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A NETWORK PERSPECTIVE ON EU ENLARGEMENT: THE ANALYSIS OF SIX-EUROPEAN NATIONAL INNOVATION PROGRAMS AND IMPLICATIONS FOR TRANSITION ECONOMIES*

INTRODUCTION

In today's global world of innovation, knowledge and learning have become strategically important factors that foster competitiveness and socioeconomic growth. Globalization, international information exchange, and strong competition impel all stakeholders of society to participate actively and promote the role of knowledge within the socioeconomic system as early as possible. Therefore, the timely possession or non-possession of knowledge and skills and the full utilization of the knowledge capacity of partners will determine national welfare and prosperity.

"Deficits and backlogs, especially if they concern the structure of the system, lead to heavy burdens and can only be remedied at the highest expense" (Tubke, A., 1999, p. 1). This has been observed recently in the Eastern European countries. After the decline of Eastern Bloc, many Eastern European Countries were characterized by the disappearance of organizational and institutional frameworks that systemize economic, political and social affairs. Therefore they have been obliged to restructure their legislative, executive and market mechanisms. However this new organizational and institutional formation, which is rather weak or embryonic, prohibits the establishment of successful economies and limits the prospects of innovation and growth.

Networking between the users and producers of knowledge has been proposed as a way to remedy the systemic structural problems and to generate more power from the synergy of participants. Consequently, networking approaches for innovation have been widely used in different levels such as initially at national (Lundvall, 1992; Nelson, 1993; Edquist 1997), and regional or sub-regional (Cooke, 1992 in Bracky et al., 1997). These approaches are also applied in different contexts like in *industrial and technological sectors* (Pavitt, 1984; Carlsson, 1995; Malerba, 1997), *scientific networks* (Pavitt, 1997; Steinmuller, 1994), structural and cluster analysis (Porter,

1995) and Triple Helix analysis of university-industry and government networks (Etzkowitz and Leydesdorff, 1996).

However networking approaches have not been utilized sufficiently at the international levels such as in the enlargement of European Union and integration of new countries. Against this background I argue while the international frameworks eliminate the national boundaries for science and technology; the widespread application of similar networking policies not only expedites this process, but also it standardizes and harmonizes international innovation system. In analogy to the international cooperation, which is more attainable and successful among the countries that have similar ideologies and aims, it can be argued that international innovation cooperation can be more attainable among the countries whose R&D programs and institutions that are incorporating the features of the Triple Helix Model.

Although non-linear models of innovation and Mode 2 state importance of networking as well, a "Triple Helix" of academia, industry, government relations and a spiral model of innovation diffusion likely to be a key component of any national or multinational innovation strategy of the twenty-first century. Thus despite different historical patterns, Triple Helix based innovation strategies can be admitted as the most viable method for both industrialized and industrializing world of twenty-first century (Gulbrandsen in Etzkowitz and Leydesdorff, 1997).

Simultaneously, the extensive use of information communication technologies, transition to knowledge-based society and increasing relations among states have accelerated the internationalization and globalization of industrial and economic activities. This transition caused national innovation policies to be shaped and mediated at the international frameworks such as EU and OECD. This paradigmatic shift provides an opportunity for the transition countries to cleanse, and set their institutional frameworks according to the true time[1].

This paper argues the idea of the replacement of traditional understanding of science & technology generation with the features of Triple Helix renders the elimination of dichotomy both at national and international levels. Such as in the case of dichotomy between the ***producers of knowledge: "academy and developed countries"*- and *users of knowledge: "industry and developing countries"***. Accordingly, the paper claims the recursive modeling of these indicators by the transition countries would help the elimination of the structural and cultural mismatches among these two groups of countries and thus speeds up the formation of a larger European innovation area. Therefore the paper claims the transition to knowledge-based economy has brought about opportunities; both to the accession countries for the adjustment of institutional settings and socio-economic models in accordance with the EU requirements and to EU to become a much bigger harmonious economy rather than a challenge that can not be contended with.

In line with these arguments, the paper makes a comparative analysis of six national programs, -which have been designed for innovation networking between university, industry and government, – of the late industrializing countries of 1990s namely "Denmark, Finland, Ireland, the Netherlands, Norway and Sweden". It deliberately stays away from detailed country descriptions to lift analysis from country levels to cross-country trends towards Triple Helix. The paper finds out eleven features, behind these programs, which can be a driving force and organizational tools for innovation frameworks for transition countries both at the national level and integration to the European Union system.

Accordingly these determinants which can be utilized by the transition countries in the eve of the integration to the EU are analyzed. The general perspective on the current situation of transition economies and how does it relate to the European innovation networking system are analyzed. In order to tackle the all the elements of Triple Helix and Innovation System models, the transition economies are presented from these following dimensions[2]:

(i) *Role and power of government*
(ii) *Characteristics of the science and innovation system in transition;*
(iii) *Education and training system,*
(iv) *Industrial relations and inter-company relations*

Even though these specific network programs can be criticized as they can not represent the whole national innovation systems, their organizational philosophies become the backbones of the whole innovation systems. By the comparative analysis of the six different European national measures and the examination of the changes and developments of the systems in the transition countries and their adaptability / compatibility and convergence to the European Union science, innovation and production system will become visible. In developing this argument, this paper contributes to the existing literature as deriving policy suggestions to the connecting networking perspective to the international levels and national institutional building.

In the remainder of this paper, I present the comparative analysis in section 2; and the indicators for the establishment of innovation networks fruitfully in these six countries. Subsequently, sections 4 and 5 deal with the current situation of the transition economies in general and appropriation of these indicators in the transition economies, respectively. These analyses then lead me to describe the institutionalization of national innovation networks and the possible impact of institutional changes on the enlargement of EU. Section 6 concludes the arguments presented in this paper.

A NETWORK PERSPECTIVE ON THE 6-EUROPEAN COUNTRY INNOVATION PROGRAMS

The relationships between science and industry and growth have been shifted from linear models of innovation of 1960s to non-linear models and systemic approaches over the last two decades, as a result of increasing recognition of the fundamental role of knowledge and innovation for economic growth, technological performance and international competitiveness. Correspondingly, non-linear innovation network formulation and interactive innovation systems have been acclaimed as effective models for innovation generation and management (Kline and Rosenberg, 1986; Rullani and Zanfei, 1988; Metcalfe, 1990; DeBresson and Amesse, 1991; Lundvall, 1992; Gibbons et al., 1994; Skyrme, 1992; Dodgson and Rotwell, 1994; Etzkowitz and Leydesdorff, 1995; Porter, 1998; Gilbert et al., 1999; Kim, 1999; Jacob et al., 2000).

On the other hand, there is a widespread belief that each nation has experienced a unique pattern in the transition to knowledge-based economy – on account of different capacities and traditions in science and technology systems, economic and cultural patterns (Göktepe; 2003). However, there is still the possibility of mutual learning from successes and failures in addressing the common objectives (OECD, 1999). Therefore the transition economies can benefit from the experiences of these six countries which have high innovation performance – to a certain extent – due to their innovation networking programs.

CASE STUDIES

i. Data Collection & Methodology for Country Selection

The data for the contextual framework are complied from the OECD figures and statistics, European Trend Chart of

Innovation, Internet sources for the national science & technology programs. Statistical and comparative analyses are done in order to figure out the uniqueness and/or similarities of these models and hence state the general tendencies and features of innovation networks at the national levels.

In order to state the basis of the selection of the countries and their programs for the comparison, the indisputable facts of R&D inputs:

(i) Percentages of gross domestic expenditure on civilian R&D (GERD);
(ii) Financing sectors like governments (GOVERD), higher education (HERD) and business sector (BERD);
(iii) GERD in real terms and per capita;
(iv) R&D personnel per capita of the countries are examined as the initial classification method;

As the main aim of the comparative study is to figure out the achievement of industry-science cooperation the ranking of countries in terms of company-company and company-university cooperation are also used for the fifth classification item (Dodgson 2000)[3].

(v) The University-company, company-company ranking

Consequently, these five main items "national expenditure on R&D, allocation of R&D financing among the private/public sectors, level of industry-science cooperation and the amount researchers" indicates the level and success of countries in R&D and innovation, thus it guides distinguishing the countries. At first off, the selection revolves around top ten countries in terms of science-industry interaction. Among these countries though the success of East Asian countries are not deniable the European Union countries are chosen from Table A.1. Among them, the countries with a higher GERD between 2 and 3,5 are picked out from the Table A.2[4].

Most of these countries have national innovation systems with many good policies that cover a wide range of areas and demonstrate favorable development. However they go beyond the scope of this research, thus the selection criteria of the programs for this comparative research based on:

(i) Non-defense related public funding mechanisms that aim to strengthen academia and industry cooperation and clustering;
(ii) Nation wide programs, which aim wide spread dissemination of knowledge;
(iii) Center on pre-competitive research, with an interdisciplinary focus;

(iv) Cooperative generic R&D in High-Tech industry;
(v) Involving relatively high number of network participant from all concerned sectors especially universities and / or knowledge centers;
(vi) Having a central national funding from government and public domains, thus exclusion of supranational funding mechanisms.

However, concerning the last consideration, it is difficult to find sole national funding within the European context, since most of the programs are built on to benefit from EU sources. As a matter of fact, this singularity implies the necessity of the integration of Eastern European countries to the EU innovation framework. Ultimately Denmark's Competence Center Contract Program (Agency for Trade and Industry), Finland's Centers of Expertise Program (TEKES), Ireland's Advanced Technologies Research Program (Enterprise in Ireland), Netherlands's BIT and Technological Cooperation Program (SENTER), Norway's BRIDGE program (The Research Council of Norway) have been selected as case studies.[5]

ii. International Comparison

After having selected the countries and national programs towards the academy-industry cooperation, this section presents the comparative analysis among these programs. It scrutinizes the cases in as much as fulfilling a Triple Helix model. It addresses to the ***factors for achievement of successful partnership and satisfaction from the program. "reasons of the program, target groups, the organizational, financial, management structures; project proposal & eligibility criterion, intellectual property rights regimes, and socio-economic implications"*** as of important parameters to compare and contrast national measures for innovation networking and comprehend the university-government-industry relations in an innovation network system. The lack of precise empirical data in the financial benefits, exact allocation of patents, or increase in the export rates are not considered as disadvantages for the composition of innovation typology policies.

R&D Inputs

When the R&D inputs of these seven countries are examined as in the Table 1, Sweden and Finland. Have outstandingly high GERD in absolute terms. However in the case of Ireland the investment on R&D is relatively lower due to the foreign investments. The critical point that is drawn from these cases is the identification of priorities, though transition countries have lower GDP per capita, they are all advised to redefine their priorities. This should not prevent them to allocate a competitive amount of resources on R&D.

Table 1
R&D inputs

Input / country	DK	FI	IE	NL	NO	SE
GDP per capita	26,300	22,800	25,200	25,100	27,600	23,000
GERD per capita	521	701	269	462	464	732
GERD %	2.%	3.1%	1.40%	2.00%	1.6%	3.5%
GOVERD %	36.1%	30%	22.20%	37.90%	42.9%	25.6%
BERD %	53.4%	63.9%	69.1%	48.6%	49.4%	68.8%
Population	5,368,854	5,183,545	3,883,159	16,067,754	4,525,116	8,876,744
Total Researchers	18,438	25.398	7,825	40,623	18,625	39,921

Goals and Objectives

Table 2 presents the objectives of the programs; the main motivations of the programs are to render the competitiveness, industrial growth and innovation capacity of countries by way of increasing the interaction between industrial bases and academic bases of the countries. Generally, the aims of the measures are the promotion of joint innovation projects between industry and universities in order to improve and continue the industrial competitiveness of the countries.

Table 2
Program Objectives

Objectives/country	DK	FI	IE	NL	NO	SE
Commercialization of knowledge	√	√	–	√	√	√
Increasing competitiveness	√	√	√	√	√	√
Increasing innovation	√	√	√	√	√	√
Start-up of high-techs	–	–	√	–	√	√

Beyond these motivations while the Norwegian, Sweden programs are giving emphasis to the factor or necessity of "absorption of new technologies by SMEs" the other measures have not specifically address this issue. Second, the Finnish and Dutch programs explicitly underline the importance of strengthening the innovation capacity of companies.

The Organizational Administrative Structure

All of the programs are initiated by governmental initiatives, they are organized according to top-down approach of innovation networking, and the governments' agencies provide the institutional, legal and financial structures necessary for innovation networks. The governments primarily undertake the following roles.

Table 3
Role of Government

Role of Government / Country	DK	FI	IE	NL	NO	SE
Administrator	√	√	√	–	√	√
Catalyser	√	√	√	–	–	√
Facilitator / Coordinator	√	√	√	√	√	√
Funder / Investor	√	√	√	√	√	√
Launcher / Initiator	–	–	–	√	√	√
Networker	√	√	√	√	√	√

This classification is reflecting the statement of Triple Helix model as the changing role of governments according to the country patterns. None of these countries has left their R&D, innovation facilities and thus industrial competitiveness into the hands of market mechanisms; instead they are involving in the innovation process in a reasonable mode with the market tendencies. They are acting on a limited but essential level that renders the propitious conditions for innovation partnership.

Intermediary/Bridging Agencies

Prevalently, all of the measures are operating under the umbrella of a governmental body. This body is bridging the business sector, industrial research institutes, higher education institutes with the concerned ministries, recurrently such as ministries of industry, trade, economics, education or national agencies for research and technology. These agencies are acting as intermediaries between the funding/policy level and performers.

Table 4
Intermediary Bodies

Type of Intermediary Body / country	DK AGTI	FI Tekes	IE Enterprise Ireland	NL Senter	NO RCN	SE Vinnova
Advisory Councils	–	–	–	–	√	–
Dedicated Organizations	√	√	√	√	–	√
General Organizations	√	√	√	√	√	√

The literature on the types of organizations argues that for an effective management of innovation partnership, the intermediary bodies need to have some considerable role in directing the way of ST&I policies and executive power in the implementation of these policies rather than just providing independent advice at arm's length.

Therefore, the cross-country analysis correspondingly shows that these national measures are generally managed by active decision-makers, rather than people appointed on ad hoc basis. Thus this kind of exclusive bodies can be considered as a more viable method for the developing countries in the management of innovation networks. The integral existence and importance of these intermediary bodies are also reflecting another characteristic of Triple Helix.

Stakeholders / Participants: These programs try to comprise of all of the participants and stakeholders of innovation networks. The main target groups of these programs are as follows.

Table 5
Target Groups

Target Group / country	DK	FI	IE	NL	NO	SE
Large Industrial	√	√	√	√	–	–
(Non-industrial) Companies	√	√	√	√	–	–
Industrial SMEs	√	√	√	√	√	√
(Non-industrial) SMEs	√	√	√	√	√	√
Universities	√	√	√	√	√	√
Research Institutes	√	√	√	√	√	√
Foreign Partners	–	–	–	√	–	–

Albeit the governments are funding and initiating the networking programs among the similar target groups, how they are organized and managed varies from country to country. As a reflection to the point in terms of company-company cooperation Ireland, Norway and Netherlands are ranked 17th, 15th and 11th respectively and there is a need for higher business participation, qualifying the SMEs with R&D capacities and strengthening the competitiveness of industry, hence the emphasis is given to industrial participants. On the other side, Denmark is ranked 10th in university-company cooperation, there is relatively more need for strengthening the industry-oriented capabilities of research institutes; consequently they introduced bridging organizations such as GTS and other measures to facilitate the transfer of basic knowledge to industrial utilization. Thus all of these countries try to remedy their "major relative weaknesses" in terms of innovation generation. (ETCI, Innovation Scoreboard, 2001, p. 12). The different tendencies or preferences according to the country needs explicitly reinforce the arguments of Triple Helix in terms of country specific projection patterns. However it should be kept in mind that none of the countries have only these measures, they have several complementary policies and programs that work within the scope of national innovation systems. Thus in each of these programs the role of the government and the target groups may vary, or overlap.

Implementation

As for the attainment of Triple Helix model, definitely, these programs are designed for the interactive innovation process between universities and industry. There are central requirements in al of these programs such as the establishment a team of project, in an active cooperation of certain number of universities and research institutes. Second, it needs to be comprised of large number of industrial participants and should be open to the new comers as well. The programs considered to be legally binding agreements between the participants. They are acting under the terms of these measures; this causes them to be the one department of a big firm working mutually for the same objective. The coordination of this "big firm" is realized generally by a committee, which represents the ministries of industry, economics and science and technology councils. They also include representatives from industry and academy. These committees are responsible for the financial and administrative relations of the partners.

Management of Intellectual Property Rights

Concerning the management of intellectual property rights, Danish Case states the actors who participated in the development of the project, has equal rights over the IPR. However the dissemination of new knowledge outside the project teams are given great importance. Among the other programs, the general tendency is to leave the final decision to the members of the consortium. They execute their own method about IPR management. This is literally coincides with the Triple Helix attribute for the management of IPR.

Delivery Measure (Financing)

The governments financially support the programs. The percentages and the budget allocations, the possibility of additional funds varies from country to country. The common point is while the governments undertake the highest burden, the participants are supposed to contribute to the development of the project. The Table shows that the details of budget allocations.

Mode of Delivery / country	DK	FIN	IE	NL	NO	SE
% Of Government Funds	50%	50%	100%	Min. 50%	–	50%
Overall Budget	NA	NA	Eu5,725bn	–	–	–
Expenditure / year (2000)	13	Eu5M to dozens of Million	P. 100,000 –400,000	Eu50M	Eu15.8M	Eu 650,000–900,000
Industry Share	25%	50%	–	–	√	50%
Research Inst. Share	–	–	√	–	√	Vinnova
Higher Education Share	–	–	No	–	–	Vinnova
Additional funding	√	√	No	Mx. 50%	NA	EU
Duration of Partnership	C	C	3yr	4yr / C	C	3yr

Eu: EURO, M: million, C: The duration of the project depends on the completion on the project. P: UK Pound.

Table 6
Financing of the Program

According to the Table 6, the governments are providing the higher shares of the program budgets from at least 50 to 80 percentages, even in Ireland the government covers the whole budget. In most of these countries additional financing, especially benefits from the EU programs are very influential in these programs funds. Moreover, according to the European Trend Chart on Innovation under the heading of cooperation for innovation between industry and university the number of the programs in this field is definitely higher than this research (ETCI, 2000).

The classification on the financial management of the programs evidently reflects the requirement of innovation networks regarding cost and risk sharing among the participants. Although it is difficult to enumerate them in an ascending order from the best application to the least one, there are still some conjectures for a late coming country. Concretely, while the governments undertake the higher burden, they need to make the business to contribute at the utmost possible level, and finance their own costs, while the participation of research institutes and universities should be financed by the (conjectural) program. The Table 6 does not show detailed data on the overall budget allocated for the measure (except Ireland). This tendency can be calculated as a positive indicator for developing countries, since generally they have instabilities in budget allocations for the longer-terms, thereupon they do not need to be concerned so much with the details of overall budget allocations. On the contrary, for a successful functioning of the measure, it needs to have a stable and increasing budget allocation at the optimum level it needs to be refrained from any macro-economic instability, which seems to be very difficult for the developing countries to achieve.

Criteria for Eligibility

The application to participate in these measures can be realized via a research institute or it can be done by individual researchers, or group of organizations. While a beforehand partnership between academy and industry provides an expeditious initiation, the program committee can act like a matchmaker and bridges the partner. Extensively, whether they are prior partnerships or joined under the framework of the measure, they are subjected to the rules of the program. The following table shows the different types applicants. Under the conditions of a developing country, the beforehand partnership seems to be difficult to achieve, thus this programs should be designed to bridge and administer these two settings.

Table 7
Applicants for the Programs

Type of Applicant / country	DK	FIN	IE	NL	NO	SE
Group of Companies	√	√	√	√	X	√
Individual researcher	√	√	√	√	√	X
Industry & Academy	√	√	√	√	√	√
Industry/business	√	√	√	√	X	X
Research Institutes	√	√	√	√	√	√
Universities	√	√	√	√	√	NA

In addition to the sort of participants for application, the committees of the programs apply similar or different criteria to decide the eligibility of the project propositions from these applicants. These criteria are by nature reflects the requirements of knowledge-based economy and objectives of a successful Triple Helix system. This table classifies the governments' industrial priorities, in initiating these programs. This classification is based on the programs' frameworks it should not be considered that there are sharp lines among the program objectives, and some points are totally neglected.

It should be kept in mind that though there are national variations, by and large the critical points in accepting or rejecting the proposals are how much they are promising to bridge the producers and users of knowledge and how much it contributes to the industrial competitiveness of the country. The Table 8 tries to itemize each programs specific and overlapping criteria and it aims to show the omnipresence of the arguments of a successful innovation partnership in these national partnership programs.

Criteria/Country	IL	DK	FIN	IE	NL	NO	SE
Active participation	√	√	√	–	√	√	√
Basic Science → Applied Science	√	√	√	√	√	√	√
Concrete solution	–	√	–	√	√	–	–
Cost/Risk reducing	√	–	√	√	√	√	√
Dissemination of technology outside	√	√	√	√	√	√	√
Employment oriented	√	√	√	√	–	√	–
Export oriented	√	√	√	√	–	√	–
Financing Requirements	–	√	–	–	√	–	√
Generic technology	√	–	√	–	–	–	–
Initiate/useful for SMEs	–	–	√	√	–	√	√
Knowledge pooling	√	√	√	√	√	√	√
Large # of Participants	√	–	–	–	–	–	√
Open to newcomers	√	–	–	√	√	–	–
Targeted at priority areas	–	–	√	√	√	–	√
Technological innovation	√	–	√	–	√	√	–

Table 8
Project Evaluation Criteria

The classification of the criteria of eligibility of in details underlines the utilization of the aims of innovation networks by each of the program. Hence it can be concluded that as higher as these items are taken into account in the assessment of project proposals, the higher the success rate of the programs. The Table 8 also reflects the objectives of the national programs.

It is necessary to emphasize that the criterion of "concrete solution" is only employed by three measures Denmark, Ireland and Netherlands. Accordingly it can be stated the main aim of the networks is not to end in results but to provide the necessary conditions for production and any kind of problem solving. In order to clarify for developing countries, these items can be grouped under four main headings to be applied as eligibility criteria: ***"success in technological innovation, high results of economic benefits, commercial potential and active cooperation of participants from industry and science".*** These factors should be taken into account in assessing the project propositions.

Results / Implications of the Measures

Definitely, this is the most difficult part to discuss since primarily there is not enough official data on the results of the programs; or no unequivocal indicator to figure out them. Second, the net results of these programs are difficult to be distinguished; since at the national level all of these measures are working in cooperation with other national and international programs. Moreover, even though all these countries have high innovation performance, the variations make a national comparison on strictly defined item difficult. Therefore, in each of the country reports the achievement of the project criteria, the general positive observations on the programs, or at least continuation of the programs and increase in their budget are considered as programs' positive implications and achievements'. Table 9 shows the indicators of success, rather than net profits of the program. Still and all, any unchecked indicator does not mean a total failure at or ignorance of that factor, rather this is due to the lack of data or a complementary connection.

Table 9
Indicators of Success

Implications/country	DK	FIN	IE	NL	NO	SE
Accomplishment of Targets	√	√	√	√	√	√
Budget increase	√	√	NA	√	√	NA
Efficiency in Gov. role	√	NA	√	NA	NA	NA
Enhancement of R&D	NA	√	NA	√	NA	NA
Extension of program/projects/consortia	√	√	√	√	NA	√
Increase in competitiveness	√	√	√	√	√	√
Increase of U&I partnership	√	√	√	√	√	√
New companies & jobs	√	√	√	NA	√	NA
Superior achievements	NA	NA	NA	√	NA	√

By and large, the programs are considered to fulfill their initiation targets, and contribute to the intensification of university-industry interaction, which is very instrumental for further innovation. Another success sign is the extension of these programs, reflecting the acceptance and effectiveness of these programs nationwide. The countries experience an increase in their competitiveness, and in the availability of employment opportunities. It can be concluded that at different levels and on different items, these measures indicate that a successful Triple Helix modeled innovation system results in such impacts.

The measures are designed to achieve the targets of a fruitful university, industry and government cooperation, which Triple Helix model expound to incite. The Table 9 rates the success of programs in the accomplishment of a trilateral networking.

POST-COMMUNIST ERA SITUATION OF UNIVERSITY- GOVERNMENT AND INDUSTRY (UGI) RELATIONS IN COUNTRIES IN TRANSITION

As a result of many historical experiences[6], which had still adverse effects on the economic growth, the Central and Eastern European Countries had followed a different path of economic and social development. Democratic capitalism in western countries led better and more dynamic environment for interaction of economy, technology and science (Koslowski, 2000). Concerning the research administration there has been lack of efficiency, order and connection to the environment. In the absence of well-defined economic and social development programs, science, technology and innovation programs have subsequently became vague and unresponsive to the needs of industrial and economic development. Public institutions have no missions or plans, its functioning rules were formed in the communist era. As a rule, ministries in CEE countries acted as organizations created to manage relatively uncomplicated and routine matters using relatively passive staff (Koslowski, 2000). Despite some reforms these public bodies are still tend to repeat the same routine behavior and far from forming a web of coordination within the whole system.

The secret and golden thing in the efficiency of the public administration in western countries is the fact that both officials and politicians apply certain basic reasoning just like scientific researchers or scientific process. Policy plan for innovation or innovativeness – which is the main concern of this paper – includes phases of: *preparation, identification of the problem, implementation, monitoring and assessment.* These phases are all actualized in the implicit or explicit form of trilateral relations of UGI.

Concerning the other organizations for innovation, such as universities, technology agencies, research councils and research organizations there are also diversity and lack of coordination within these organizations. There are no institutional framework bridging the knowledge centers to the industrial level.

LESSONS LEARNED IN DEVELOPED COUNTRY PROGRAMS: READINESS FOR INTERNATIONAL COLLABORATION

In this section, some of the indicators and guidelines for a successful international cooperation analogous to the Triple Helix based UGI relations are identified. This helps the elimination of the dichotomy between technology producers – developed countries – and technology users – developing countries. The appropriation of these features would help transition countries to become a part of global production system as well. While the level of economic development, ideological similarities are used to be factors for the collaboration between states, recently the culture and philosophies for the management and generation of innovation becomes another important determinant of international cooperation. Beyond the percentages of GERD or total number of researchers, currently different indicators have been utilized as to measure the readiness for international cooperation in R&D and innovation programs. These indicators are gathered from a comparative perspective on the general indicators derived from innovation programs in developed countries the current University-Government and Industry (UGI) relations in countries in transition.

Governmental Indicator: "An active participant government"

As international cooperation starts at the governmental or institutional levels, a developed country (S&T body) seeks out the facilitator bodies that operate on similar basis. Successful country cases and Israel reveal the existence of administrations by which science base and productive base are integrated. They have absolutely identified ST&I bodies that are dedicated to the management of UGI relations. Thus after having an administrative reform and restructuring the S&T bodies these countries will become a more eligible partner for cooperation.

Academic Indicator: "entrepreneurial university"

The existence of a history of highly qualified academic culture and more strikingly the entrepreneurial academy of 21st Century, with the mission of economic development is the general indicators that initiate a propitious cooperation at the domestic and international levels. On the other hand, it would be imaginary to expect an attainable relation between a university with a number of independent interdisciplinary centers, and programs where the staff following the latest developments, and a university where faculty assumes basic research and education on traditional areas as its exclusive mission and can not follow the recent scientific developments. As a second point, EEC needs to reform its higher education system not only to have more industry-oriented universities but also to have internationally attractive higher education institutions.

Industrial Indicator: "science-based industry"

A significant number of technology-based industries that have the ability to integrate internal R&D, production and commercialization process with external partners are the preferable business types of knowledge-based economy. Therefore in order to be an eligible partner in international programs, CEE urgently needs to initiate a framework that encourages its industry to generate technological innovation via networking and partnership.

Work Force: "skilled human resources"

Well-educated human resources capable of developing and implementing innovation are critical national assets that attract other nations for cooperation. The CEE on the other hand with their younger and educated society demonstrates some advantages as to make cooperation since most of the European countries are suffering from ageing population and declining birth rates.

Stability of Program: "Research missions & plans"

Rather than the amount of R&D expenditure, the financial and political stability of the program are more positive indicators to initiate a successful cooperation. Additionally, if can not expand its GERD, CEE needs to convince the international participants about the stability and commitment to the measure. Innovation policy must be immune from the short-term political and interest considerations. It must be embedded into the national system and culture.

Well-defined Market: "rich consumers"

All of these programs are aimed at producing goods that have the potential for commercialization; even they may have existing markets. The forecasts of future consumer trends and needs decrease the risks of marketing. Moreover, existence of sufficient market-pull with increasing demands for the application of technology in the products is also important incentives for collaboration. While with its large young and demanding population CEE represents a good market, however the low-income rates and life standards are fading the purchasing power and people are forced to consume less technology intensive products. Therefore, CEE also needs to increase average income level, as indicated in the previous sections.

Trust-Building in Networks: "Social network"

As the literature survey and the case studies elucidate the mechanisms of innovation networks, more specifically Triple Helix system works on an evolutionary selection mechanism that is enacted by its members. In the system there is no central control dictating them what to do or not to do. Since the participants are linked through the elements of trust, cooperation and close interaction, they prefer to select those with whom they can achieve these elements and have mutual benefit. Thus assuredly, while they have inclination to select the ones who has the qualification of a beneficial partnership they have disinclination to cooperate with the ones who does not carry the characteristics that are defined as indicators for collaboration.

Network is the forum for collective learning, communication, and synergy creation. The analysis on the cases bears out that the main success of networks is based on the achievement of energy of ***critical mass***[7], establishment of trust among the members. Involvement of end-users, customers and potential networkers enable the system to have the understanding of their customers' needs (SPRU, SAPPHO Study, in WAMP, 2001). Pertaining to conditions of catch up countries the trust and reliance between neither within the industrialists nor between industry and university even to state sector is difficult to achieve. Thus the governments are obliged to assure trust among the partners and their commitment to the system; they must pledge to continue the system despite of the political instabilities.

Generally, networks are the virtual, symbolic places of cooperation embody the image of a big company. In as much as the management of a big company is hard the administration of networks is arduous and requiring concessions, trust endurance and determination. Thus, the catch-up country should persuade the potential partners based on Luzt's[8] assertion for consortia as none of the partner is calculating individual gains, but this is a matter of belief and devotion for the national competitiveness and development. It is not a win and lose individual competition, but achievement of exceptional R&D results. The impacts of networks are greater than the sum of its parts, because they are benefiting from the synergy of the system.

Historically, while capitalists-liberal economies used to cooperate between themselves, communists-socialist states used to form their networks on the other hand. Currently, however studies reveal that cross-cutting arrangements like the Triple Helix are becoming the mode of cooperation. Thus it is not illogical to assume the foundation of cooperation between countries now have the characteristics of Triple Helix in their innovation or more generally in their production system. International networking can be successfully achieved among states whose R&D programs are designed on similar base and whose potential partners not only seek the opportunities to gain, but also contribute to the system.

The aim of international cooperation is to co-development of technology rather than establishment of multinational companies or transfer of technology from one company to another. Analogous to national level, international cooperation aims the pooling of multinational resources either industrial, academic or human resources. The aim is also similar endogenization of knowledge production into the system and reduction of technology transfer costs and applicability risks of new technology products. On the other hand, not only developing countries are in need of cooperation, but also developed world needs cooperation since even if they can generate innovation endlessly, they will not be able to find innovation demanding young and rich consumers to sell their products. As a case to the point while Finland is considered the center of ICTs and cell-phones, the consumers of cell-phone are mainly from developing countries with their larger population.

CONCLUDING REMARKS

Building upon the argument presented in this paper, innovativeness and hence the economic success of enlargement of the European Union will depend on the extent and the way in which the transition countries are adapting their innovation structure to well-balanced, value added trilateral relations of university-government and industry. The EU is neither nation state nor a federation of nation states. The enlargement process should have a networking perspective. It should be achieved on the network of relations among national governments, industries and knowledge centers. The new institutional framework can be constructed on the networking principles rather than big expectation of an enlarged harmonious system. However it is my belief that the if national programs complement and compatible to each other, the achievement of networking will be much more promising than the integration of completely diversified policy plans. Therefore the knowledge-based economy provides a paradigmatic shift and opportunity for both countries in transition to harmonize their institutional structures with the European Union, and for the EU to develop a network systems against the competition coming from the US, Japan and East Asia.

FOOTNOTES

* The concept of transition countries are synonymously used with Central and East European Countries or accession countries for European Union.

1 Laws and institutions are constantly tending to gravitate. Like clocks, they must be occasionally cleansed, and wound up and set to true time (Henry Ward Beecher life Thoughts, 1858).

2 These features have not covered enough due to the lack of data. It is the hope of author to complete that part soon.

3 The ranking of these countries are taken from the World Competitiveness Handbook in Dodgson, 2000. The list is attained through the national and international surveys in which the respondents were asked whether technology transfer between companies and universities are sufficient, and whether technological cooperation between firms is common or lacking.

The complete lists of Tables showing all these cross national data are attached as appendix.

4 For a further qualification for eligibility, as while higher rates of BERD and lower rates of GOVERD signify the trends of developed countries (OECD, 1999) the countries with relatively higher BERD and lower GOVERD are preferred over the others as to underline the developed country trends.

5 The selection and classification of these countries and their programs are based on authors' previous and current research on the comparative analysis of national innovation systems.

6 i.e. The "Second serfdom, stagnation, weak bourgeoisie, having no state of their own or independence, having to survive communism" and Roman Catholic, Greek Catholic and Orthodox which showed greater passivity, fatalism, distrust towards change and focus on religious made CEE countries follow a different path.

7 The amount of substance that is needed for a nuclear chain reaction to take place.

8 Chief of Crysler and partner of Crysler-Ford-General Motors consortium.

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APPENDICES

Table A.1

Country	GERD $	% of GDP on R&D	% of GOVERD	% of BERD
Israel	–	3.6	30.40	60.40
Australia	N.A	1.4	47.80	45.00
Belgium	5,025.4	1.8	24.90	69.40
Canada	14,727.0	1.6	31.20	49.30
Czech Rep.	1,751.0	1.2	42.60	52.60
Denmark	2,968.9	2.0	36.10	53.40
Finland	3,752.0	3.1	30.00	63.90
France	29,239.9	2.0	40.20	50.30
Germany	47,573.6	2.3	33.80	63.60
Greece	1,084.3	0.5	53.50	21.60
Iceland	170.0	1.9	51.20	41.70
Ireland	1,083.8*	1.4	22.20	69.10
Italy	13,830.0	1.0	51.10	43.90
Japan	95,084.0	3.0	19.30	72.50
Korea	18,543.0	2.4	22.90	72.50
Netherlands	8,394.8	2.0	37.90	48.60
New Zealand	752.1	1.1	52.30	30.50
Norway	2,140.2	1.6	42.90	49.40
Portugal	1,268.7	0.6	68.30	21.20
Spain	6,375.1	0.9	38.70	49.80
Sweden	7,755.5	3.5	25.60	68.80
Switzerland**	4,867.6	2.7	26.90	67.50
Turkey	2,635.9	0.49	53.70	41.80
U.S.	197,830.0	2.3	29.20	66.80
UK	22,467.0	1.6	375.60	47.30
EU-15	157,641.0	1.82*	36.9	54.1

Table A.2

Company-University Cooperation		Company-Company Cooperation
Country	Ranking	Country
Finland	1	Finland
Singapore	2	Israel
Israel	3	Japan
Netherlands	4	Germany
Switzerland	5	Denmark
Sweden	6	Singapore
USA	7	Sweden
Canada	8	Canada
Ireland	9	Iceland
Denmark	10	Taiwan
Australia	11	Netherlands
Taiwan	12	Switzerland
Germany	13	USA
Norway	14	Luxembourg
Iceland	15	Norway
Belgium	16	Australia
Colombia	17	Ireland
New Zealand	18	New Zealand
Austria	19	Belgium
United Kingdom	20	Austria
Hungary	21	Malaysia
Hong Kong	22	France
China	23	Hong Kong
Malaysia	24	Hungary
South Africa	25	China
Japan	26	United Kingdom
France	27	Russia
Russia	28	Spain
Luxembourg	29	Slovenia
Philippines	30	Poland
Chile	31	Czech Republic
Spain	32	Greece
Czech Republic	33	Italy
Greece	34	Philippines
Brazil	35	South Africa
Turkey	36	Brazil

Table A.2
(nastavak)

Company-University Cooperation		Company-Company Cooperation
Country	Ranking	Country
Korea	37	Chile
Portugal	38	India
Italy	39	Turkey
Thailand	40	Argentina
Poland	41	Mexico
Argentina	42	Venezuela
Mexico	43	Portugal
India	44	Korea
Indonesia	45	Thailand
Slovenia	46	Indonesia
Venezuela	47	Colombia