding and personnel*

R&D expenditures have significantly dropped since the late 1980s. Whereas 2.3% of GDP had been devoted to R&D in 1988, this ratio fall to 0.7% by 1996 and has remained at that level since then.[24] Given that GDP only reached its 1989 level in 1999, it is a dramatic drop, indeed. (*Table 3*) To compare, EU countries on average spend around 1.8-2% of their GDP on R&D.[25] This is already a huge difference, moreover, their GDP per capita is three times higher than the Hungarian one.

Table 3

**Gross domestic expenditure on R&D (GERD),
1990-2000, current prices**

GERD	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Billion forints	33.3	26.7	31.0	34.7	38.9	41.2	44.9	61.7	68.6	78.2	105.4
GERD/GDP (%)	1.46	1.06	1.04	0.97	0.88	0.73	0.65	0.72	0.68	0.69	0.82
GERD per capita*	123.3	79.1	81.0	78.0	74.0	66.5	60.7	71.0	71.1	77.1	n.a.

Source: OECD, *Main S&T Indicators*
* current PPP $

The Hungarian government declared in 2000 that GERD should reach 1.5% of the GDP by 2002. Most experts are sceptical, however, about the feasibility of this goal. Their main reservation is if it is possible to double R&D expenditures in an efficient way in the space of 2 years.

Inevitably, R&D personnel had also been cut drastically until 1995, by 56.5% compared to 1988.[26] Since then a slight increase can be observed,

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[24] It should also be added that OECD methodologies to collect and interpret R&D data have only been applied strictly since 1994. Thus direct comparison between the periods until 1993 and from 1994 should be taken with a pinch of salt. The sharp decline in the figures for R&D spending, however, has not been caused by the application of the new methodology: it is a genuine phenomenon, not just a misleading statistical observation.

[25] The European Commission has urged them for quite some time to increase this ratio in order to catch up with the US and Japan. (see, e.g. EC, 1996) The latter two countries spent 2.5-3% of their GDP in 1985-1999. (OECD, 1998, 2000) Recently, the EU Summit held in Barcelona in March 2002 decided to raise the GERD/GDP ratio to 3% by 2010.

[26] The first few years of the transition process, i.e. 1990-92, were specifically harsh in this respect, too.

yet, the 2000 total is still 47.8% lower than the 1988 one. *(Table 4)* In some cases, this cut meant the necessary streamlining. In others, it implied a severe loss of useful knowledge (including tacit one) and skills developed and accumulated over time. Clearly, it would not be possible to reproduce these intangible assets immediately when funds are increased. There are no reliable estimates readily available on the share of necessary streamlining and severe loss.

The composition of the total R&D personnel has also changed: as opposed to late 1980s, the number of researchers and engineers exceeded that of the supporting staff. In some cases, it is a step towards increased efficiency, but in others it causes inefficiency at a social level. When the lack of supporting staff forces highly qualified scientists to perform simple tasks, instead of solving scientific problems, what they are trained for, that is obviously a waste of expensive resources.

Table 4

R&D personnel in Hungary, 1988-2000, full-time equivalent

	1988	**1992**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Total R&D personnel	45,069	24,192	19,585	19,776	20,758	20,315	21,329	23,534
of which Scientists and engineers	21,427	12,311	10,499	10,408	11,154	11,731	12,579	14,406
Other staff*	23,642	11,881	9,086	9,268	9,604	8,584	8,750	9,128

Source: Research and Development (CSO), various years
* Includes technicians, assistants, administration, etc.

Given the underlying principles of a market economy, some observers and politicians expected firms to play a decisive role in financing and executing R&D, and, in turn, the government's share to fall. Quite the opposite shift occurred in 1990-94. In fact, it is not even surprising if one takes into account the broader economic trends.

In the early 1990s, most Hungarian companies were suffering from the loss of markets for two principal reasons, namely the collapse of CMEA, their former major market, and swift import liberalisation. Hence, their sales dramatically declined (by up to 75% in some industries) compared to the last pre-transition years, 1988–89. Shrinking revenues, in turn, prevented them from generating adequate funds for R&D *(Table 5)* and investment.

Another element of the explanation is that privatisation only started in 1990, and it always takes time to find investors. In that period, however, managers were not in the position to make decisions on long-term issues,

including R&D and innovation, for two reasons. First, it would have been somewhat hostile to the would-be owners to tie their hands, which, in turn, would have made the relationship between the (prospective) owners and managers uneasy. Not surprisingly, managers did not want to cause that type of conflicts. Second, managers were overwhelmed by the preparation for privatisation (re-structuring, cost cutting, etc.), i.e. by short-term issues. In brief, uncertainties related to the would-be privatisation of companies also hindered R&D until the mid-1990s.

Then the share of business R&D expenditures in GERD jumped almost 8 percentage points in 1995, and since then it has remained around 38 per cent. (*Table 5*) The significant differences among companies should also be noted. Foreign-owned firms do spend more on R&D than indigenous ones. The share of foreign affiliates in Hungarian BERD (R&D expenditures of all enterprises) grew from 22.6% in 1994 to 78.5% in 1998. (OECD, Main S&T Indicators) Moreover, they can also rely on the R&D results achieved, or purchased, by their parent company.

Obviously, the share of government R&D expenditures changed in the opposite direction in the meantime, and by 2000 it dropped below 50 per cent. Another important factor to account for this change is the fact that funding from international sources, notably from the 5th RTD Framework Programme of the EU, significantly increased in 1999–2000.

Table 5

Breakdown of GERD by sources, 1990-2000, per cent

Funding sources	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Business	38.8	40.3	31.3	28.6	28.7	36.1	37.4	36.4	37.8	38.5	37.8
Government	58.6	55.8	62.9	65.1	63.0	55.1	51.2	54.8	54.7	53.2	49.5
Other domestic		2.1	2.9	3.9	4.7	4.1	6.9	4.6	2.8	2.7	2.1
Foreign, int'l		1.8	2.9	2.4	3.6	4.7	4.5	4.2	4.7	5.6	10.6

Source: *Research and Development* (CSO), various years

Given the drastic microeconomic adjustment in the early 1990s, the number of R&D units operated by firms first sharply decreased, and then considerably increased since the mid-1990s.[27] A number of large, foreign-

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[27] Besides economic reasons behind this trend, there might be some methodological ones, too. Given the organisational and ownership changes occurring on a massive scale, the Central Statistical Office might have not reached a number of companies

owned firms have either substantially increased R&D spending at their existing R&D units or set up new R&D facilities, especially since 1997–98.

The expanding number of R&D units in higher education is also worth noting. (*Table 6*)

Table 6

Number of R&D units, 1990-2000

Type of organisations	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Research institutes	69	68	68	68	63	61	73	80	74	66	121
Higher education	940	1,000	1,071	1,078	1,106	1,109	1,120	1,302	1,335	1,363	1,421
Firms	174	124	98	178	183	226	220	246	258	394	478
Other*	73	65	50	56	49	46	48	51	58	64	–
Total	1256	1,257	1,287	1,380	1,401	1,442	1,461	1,679	1,725	1,887	2,020

Source: Research and Development (CSO), various years
* Includes R&D units operated at/by national and regional archives, libraries, museums, hospitals and ministries; since 2000 reported as part of Research institutes.

A simple analysis of the distribution of researchers by sector corroborates the above observations. *(Tables 7–8)* The total number of researchers was still slightly below the 1991 level in 2000 (0.4% lower), but there was an almost 40% growth in the 1996–2000 period. The higher education sector was a clear winner with a near 20% increase in absolute numbers by 2000 compared to 1991, and a massive, 51.7% expansion since its lowest level in 1996. Thus, the share of this sector also grew from 34% in 1991 to above 40% in 2000. The government sector was the most stable one, losing less than 7% in absolute numbers in 1991–1996, but gaining almost 11% in 1991-2000, and slightly above 3 percentage points in terms of its weight throughout decade. Although the business sector also showed a spectacular growth – close to 50% – in absolute numbers in 1996–2000, it contracted by the same degree in the first six years, and hence lost over a quarter of its researchers when the year 2000 is compared to 1991. Its share, therefore, dropped by almost 10 percentage point by 2000, what does not seem to be a favourable development from the point of view innovation. Thus, a recent scheme aimed at encouraging private investment in R&D *(Table 2)* is addressing a crucial issue, indeed.

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up to the mid-1990s. Moreover, a number of those reached by the CSO survey might not have answered.

Table 7

Number of researchers by sector, 1991-2000, full-time equivalent

	1991	1995	1996	1997	1998	1999	2000
Business enterprise	5,341	2,926	2,626	3,049	3,044	3,261	3,901
Government	4,204	3,529	3,925	3,911	4,289	4,550	4,653
Higher education	4,926	4,044	3,857	4,194	4,398	4,768	5,852
Total	14,471	10,499	10,408	11,154	11,731	12,579	14,406

Source: Research and Development (CSO), various years

Table 8

Trends in the distribution of researchers by sector, 1991-2000

	share 1991	share 2000	1996/91	2000/91	2000/96
Business enterprise	36.9	27.1	49.2%	73.0%	148.6%
Government	29.1	32.3	93.4%	110.7%	118.6%
Higher education	34.0	40.6	78.3%	118.8%	151.7%
Total	100.0	100.0	71.9%	99.6%	138.4%

Source: Author's calculation, based on *Research and Development* (CSO), various years

Regarding the output of R&D, the number of patents registered in the United States is frequently used as a reliable and comparable indicator.[28] Several former CEE states were split in the 19990s, therefore, to save data for comparison, figures for the former Czechoslovakia and URSS are also included.

Table 9 shows interesting trends and ratios. In 1989 two countries performed relatively well: URSS and Hungary. Besides the turmoil of transition, this picture has remained practically the same throughout the 1990s. If the size of countries is also considered, two Central European countries can be highlighted: Hungary and Slovenia.[29] Slovenia, however, spends considerably more on R&D than Hungary: roughly 3 times more per capita every single year since 1994 (e.g. in 1999 240 and 78 current PPP $, respectively).

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28 One also has to bear in mind, however, that certain inventions cannot be patented, and some inventors do not file patent applications (for lack of funds or knowledge on the importance of patenting).

29 Hungary's population (10 million people) is 5 times bigger compared to Slovenia.

Table 9

Central European and Russian 'utility patents' granted in the USA, 1963-2000

	pre 1987	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	1990 - 2000	Total
Croatia	-	-	-	-	-	-	0	2	1	6	4	4	13	16	6	*52*	**52**
Czech Rep.	-	-	-	-	-	-	-	0	1	1	5	14	13	24	23	*81*	**81**
Hungary	1469	127	94	129	93	85	88	61	46	50	43	25	50	39	36	*616*	**2435**
Poland	537	13	8	14	17	8	5	8	8	8	15	11	15	19	13	*127*	**699**
Slovak Rep.	-	-	-	-	-	-	-.	-	0	0	1	3	2	5	4	*15*	**15**
Slovenia	-	-	-	-	-	-	0	3	6	4	10	7	18	10	16	*74*	**74**
Russian Fed.	0	0	0	0	0	0	0	3	38	98	116	111	189	181	183	*919*	**919**
USSR	6037	121	96	161	174	178	66	65	53	12	16	4	6	3	1	*578*	**6993**
Czech.Rep.	1847	46	33	34	39	27	17	13	19	15	8	9	9	5	9	*170*	**2130**

Source: United States Patent and Trademark Office

Notes: Patent origin is determined by the residence of the first-named inventor as displayed on the face of each patent.
USPTO definition of 'Utility Patent': Issued for the invention of a new and useful process, machine, manufacture, or composition of matter, or a new and useful improvement thereof, it generally permits its owner to exclude others from making, using, or selling the invention for a period of up to twenty years from the date of patent application filing, subject to the payment of maintenance fees. Approximately 90% of the patent documents issued by the PTO in recent years have been utility patents, also referred to as "patents for invention".
Design, plant and reissue patents are not included in this count.
-: not applicable (the country did not exist)

3.4.2. *Strong innovation performance*

Although business R&D expenditures have picked up since 1996-97, firms do not spend a lot on R&D. Yet, fierce competition – both in the export markets and the open, liberalised domestic one – compels them to introduce new products and/or processes. Indeed, they do so – otherwise would not survive – but in most cases these innovations are not based on domestic R&D projects. Quite often they rely on technologies provided by parent companies or other foreign partners, e.g. in a subcontracting agreement. Foreign firms encourage their Hungarian suppliers to introduce new managerial techniques and other organisational innovations, too.[30] Joining the international production networks, especially in electronics and automotive industries, has also opened the gates of the global markets for Hungarian firms. Domestic innovative activities – outside the domain of formal R&D – do play an important role, too, e.g. engineering and re-design to adjust to the local needs and production facilities, as well as upgrading production equipment and tooling up to increase efficiency and/or to introduce new products and processes.

The harmonised OECD-EU innovation survey (CIS) has not been conducted in Hungary yet, and thus data on innovation activities are not available. An indirect method, however, provides straightforward results. Trade data show a rather radical restructuring both in terms of the main export markets – a swift move towards the overriding share of the EU (*Table 10)* – and in the composition of exported goods, that is, a move towards higher value-added products. Meat and semi-finished products have been 'dethroned' by telecom equipment, electric, energy generation and office machinery by 2001. *(Table 11)* This remarkable performance in such competitive markets could have not been achieved without strong innovation performance.

Table 10

Share of the EU/EC countries in Hungary's foreign trade (per cent)

	1989	1994	1999	2000	2001
Export	24.8	51.0	76.5	75.1	74.2
Import	29.0	45.0	64.0	58.4	57.8

Source: Central Statistical Office (1989-1999), Ministry of Economic Affairs (2000-01)

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30 For a more detailed analysis of the major automotive cases see Havas, 2000*b*.

Table 11

**Share of the top 10 commodity groups
in the Hungarian exports (1990, 2001)**

1990		2001	
Commodity groups	**share (%)**	**Commodity groups**	**Share (%)**
Meat products	10.1	Telecommunications equipment	12.6
Chemical semi-finished products	8.6	Electric machinery and components	11.9
Steel semi-finished products	7.1	Energy generation machinery	10.7
Clothing	6.8	Vehicles	8.9
Vehicles	4.8	Office machinery	8.3
Metallurgical raw materials	4.2	Clothing	4.4
Canned fruits and vegetables	3.3	Other processed products	2.9
Chemical raw materials	3.2	General machinery	2.9
Metal semi-finished products	2.3	Metal products	2.2
Pharmaceuticals	1.7	Meat and meat products	2.2
Total	*52.1*	*Total*	*67.1*

Sources: Foreign Trade Statistical Yearbook, 1990 and Press release on Foreign Trade, January-December 2001, preliminary data, Ministry of Economic Affairs and Ministry of Foreign Affairs, 22 February 2002

It should be also added that the pressure to innovate is eventually leading to more intense formal R&D activities. The first clear sign of this is that FDI have significantly contributed to strengthen the formerly rather weak and ad hoc business – academia links. In other words, foreign firms have increasingly realised that their competitive performance can be maintained more easily if they rely not only on their home R&D labs, but also on the knowledge of Hungarian researchers, either hiring them[31] or co-operating with university departments and R&D institutes.

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31 Major international companies set up new R&D units (Nokia, Ericsson, Knorr Bremse, Audi etc.) or expanded the existing, 'inherited' ones (General Electric, Chinoin, etc.) in the second half of the 1990s.

4. CONCLUSIONS

The political and economic transition posed a complex, tremendous challenge in Hungary in the beginning of the 1990s. Not only macroeconomic stabilisation was required, but fundamental organisational and institutional changes were also needed to transform the country into a stable, middle-income economy, capable of catching up with the more advanced ones in the longer run.

Science, technology and innovation (STI) policies are, no doubt, cornerstones of any successful catching up strategy as, for example, the case of the East Asian 'tigers' clearly shows. Yet, in the current Hungarian context it also means that a number of Herculean tasks have to be performed at the same time, each of them demanding not only from a financial point of view, but also politically and intellectually. These issues, then, compete for the attention of politicians and policy-makers as well as public funds.

Faced with all these challenges, not surprisingly, Hungary's performance has been mixed. The crucial institutions of a market economy have been put in place rather quickly, and after some hesitation a successful, but – largely due to the delay– harsh macroeconomic stabilisation programme has also been implemented. Some important legislative changes have occurred in the field of higher education and intellectual property rights, too. Government S&T bodies, however, seemed to lose their political clout throughout the 1990s. As for policy, although R&D expenditures and staff had been cut severely up to 1995-96, the science community has always exerted some influence on public policies. As an unmistakable sign of that, the government has recently approved an ambitious science policy document, shifting the structure of overall R&D spending towards 'basic science'-type projects. Technology policy schemes have also been substantially renewed since the early 1990s, and 'hidden' among these tools, some elements of innovation policy have been gradually introduced, especially since the late 1990s.

Yet, attempts to devise and implement a coherent set of policies to strengthen the innovation system have 'consistently' failed throughout the 1990s – regardless of the political stance of the actual governments in office. Pressures stemming from macroeconomic imbalances – requiring immediate actions, intellectual and financial resources –, the socio-psychological legacy of central planning as well as illusions and policy misconceptions all contributed to this, as discussed in the sub-section on STI policies. As a clear indication of the policy-makers' (lack of) interest in innovation, the harmonised OECD-EU innovation survey has not been conducted yet in Hungary (as opposed to Poland and Slovenia, to mention other EU candidate countries). Innovation efforts and their outputs, therefore, cannot be measured. It is also telling that only a tiny research community works on STI issues: simply there is no demand for

thorough, regular policy analysis. Lack of data and reliable analysis on innovation performance, however, poses a significant threat: policies are more likely to be influenced by pressure groups and short-term political considerations than by a sound understanding of the impacts of foregoing decisions and current (as well as foreseeable future) socio-economic needs.

An even more worrying possibility is that the lack of explicit innovation policy may hinder long-term development. Evolutionary economics of innovation clearly show that policies aimed at improving learning capabilities, facilitating institution and network building, as well as communication and co-operation among the key players are of crucial significance. Concerted efforts – both in terms of public-private partnership and co-operation among compartmentalised government agencies – are further keys to success. Here lies the importance of a thoroughly devised innovation strategy: via explicitly targeting networking and communication, it can contribute to creating the preconditions of co-operation and to channel financial and intellectual resources to achieve the jointly set goals. In other words, it can signal the main policy directions and commitments of the government. Further, it provides an appropriate framework to understand that enhancing competitiveness and improving the quality of life is a complex task. It requires various types of efforts and factors – among others, education and life-long learning, research and development, appropriate legal, organisational, knowledge and physical infrastructures, institutions to facilitate close co-operation among the key players –, and these inputs can be used more efficiently in a co-ordinated way. The lack of such a strategy, in turn, is a major concern, indeed.

As mentioned above, one can 'detect' the emergence of an *implicit* innovation policy in Hungary, when having a closer look at the technology policy tools administered by the R&D Division of the Ministry of Education. There is a severe shortcoming, however. These are, by definition, schemes of a single government body, i.e. they cannot be mistaken with the tools of a concerted, overarching innovation policy, approved by the government as a whole, and thus 'mobilising' the resources of various government departments into the same, jointly discussed and agreed direction.

Beyond the lack of an explicit innovation policy, the recent 'relegation' of OMFB, the formerly (semi-)independent government agency, signals an even worsening situation. The former Council of OMFB – consisted of high-ranking officials of interested ministries, representatives of the research and business communities – was a decision-making body. It was, therefore, an important forum to co-ordinate the RTDI-related efforts of various government departments. Since January 2000 this is no longer the case, as this body then was stripped of its decision-making rights. Neither can it serve as an influential communication channel between policy-makers, researchers, business people and innovation experts as its 'demotion' obviously led to a diminishing prestige.

The theoretical arguments of evolutionary economics of innovation, together with the lessons of successful 'catching-up' economies, all point to the importance of an explicit innovation policy to improve economic performance, and thus providing means for a higher standard of living. Hungary's case, so far, has shown that a country can escape the immediate consequences of not having one, but most likely only for a limited period, and due to some lucky coincidence. The direct disadvantages can be, at least partially, rectified by a fortunate set of factors, and these all have been present in Hungary:

- an extreme inflow of FDI, bringing in technological, organisational and managerial innovations in bulk, more recently organising suppliers' networks and strengthening academia-industry links, too;
- coupled with a previously strong, albeit severely hit, R&D system, which – relying on both its previous strengths and the current radical restructuring – is still churning out useful research results as well as skills required by multinational firms; and
- helped by a more or less systematic technology policy, assisted with some elements of an implicit innovation policy.

The long-term drawbacks, by definition, cannot be felt immediately. Yet, the currently favourable Hungarian circumstances are unlikely to hold without systemic, thoroughly devised efforts, and then the temporary positive outcomes are lost. This is a one-off, 'shaky' situation, indeed. Foreign firms can easily move, whenever they find more attractive locations. They can close down their plants entirely, or leave only their obsolete technologies and low-wage, simple tasks in Hungary. That would give a fatal blow not only to the still fragile R&D system, but also to their suppliers, and then there would survive hardly any applicants to make use of technology policy schemes, regardless of their sophistication.

By reshaping and considerably strengthening the national innovation system, building the appropriate supporting knowledge and physical infrastructures, the current, temporary advantages can be converted into lasting ones. And these are precisely the tasks of an explicit innovation policy. For example, stronger co-operations among firms, as well as between firms and R&D institutes are advantageous for all parties (as shown by a vast body of literature). Further, operations of the 'enlightened' foreign firms i.e. those interested in building long-term, mutually beneficial relationships in Hungary – as opposed to exploiting short-term cost advantages – can be 'anchored' by, among other tools, fostering the emergence of knowledge-intensive services. Their favourable impacts on the Hungarian economy can thus be strengthened and maintained.

To put it differently, an explicit innovation policy is perhaps even more needed in a transition country – where most of the previous organisations have to be radically reshaped, new ones established, communication and co-operation strengthened, etc. –, than in an advanced country. A bitter lesson of the Hungarian case is a sobering one: the likely positive impacts of an explicit

innovation policy are indirect; occur through many 'transmissions', and mostly in the medium or even long run. It is, therefore, a rather demanding task to account for the outcomes of these efforts, whereas the lack of them can be eclipsed by the results of some favourable, albeit temporary, conditions. Politicians, by contrast, usually apply a much shorter time horizon in their decisions. For all these reasons it is very difficult to convince them that they should instruct policy-makers to devise and implement a coherent, overarching innovation policy. This is then becoming almost impossible when decision-makers – both politicians and policy-makers – are working under the tremendous pressures of transition, trying to solve immediate problems.

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