7. Implementation of a Network Based Innovation Policy in Central and Eastern European Countries – Slovenia as an Example

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7.1 Introduction[1]

Since the beginning of the 1990s, most Central and Eastern European Countries (CEECs) have achieved considerable success in the transformation to an open and innovation-oriented market economy. Nevertheless, the transition period is not over. As governments are still under the threatening trade-off between stabilisation policy and structural transition, salient issues of the new economic order such as privatisation, reform of the social security system and deregulation are not pursued consistently. Furthermore, there is the need for a long-term strategy for technological development and economic growth. In this situation many initiatives of international co-operation aim at supporting these countries through Western expertise. One example is the bilateral techno-scientific co-operation between Germany and CEECs (Abel 1999).

With the cessation of the previous socialist order, the CEECs were directly confronted with the task of fundamentally transforming their political and societal systems. This systemic transformation is historically unique in its radicality. Against a background of political instability, a positive development of the economy gains particular importance. The economic systems of these countries are now reorienting themselves, away from a more or less centrally planned economy and from embedding in the socialist state system towards a free market economy; they are opening up to the global economy. At present, most of them are only able to gain a modest foothold in the world market.

In the time immediately following the changeover, national and international initiatives were - and still are today - simultaneously faced with a multiplicity of tasks in conditions of extreme shortage of resources. No clear strategies or policy recom-

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1 This paper is partly based on (Walter/Bross 1997) but updated and modified.

mendations could be derived from existing political and economic models. However, in view of the international competition of locations for scarce resources, an overall political concept is needed as a prerequisite for successful economic development. An integrated plan to re-structure the whole economy is more relevant than the use of individual policy instruments. Three development courses will shape the future order: firstly, parts of the old system will survive, with their actors and institutions; secondly, economic policy models will become adopted which are mainly Western in character and, thirdly, endogenous potential will be enabled to develop in a way which was not possible under the imposed former order. The transformation of an economy requires action at very different policy levels. One important starting point for a country's innovative power and its economic success in the long term is innovation and technology policy.

Technology policy and innovation policy include all public measures which are oriented towards converting technical inventions into industrial applications and which support the diffusion of product and process innovations (Meyer-Krahmer/Kuntze 1992). Instruments of public technology policy include measures such as the institutional support of research institutions, financial incentives for industrial innovation projects, and the initiation and expansion of an innovation infrastructure in terms of consulting, technology transfer and innovation financing.

This paper attempts to select from the accumulated knowledge concepts relating to success determinants in innovation and technology policy that can appropriately be adapted for use in the process of modernisation now taking place in CEECs. Technology and innovation policies in these countries clearly have to pursue strategies of modernisation which support the internationally opening up processes of these countries which mobilise their endogenous resources and form the basis for an integrated policy concept. Western countries can only provide very limited assistance for this transition process, in the form of "help towards self-help". But even this approach always has to take account of the differing initial situations in the individual CEECs and the differing paths they have adopted in the process of reform.

7.2 Strategy: Bottom-Up, Endogenous Growth

By opening up their economic systems, CEECs have joined international competition. After several decades of political and economic encapsulation from the Western world, consensus has been reached with regard to the necessity for their integration into the global economy and into the international division of labour. This integration can best be realised by a "free market" type of economic system which derives its impetus from individual, decentral initiatives. The realisation of existing competitive potentials is hampered by the current state of the markets, which are not yet fully able to function, and by the existence of certain types of market failure.

This situation also requires a comprehensive public technology and innovation policy. However, before discussing the instruments that should be used in innovation and technology policy, and the extent to which the government should intervene, it is necessary to consider which modernisation strategies should be adopted in view of national framework conditions.

Integration into the international division of labour can occur in different ways, as various economic theories suggest. For CEECs it is possible to imitate leading industrialised nations or approach their standards of living by producing innovative products that are mature for the market. To ensure a competitive industry, most advanced market economies have developed and built up a national innovation system consisting of dynamic business organisations (e.g. innovative industrial firms of all sizes and sectors, new technology based companies, innovation supporting services in consultancy and financing), a science, research and educational sector (research and development, academic education, vocational training) and a differentiated framework of research, technology and innovation policy instruments to provide a wide range of research and development (R&D) and to support links between R&D and industry.

Empirical and theoretical research offers starting-points for the derivation of strategies and policy recommendations to build up a national innovation system. One basic element here is the establishment of innovation networks. Economic theories suggest that the development of modern technologies is characterised by a growing interdependence and complementarity of different areas in society such as R&D and industry. Studies confirm the relevance of these factors for the economic success of a location. In regions which are economically highly developed, networking between the different actors is very strong (Herden 1992).

Management research has also thoroughly investigated the importance of strategic network relations, particularly between different steps of the value-added chain (Sydow 1992). Networks serve the purpose of interlinking actors in production, services and research in such a way that their comparative strengths are exploited to the full and developed further. Innovation networks are able to activate, co-ordinate and combine the resources which support the technological competitiveness of regions and countries.

Economic theory also provides a valid explanation for this phenomenon in the network theory. Generally speaking, in these models complementary - and therefore resource-saving - learning processes are initiated between the actors in the economic process. Firstly, "learning by doing" and "learning by using" take place between suppliers, producers and customers in their business relations (Kline/Rosenberg 1986). But networks are not only characterised by performance-related businesses. In the course of repeated interchanges the integrity of the partners is recognised; a relationship of trust is built up, and stable personal relation-

ships also develop between the partners (Walter 1992). Through the co-operation with the network partners, knowledge is accumulated which forms the basis for future competitive advantages. Externalities in an alliance of this kind extend beyond the reduction of transaction costs: dynamic economies of scale in terms of learning and complementary investments enhance the productivity achieved with limited resources. Moreover, the reduction of uncertainties through institutionalisation of the exchange relationships, and risk share among several partners in case of failure, are very important aspects, particularly in industrial innovation activities. These are the factors that make networks successful and have caused them to be an object of economic and regionally-oriented research for several years now.

The results of various studies indicate that the parameters of firm size, industrial sector and technology orientation give rise to different patterns and intensities of co-operation (Koschatzky 1998). Innovation networks are based on specific national, regional or local development patterns in the sense of different "best practices" in technogenesis and technology use; the starting-point for these is formed by specific innovation potentials, such as accumulated knowledge in certain technologies. A synergetic innovation network arises e.g. through the alliance of actors in research, production and services, aiming at the optimal exploitation of existing resources for growth (Koschatzky 1999). Overlapping, flexible network relations have proved to be effective in coping with structural changes caused by shifts in the framework conditions for competition (Herden 1992).

From the viewpoint of innovation economics, national and regional networks can be used for the economic development of CEECs: to systematically exploit existing development potentials by converting them into application-oriented knowledge and the rapid diffusion of new technologies (Koschatzky 1997), thus also providing a good basis for participation in international networks. The innovation networks that are of particular interest for innovation and technology policy arise through co-operation between suppliers and users of technological knowledge: these may for example be relations between enterprises and technology suppliers (e.g. universities and research establishments). Additionally such networks also refer strongly to the exchange of business know-how and innovation financing by public R&D promotion programmes or private venture capital.

The network concept can provide starting-points for the application of a specifically-oriented innovation and technology policy: firstly, the mobilisation and complementation of resources for the development and application of new technologies; secondly, the co-ordination and interlinking of these resources within innovation networks involving all the relevant actors in industry, science and policy; thirdly, the integration of networks into the national and international development and production of technology, by the creation of active interfaces and the support of co-operation.

Innovation and technology policy in particular is able to support innovative co-operation between science and industry, if it succeeds in integrating the relevant actors into a network of enterprises, research institutes, universities and innovation services. Having a sound base in science and also in industry, technological and economic modernisation of CEECs can rely mainly on endogenous potential within the countries. Growth in firm size, employment, export opportunities can be realised. By choosing a strategy that supports innovative firms significant positive economic and social effects can be expected, especially if all relevant fields of policy are integrated into an innovation-based overall industrial restructuring.

7.3 Creation of Networks in Central and Eastern Europe

This chapter commences with a brief description of societal framework conditions in CEECs. Following and based on this, networks are then specifically described and an example is given of ways to implement them in Central and Eastern Europe.

7.3.1 Shortcomings of Innovation Systems in Transition

Under the socialist economic order, research and industry in the CEECs were characterised by a centrally-steered, "top-down" type of organisation which was predominantly state-controlled. This situation led to vertical structures in science and industry, with very few relations of horizontal interchange.

Exchange within networks must occur as interaction between the various actors in the national economy. Thus what is required, rather than the former centralistic policies, is a policy strategy which emphasises the free development of individual actors according to the "bottom-up" principle. In the foreground is the promotion of efficient, innovative co-operation in the form of "horizontal" relations between actors especially in industry and research. In strategic terms, this implies that policy should aim to support interactive relations with a view to the formation of networks, and should itself become active in the creation of new networks.

In CEECs, innovation and technology policy measures that are intended to support networking activities are sometimes still influenced by the surviving remains of inherited political and legislative framework conditions. Another problem arose in the first few years of the transitional phase when, due to the shortage of resources, drastic cutbacks in funding took place, with the result that today much of the previously-existing potential in science and industry is on the point of collapse. Strategic plans or financial means are only available to a certain extent for their consolidation during the system changeover.

Industry and science

Industrial structure in CEECs, with its large-scale business units, is disproportionate to the small domestic markets. Capital-intensive production was previously based principally on mass production and economies of scale; only some products offered satisfied international standards. In all CEECs, the situation is marked by drastic declines in production in the first few years of transition, due to the disappearance of the trade relations formed under the socialist regime. However, today one sometimes already finds a wider variety of small businesses. The financial means at their disposal are small. They concentrate on goods and commodities for everyday use. Small-scale production is based on forms of production which still represent "manufacture", i.e. technical crafts; in these countries, manual skills and corresponding capabilities predominate.

For CEECs, pressure to adapt to market forces is a new challenge, further intensified by foreign competition. In some cases the managers of firms have been able to make autonomous, market-oriented decisions and develop individual strategies for survival. In view of the high degree of uncertainty regarding markets and the shortage of resources, such strategies tend to be based on improvisation skills and lead to relatively simple, not very technology-intensive production structures and to small production volumes (Portratz/Widmaier 1999).

In industrialised countries in the West, small and medium-sized firms which are innovation-oriented or capable of innovation play an important role in economic development; in most CEECs, however, such firms are not yet numerous, as an after-effect of ownership law under former socialistic regimes and a previous lack of societal acceptance. Therefore, the re-structuring of the industrial sector is still incomplete in CEECs. Whereas on the one hand the start-up and survival chances of firms are still very hazardous, suppliers at the various stages of the value-added chain also appear underdeveloped, as does industrially-oriented research.

In general terms, until now this has meant that the private sector was virtually unable to fulfil tasks in the field of R&D to a larger extent. Moreover, industrial R&D in CEECs was previously mainly concerned with carrying out adaptation developments, and was not oriented towards innovative products or new production technologies. Industrial R&D potential has turned out to be one-sided in its qualification. In addition, it has suffered to some extent from the fragmentation of industrial complexes and from cuts in personnel. For firms whose survival strategies do not lie in the area of sophisticated technologies, future prospects are at best uncertain.

Technological R&D potential does exist, however, in the public research institutions. In CEECs the performers of research were primarily the universities, public research institutes and academies. Due to the intensive research that took place in publicly funded institutions, there was an ample availability of R&D results. Today,

many CEECs still possess a broad range of research institutions. Some of these countries cultivate a presence in various different areas of basic research. For them, orientation towards the international scientific community both was, and is, a priority consideration. The universities and other scientific institutions regard themselves as an academic elite and, consequently, do not see themselves as "pre-thinkers" - or even problem-solvers - for industry, especially as private enterprise is often not considered as a potential partner or client of the science sector.

Not only does the vertical structure of the research landscape separate industry from science; often its effects are also felt within the science sector itself. All in all, the exploitation of research potential linked with industrial know-how in application-oriented research is too low.

Socio-political framework conditions

Policy and administrative law in CEECs does not provide incentives for innovation. Initiative and a willingness to bear risks and participate in free market competition are not sufficiently recompensed in terms of economic success. There is frequently a lack of generally valid regulations, particularly in the area of contract law, and a lack of (administrative) provisions for the legal enforcement of contracts in cases of conflict. The uncertainties with regard to these legal aspects constitute an obstacle to formal co-operation relations between actors, and negatively affect the subjective perception of success prospects for innovation projects in the private sector.

Often, policy regulations hardly allow for free communication or the free combination of resources. Policy is often still centralistic, fairly inflexible and not very demand-oriented. Practically-oriented politico-administrative decisions are frequently impeded by a rigid adherence to the "letter of the law" in the implementation of regulations, and by time consuming decision procedures. In CEECs, unlike countries in the West, it is not regarded as the self-evident duty of the Government to make (scientific) knowledge available to the general public or industry. This situation is rendered all the more serious by the fact that in these countries the state-owned institutions would be best positioned to initiate co-operative synergies between societal groups such as industrial enterprises and the science sector. Although in many CEECs the establishment of a new political order, including administrative and economic policy regulations has still not been completed, some CEECs have to a large extent resolved many of the problems associated with transition.

It is in this complex, multi-faceted context that measures for an operative and strategic innovation and technology policy have to be developed for individual CEECs. This has to be accomplished in a situation of extreme shortage of resources and in the face of other urgent and pressing policy requirements (e.g. structural assistance for regions in need, payments to the unemployed). Thus for most of these countries, it would be generally true to state that since the beginning of the transition, an inno-

vation or technology policy has existed only in a rudimentary form, if at all, and that existing innovation potentials are endangered.

CEECs should build up innovation-supportive relations between all relevant contributors of resources in society. These relations include the formal and personnel exchange of information, networking and co-operation. The "mental gap" between science and industry must be eliminated in order to effectively exploit endogenous potentials. There must be greater awareness of the necessity to orient research more strongly towards the needs of industry. Up to now operational concepts have been lacking and co-operation have failed due to financial bottlenecks of the enterprises. The utilisation of technological research results for the development of innovative products necessitates co-operation between science and industry, with relations taking the form of an intensive two-way exchange in which users of technological knowledge test out its suitability for industrial manufacturing, and the necessary modifications are made in a process of mutual learning.

7.3.2 The Implementation of Networks in CEECs

The purpose of a network is to support industrial innovation by making available necessary resources such as technological and economic know-how, demand oriented funding for the promotion of R&D, production and market introduction of products and processes based on new technologies. To do so the network has to link all relevant actors: enterprises, institutions for technological R&D, for techno-scientific information and further qualification, and technology consulting. Also, entities for innovation financing (in both the public and private sectors), for innovation management and market consulting (including market research) need to be network partners. The network has to be extensive enough to provide support for enterprises all over the country as companies in all areas may need innovation services. The network must be oriented towards an internal exchange of funds, information and services, i. e. towards co-operation between all participants. Exchange of experiences is important for orienting services towards the real demand; it also implies the possibility of reversing the role of users and suppliers of technologies, services etc.

The successful implementation of a network concept in CEECs will not necessarily result from the transfer of measures that have proved successful in other countries. The same activities may have very different impacts when applied under different specific societal and political framework conditions. However, it is possible to identify success factors that are independent of any specific system and adapt them to different societal conditions (Walter 1992). This should be borne in mind when transferring experiences to CEECs and in the implementation of transition assistance by Western countries. Networks have arisen in Germany and other Western industrialised nations over a relatively long time span, and mostly through trial and

error. For reasons of time and economy of resources, a trial and error process is not suitable for CEECs. Furthermore, due to the framework conditions described above, it cannot be assumed that in CEECs innovation networking between the various different sources of innovation potential will automatically occur.

Based on empirical experience, a possible procedure is now described for the infrastructurally-supported initiation and strengthening of national networks, with the possibility of integrating them into international innovation networks. This procedure takes account of already existing institutional starting points and relevant personal and political contacts in the countries concerned, but also supports early self-organisation of the networks.

Government innovation and technology policy can support efficient, innovative co-operation in the form of "horizontal" networks between research and industry, if it succeeds in integrating the relevant actors into the networks: enterprises, research institutions, universities and suppliers of innovation services. This can be done by strengthening existing interactive relations and initiating new networks on the one hand, and on the other by identifying network deficits. If such deficits are found, the missing network partners can be established by state initiatives as a part of innovation and technology policy.

The success or failure of innovation and technology policy measures supporting the network concept is decisively dependent on reaching a broad consensus of all relevant actors in policy, industry and science at an early stage (Koschatzky 1997). It is also important to jointly identify priority problem areas and fields of action. Concrete policy measures for support should be defined on this basis as well.

Networks support industrial innovation if they enable a demand-oriented exchange of techno-economic know-how to take place and mobilise funds. First, suppliers of know-how can be networked with one another and with know-how users. The suppliers of know-how are primarily application-oriented research and development establishments, techno-economic institutions and higher education institutions, but also - insofar as they (still) exist - development departments and research groups in industry. The main users are enterprises of various sizes in different sectors. For activities to reflect real needs, there is a necessity for close co-operation between suppliers and users and for interactive supplier-user learning processes with alternation of roles. For the mutual exchange of information, services and funds to take place, spatial proximity of the actors is also important.

Under the conditions that pertain in transitional countries, the responsibility for initiating and stimulating networks tends to lie with governmental agencies. These should entrust specific tasks to network actors according to their specialist expertise, their capacities and their location or radius of action, and should partly finance these tasks in the initial phase. This is the point of application for innovation and

technology policy instruments designed to support the expansion and formation of the network and promote co-operation activities between the network partners. As well as the institutional promotion of important institutions in the network, financial incentives will result in learning effects and will spur on other initiatives - including private ones.

A strategy for the formation of an innovation network must involve all relevant actors at various regional and national levels and in different industrial sectors. Although the networking relations that arise are between decentrally active participants, it does appear important to have a central institution in the initiation phase.

Such an institution can perform planning and co-ordination tasks in the network and can provide organisational support. However, this institution should not function as a centralistic planning body - rather, its importance should be in acting as a moderator in the generation of a modernisation strategy and the formation of consensus among all relevant actors in science, industry and policy. Network co-ordination requires techno-economic competence and an abundance of contacts with users and suppliers of innovation support services, in order to collect information and the identify demand for them. An institution, as the nodal point of the network, also acts as a contact partner for all other network partners and establishes active external contacts, for instance to international networks. An interface of this kind gives the network access to the direct use of globally available research results and, conversely, enables it to co-operate on equal terms in the international exchange of knowledge and know-how by making its own resources available. For CEECs, this would seem an important contribution towards integration into global networks and gaining a position in the international technology competition.

The decentral elements of the network structure to be established include public teaching and research institutions as well as industrial and sectoral associations. These can make their sectoral or specific knowledge and know-how available. Transfer and advisory offices can cover different specialist areas and contribute at a national level to a comprehensive, complementary offer of knowledge and know-how. The wealth of highly specialised information contained in these institutions should be used by all network partners. As well as the technological input, surviving links and contacts to international science that may still exist in research are also important for the network.

Regional contact offices which are spatially accessible have to be available or be set up to provide users in the region with demand-oriented information and funds and to mediate contacts. These offices should be run by existing institutions (e.g. economic promotion agencies) which, as actors at a regional level, have the advantage of intensive awareness and are well suited for organising the exchange of specialist information. They should also be in a position to smooth out, at an informal personal level, possible differences that arise between network partners.

It is a good idea for the internal flow of communication and financial means within the network to be secured and organised by the co-ordinating institution. Also additional services should be provided to foster the exchange of experiences and the mediation of contacts. It seems important that communication is not "centralistic", but that all the actors intercommunicate. The contact offices also function as intermediaries, i.e. between the firms and suppliers of know-how. If the need arises, the network brings in other additional institutions. Existing gaps in the network are closed hopefully by policy support. Care should be taken to ensure their practical orientation, so that their services are accessible to all partners.

To sum up: Since innovation and technology policy in CEECs is only able to implement measures involving relatively low financial resources, these measures should be directed towards the initiation of networks. Networks should aim at mobilising and focusing existing institutional and personal resources in order to strengthen industrial innovative activity, and to stimulate firms which are as yet non-innovating, to engage in innovative activities. Financial resources can be used for the promotion of specific co-operation between partners in the network and institutional funding to close gaps in networks. In this respect, public financial assistance should be regarded primarily as "initiation financing".

7.4 FhG-ISI Scheme of Transfer of Institutional Know-How

The bringing together of existing resources and the initiation of innovative networks is a difficult task under present conditions in CEECs. Thus it appears important for developed industrialised countries to offer Central and Eastern Europe assistance in the process of transition and give "help towards self-help" to public organisations there. Such kinds of assistance can support the planning and implementation of adequate research, technology and innovation policy by providing analyses and new methods, and by the transfer of expert knowledge, training and advice. A scheme of this kind of policy consultation was developed by the Fraunhofer Institute for Systems and Innovation Research (FhG-ISI) at the request of the Federal Ministry for Education and Research. The scheme is based on empirical and theoretical know-how and can be flexibly adapted to the transitional context of individual CEECs. Transitional support of FhG-ISI for CEECs aims to stimulate modernisation processes based on the existing strengths of these countries. The governments in CEECs themselves have the responsibility for the individual steps and for their co-ordination.

Assistance by FhG-ISI in the implementation of a network based technology and innovation policy usually begins with an analysis of existing information in the form of a compact descriptive profile. Discussions with actors from policy, industry and science of the country concerned aim at further steps of co-operation. This ex-

change of experiences also serves as an opportunity for a transfer of basic information about modern western technology and innovation policy to CEECs. Personal contacts help to form a broad consensus on proposals for improvements. A suitable overall concept on policy measures to initiate and expand a network for the support of industrial innovation is elaborated by CEECs representatives and FhG-ISI in a joint development. Another part of the transition assistance requires binding commitment by the CEECs to building up networks: New institutions have to be created and topics covered by existing institutions have to be expanded or redefined.

In general, transitional assistance for CEECs is characterised by numerous, parallel tasks with different time horizons, fluctuating determinant parameters and a changing of contact partners and situations. This constellation overlays a basic structure with a multitude of personal dependencies, resulting in low flexibility and mobility. Thus, on the one hand there is a necessity for a long-term, integrated approach in transitional assistance, with gradual realisation in successive steps and the possibility of correction; on the other hand, there is also a need for relationships of interchange, the use of changing procedures and powers of improvisation.

7.5 German Transitional Assistance for Slovenia

As an example, this chapter describes German transitional assistance given to Slovenia. Since independence in 1991, Slovenia has established democratic institutions and achieved economic stability. Historically, attitudes were biased towards science, and interest in innovation only existed to a minor extent. Therefore, there is a lack of networking and co-ordination between the actors relevant to innovation.

7.5.1 FhG-ISI Transfer of Institutional Know-How to Slovenia

The support for Slovenia (Walter 1995) is a "typical" science and empirical-oriented technology and innovation policy advisory project by FhG-ISI. Its basic outline also applies to the work of the FhG-ISI in other countries and regions in Central and Eastern Europe.

In Slovenia, first activities took place in 1993 with a preparatory evaluation of the Slovenian situation based on information existing in Germany. Data about Slovenia relating to policy, economy, science and spatial structure were collected and interpreted. This analysis later served as a basis for the extensive "inventory" of the initial situation of the country. An introductory workshop was held in Slovenia, in which possible work steps and parts of the network approach were presented by FhG-ISI to the main actors in Slovenian industry, policy and science. In addition, the German and European innovation systems and especially the "promotion land-

scape" in the areas of technology and innovation policy were sketched. The next step in Slovenian-German co-operation was a screening of industry and science in Slovenia to identify areas and potentials which were to be integrated into an innovation network system of Slovenia. This assessment revealed the following picture of the situation: Despite good overall economic development, innovative networks needed to be further developed. Also special efforts had to be made to ensure that a modernisation concept for Slovenia was accepted and supported by all relevant social groups in economy, research, and policy.

FhG-ISI provided support to the Slovenian Ministry of Science and Technology to extend the previous considerations and activities in terms of R&D, innovation and build-up or enlargement of innovation-oriented networks. Thus, the Slovenian capabilities in technology and innovation policy could be improved by new methods of analysis, promotion steering and evaluation of projects, instruments and programmes. FhG-ISI also offered consultation and training on subjects such as technology foresight and new evaluation methods. To support co-operation between research, innovation funding and economic promotion, research institutes and other entities were trained e.g. in innovation management, utilisation of R&D results or setting up technology transfer and technology advisory groups.

As governmental agencies gained importance (Walter 1999), in 1997 and 1998 FhG-ISI efforts were integrated to the Slovenian Innovation Agency (SIA) project financed by the European Union (EU). FhG-ISI was involved in the conception and start up phase of this agency. The EU project was not only concentrated on counselling and advising but also provided financial means for institutional funding of SIA to act as a network co-ordination unit (Walter *et al.* 1997).

7.5.2 The Slovenian Innovation Agency

Network based policy in Slovenia focussed primarily on improving the already available innovative structures, public R&D programmes and potentials in economy and science. A specific network co-ordination unit - the SIA –should also create a more positive attitude in Slovenian society towards the necessity of industrial innovation.

Participants to the network managed by SIA should be

- Slovenian ministries that are responsible for science and technology and innovation policy (Ministries for Science and Technology and for Economic Affairs), e.g. to support co-operation between industry and science by providing financial help for joint R&D and contract research;

- technology transfer centres etc. as entities to mediate the demand for R&D of technology utilisers such as industrial enterprises and the supply side of R&D such as universities, R&D institutes;
- general business services and regional network institutions all over the country, such as existing economic development organisations, business services, industrial organisations (e.g. chambers of economy and crafts, economic promotion agencies).

Additionally, SIA should be involved in administering and managing the funding of public R&D programmes.

SIA was established in stages and started as a co-ordinating unit for public bodies that support industrial innovation and fulfil administrative tasks of funding programmes, beginning with the support of the operational management of a small subsidy programme on behalf of the Ministry of Science and Technology.

SIA started working in autumn 1997, as a unit within the Subdivision for Technology and Innovation of the Slovenian Ministry of Science and Technology. SIA received staff training in Slovenia and in EU countries and the staff of the SIA visited companies, ministries and other possible network actors. SIA also organised events in relation to EU access of Slovenia and elaborated a business plan for its future work.

Later in 1998, SIA activities stopped or were partly integrated into the usual administrative work of the ministry. Reasons were legal problems: the law of science and technology was delayed in parliamentary discussion. Today, SIA is no longer acting in network co-ordination. However, a continuation of the activities can be expected in the near future, based on a new law on science and technology in Slovenia as regulations on independent agencies also are a part of this law (Kalin 1999).

7.6 Looking Ahead

Central and Eastern Europe can only achieve international competitiveness if an innovative national economy is present. Taking account of the institutional situation and the specific strengths of CEECs, the network approach demonstrates concrete possibilities for making an effective contribution to the economic development and helping to build up international competitiveness. Network theory offers concrete starting points for the promotion of co-operative development in these countries. The targets of a network based technology and innovation policy in CEECs are: activation, focusing and complementation of existing potentials. In Slovenia and

some countries, the first steps towards the implementation of networks have already been taken.

The co-operation between CEECs and Germany permitted the setting up of a partnership through which institutional know-how from advanced market economies could be transferred to these countries. During the course of co-operation, the CEECs developed an awareness of the requirements of modern technologies, and the bottlenecks of technology and innovation policy were perceived.

Despite the positive perspective on building partnerships and mutual learning between CEECs and Western countries, international collaboration with CEECs has to acknowledge that there are factors which cannot be thought of right at the beginning of the co-operation, but which may deeply affect its outcome. These factors in CEECs are especially the fragmentation of relevant actors, formal structures being very influenced by alternative streams which interfere with policy formulation and implementation, and furthermore, the high nontransparency of informal structures which still have to be overcome.

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