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Central and East European countries: innovation leapfrog versus “path dependence”?

Since the end of the second world war the international community has never been in such a deep motion towards a new economic and political order. Regarding this historic challenge strengthening the EU economic and political environment would positively affect the global development biasing towards increasing conflicts and tensions never happens since the end of the cold war. Albeit, building the internal life in the enlarging European society per se is quite a challenging task. Increasing diversity engenders a huge variety of never seen before problems, which must be responded in an appropriate manner. Within this multifold complexity, and despite the variety of issues related to elaboration of a new economic agenda for the member state countries this is specifically innovation path of economic development which would be emphasized as the main underlying route for approaching the prosperous future. As this is declared by the Commission of the European Communities, entitled “Innovation for a competitive Europe (a new action plan for innovation)”, “Innovation will enable Europe to meet the challenge of competitiveness. It will ensure that Europe can raise productivity and generate more added values in the face of ever increasing international competition. Future growth and employment depend on it directly”². It is worth mentioning here, that this specific target was also proclaimed in the Valencia declaration³.

In many declarations the innovation driven development is proclaimed as a goal for actions towards renovation of societies throughout fostering new ideas, encouraging new business, establishing new networks and creating new, innovative, alliances. Innovation development brings a variety of choices for societies, however, spontaneous actions would be coincided with a multifold problems unless an appropriate theoretical and methodological foundation is primarily elaborated. In fact, theoretical roadmapping would be quite helpful in avoiding a rockfall, while approaching to an uncertain, uneven but inevitable and prosperous future.

Thus, the building of an innovation society would probably goes a both ways simultaneously: towards elaboration of theoretical concept of innovation development on the one hand, and practical decision makings towards creation of innovation led economy on the other hand. Hopefully, our insight would be a small step forward to debate and to relate these two processes within one rich.

We divide our investigation into several parts:

- a brief introduction of some building blocks of innovation economy, specifically related to a “spatial” context;
- some comments on CEEC’ technological path dependence, pursued by FDI;

¹ Research for this article was supported in whole by Central European University (“CEU”) Special and Extension Programs. The opinions expressed herein are the author’s own and do not necessarily express the views of CEU.

² “Innovate for a competitive Europe (A new action plan)”. Commission of the European Communities. 2.4.2004.

³ Valencia Declaration on Innovation: European stakeholders support action on innovation policy. Valencia, 28 November 2006. // <http://www.europe-innova.org>

- clustering as an alternative choice versus a path dependent type of technological development
- case study: biotechnological cluster. Preliminary observation.

Innovation path for “spatial economy”: a few theoretical blocks

It still remains many unknown about innovation economy¹. The move towards this destination is alike searching a way in a jungle. However, innovation development represents the only one relevant response on contemporary challenges and a path for further economic advance of societies.

There are still ongoing debates over a key notion of innovation economy - “innovations”. Our standpoint is that innovations (technological innovations) represent a new technologies (emerging from scientific laboratories), which are adopted by a private business for some commercial needs (to overcome resource shortcomings, to expand on a new markets while facing the problems on the existing markets, to combat over rivalries by cost and prices, to increase a revenue by introducing better design of production and so on, so forth). Regarding this definition we have been distinguishing two types of innovation: process innovation and product innovation.

Process innovations enable countries to reduce their production costs and hence to improve a price competitiveness of national production, which, in turn, yields a national companies with an extra profit or affords them to compete more effectively over rivalries on the world markets. Process innovations are also well designed for saving resources, which are scarce either in physical terms or in terms of price (as in the case of oil&gas resources). It is worth mentioning here, that effectiveness of the process innovations directly depends on the domestic market scale: the larger is the number of national companies adopting a certain type of process innovation the higher would be the accumulated commercial revenue and hence, the whole economic effect for the country. Probably, this kind of cohesion between innovations and economic scale would have a specific significance for the EU enlargement in terms of higher innovation capacities for the member state countries rested on a following specific advantageous: 1) increasing a number of companies, operating within a certain production niche, which would be able to adopt new technologies; 2) extension of a scale and variety of R&D, undertaken in the member state countries; 3) enlarging capacity to absorb new technologies (in terms of resources, skills and market facilities), enabling the EU countries to cope with the increasing technological complexity; 4) substantially increasing market diversity within enlarged community, providing a new perspective for the business either “old champions” and “new comers”.

Product innovation enables production of radically new products emerging from a breakthrough R&D, especially interdisciplinary basic research. Stemming from that peculiar feature of product innovation, companies, adopting them, are competing on the world markets by novelty rather than by price. It means, that instead of extending the technological life cycle of the production which is already “on line”, innovative companies are striving to adopt a drastically new technologies, thus replacing and renovating the existing production lines. Relying on this fact we would probably explain why small and medium enterprises (which are less path dependent in terms of substantial investments, large scale market for production&sale and existing facilities to lobby market positions) are the most likely to be a key players in the innovation economy predominantly embedding this specific kind of innovations. Regarding this specific insight, we would presume that, the larger is “spatial” dimension for testing, producing and trading new products, the smaller would be investment risk related to the invention and implication of new technologies into production

¹ The definition of innovation for statistical, public aid and policy-making purposes is currently under EU discussion panels. //”Innovate for a competitive Europe”. A new action plan for innovation. Commission of the European Communities. 2004. P.23

chain and a higher return on every unit of R&D resources, which are expensive, uncertain and risky by their nature.

Probably, this type of innovation economy would also provide a new prospective for a new EU comers who are less favored in terms of size and capacity of their business, having a shortages in financial resources, meeting a problems of earning their own brand names, experiencing dependence from multinational giants and combating for protecting their national identity.

A brief summary. Enlarging communities potentially posse a specific innovation advantageous rested on increasing scope and scale of their R&D, market and business facilities. Adoption of process and product innovations would, undoubtedly, increase the competitiveness of the EU on the world markets and would make the EU more sustainable and less affected by global turmoil.

Innovation economy: underlying paradigm

The monetary paradigm of economic growth seems being not well suited for innovation development. Growth in many cases does not means development, the quantitative indicators are rather well designed for describing the path-dependence then a leap frog, the financial indicators are focusing stakeholders on getting a short term effects, namely increasing short term profits, manipulating of current interest rates, increasing consumer spending rather then savings, maintaining balance in an annual government budget at the expense of long term investments and so on. On the contrary, innovation development as such is a long lasting process (this is an essential feature of technological development), which results couldn't be properly evaluated on a short term basis. In most cases, financial resources do not fuel the economic development forward as they did during the previous century. Anyway, this is a theoretical puzzle, which is outside a specific frame of the given analyzes.

Leaving this theoretical exploration outside our investigation we would however, assume that the process of building up innovation economy might proceed in different ways, stemming from a distinction in theoretical grassroots: monetary on the one hand and non-monetary on the other.

1. Monetary paradigm ignores a "spatial dimension" of national economic development focusing mostly on a reallocation of financial resources towards elimination of here and there arising market "bottlenecks" or stimulating some kind of activities. The "monetary factor" is treated as the main driving force even for innovation activity. Within this concept, the amount of total expenditures on R&D, education, on setting up the innovation infrastructure and some other kind of similar activities are considered to be a main input into creation of innovation output. Practically, the leading national actors (large companies, large regions, large universities) are the major recipients of innovation funding (it is well known, for instance, in the US the larger R&D procurements in business sector are made by the government in favor of large, specifically military, companies; the larger recipients of the government and business R&D allowance in Canada, US, Russia and in the other countries are leading universities well-known by their brand names and so on down to the list). Thus, within monetary concept a new companies, universities, new emerging regions of knowledge, new individuals could hardly be identified and properly treated as a national actors, enabling to frame a national development in a new manner.
2. Another, or non-monetary", methodological concept, which would be called as "Schumpeterian" by the name of an outstanding Austrian economist. J.Schumpeter, is quite different from the "monetary" vision of economic development, explaining it as the dynamic process of shifting economic systems from one static state to the other through introduction of new actors, new networks and new combinations of factors. J.Schumpeter writes to that matter, that "development in our sense is then defined by the carrying out of new

combinations”¹. Thus, according to J.Schumpeter, new stage in economic development is based on: 1)“introduction of a new good” – that is one with which consumers are not yet familiar – or of a new quality of a good; 2) the introduction of a new method of production; 3) the opening of a new market; 4) the conquest of a new source of supply of raw materials or half-manufactured goods; 5) the carrying out of the new organization of any industry.

In fact, a key role of new actors (government elite, business or individuals), whoever they are, in drifting national economy from obsolesce towards modernity represents a crucial J.Schumpeter’s finding.

A brief summary. Initially, it would be quite meaningful to make a choice of what type of concept should be treated as a basis before designing a national innovation driven policy in general and framing a whole pursuing bunch of economic and political decisions. Probably, “Schumpeterian approach” would be seen as the more appropriate for getting an innovation destination even for the “less favored” countries with a lack of substantial financial resources, but with a strong community will to make a life better.

Technological policy as a precondition for setting up national innovation policy

Eventually, the following question might be raised: what kind of policy, financial or technological, has to be seen as underlying the innovation-led economic policy? We presume, that technological policy should dominate over financial in designing the national innovation policy. When searching for financial resources, it would be very useful to keep in mind what kind of new products or processes they would serve and what type of diffusion this “new combinations” would evolve in the economy.

Obviously, within monetary paradigm innovation policy is visualized in close cohesion with financial policy, meanwhile within “Schumpeterian” paradigm this is the technological policy which preconditions innovation policy and is embedded within it as a part.

Regarding this, it would be important to determine technological policy explicitly. Presumably, technological policy per se is composed from creation, selection, adoption and diffusion of technologies pursued by national or regional governments. In fact, technological policy should be directed on overcoming various social and economic challenges, meeting at a certain time by a society. **Thus, there is a direct linkage between technological policy and the societal challenges on which it has to respond properly.**

No doubt, every chain, composing the national technological policy plays a very significant role in the entire technological and innovation success. **Creation** of technologies requires maintaining a national capability to conduct a cutting edge R&D (basic, applied and development) and to reserve an appropriate pool of knowledge and skills. **Adoption** of technologies requires a specific skills to produce a new goods and to trade them successfully either on domestic or overseas markets. Speeding up **diffusion (or spread)** of commercially successful technologies amongst as much as many national companies provides countries or regions a higher accumulated commercial benefit and thus leads them to a more sustainable economic growth. However, we would like specifically underline **selection** of new technologies as a very crucial process in linking national R&D (science) with a commercial need (private companies), enabling to frame a stringent spectrum where new technologies are straightly directed on obtaining a high commercial outcome. In this regard, national companies, operating within peculiar market domain, seeking for a new technologies and enabling to adopt them in terms of skills and experience are the best creator of a national success. This

¹ J.Schumpeter. Theory of Economic Development.

would, in turn, enforce a concentration of the best intellectual and other resources on enhancement of the national competence within a specific market niche.

A brief summary. Technological policy, probably, would have to dominate over financial in designing a national innovation policy. Among a various dimensions of national technological policy selection is particularly important to relate an “upstream” scientific activity to a “downstream” business practice for translating a new ideas into a shining commercial starts.

National identity and innovation development

Innovation driven development is quite consistent with strengthening a national identity. Moreover, national identity would be a pillow for building a pattern for successful innovation development. It would be hard to say a words better on this matter then S.Kuzneth, outstanding American Nobel prize winner,says: “One major benefit of small size must lie in the internal unity that can be attained, and hence in the ease with which decisions basic to successful economic growth can be made”, “... among the small nations there are many in which linguistic, cultural, and other unity are at high levels, higher levels perhaps than are attainable in the large countries, in which regional diversities are inconspicuous, and in which minorities, if they exist, count for little. Under such conditions, it is relatively easy to make secular decisions- on land tenure, labour problems, control of business enterprise, taxation, and so on down the line... Obviously, community of feeling, a sense of common destiny, and subordination of individual or group interest to that of the whole, are far easier to attain in small and homogenous nations than in the larger nations with their regional, racial, and other diversities”, ...“another possible advantage of small units is the rapidity with which they can adjust to changing situations. In a sense this rapidity is related to the greater possible ease of reaching secular decisions. For slowness in adjusting may be due to the disparate effect that changes may have upon different groups within the country, and to the resistance of some to the proper adaptation to the change. A greater community of feeling thus not only helps to make the necessary decisions but also permits them to be made promptly. And since economic growth is a process of continuous adjustment to a changing technological potential and a changing constellation of national structures, the speed with which small nation may be able to make such adjustment is a great advantage”¹.

Despite the fact, that innovation economy represents a main destination for economic development of the various countries, the road still remains unknown and moving by that road is quite a challenging deal. In the whole realm of unknown, the evaluation of the best national resources and elaboration of an appropriate type of economic policy treating these resources as a core would be a precise and justifiable national agenda.

A brief summary. National identity is a grassroots and a starting point for framing a successful national innovation policy, implying concentration of the best national resources on improving positions of national society in a global economy. Homogenous countries possesses a specific advantage of “common destiny” (S.Kuzneth words) which would be very useful in creating a prospective innovation economy.

On creation of national innovation cluster

Innovation development is not a contingent act of an accidentally successful implementation of some technologies. This is a continues process of introduction a new technologies for meeting an increasing complexity in needs of societies. Innovation development represents a collective and

¹ S.Kuzneth. Six lectures on economic growth.

coordinative action of various stakeholders directed on shifting society to the other, more advanced, stage in economic and consequently political development. This is a way of escaping problems arising more constantly in an everyday life by changing the order of that life. A core in this process, which comes from the notion “innovation”, is the creation of a bunch of new technologies, or “technological cluster” construction¹.

Cluster theory would probably be under further investigation, however its significance for local development is quite evident, “clusters can develop by chance, but they can also be cultivated through the collaborative efforts of a region’s stakeholders, working together to nurture their existing assets. Experience suggests that it is possible for local communities to formulate strategies to alter their economic trajectory and improve their prospects for economic development. What is required is the presence of an “economic community” – a place with a strong, responsive relationship between the economy and community- a place that affords both firms and the community a sustained development”².

M.Porter, distinguished US economist, explains clusters as a tool for economic policy in such a way:

- a new way of thinking about an economy and organizing development efforts;
- better aligned with the nature of competition and sources of competitive advantage. Clusters capture important linkage in terms of technology, skills, information marketing and customer needs that cut across firms and industries. Such linkage are fundamental to competition and, especially, to the direction and pace of innovation;
- recasts the role of the private sector, government, trade associations and educational or research institutions;
- brings together firms of all sizes;
- creates a forum for constructive business-government dialog;
- cluster members identify common opportunities, not just common problems;
- highlights attractive public and private investment opportunities;
- provides guidance for both social and economic policies³.

A few further remarks on that matter could be also extracted from “High Technology Cluster Evolution: a Network Analyses of Canada’s Technology Triangle”⁴: “Industrial clusters are systems of interconnected firms and institutions located proximately within a geographic region” (Porter, 1998). “The emergence of industrial clusters is a manifestation of the twin processes of economic globalization and industrial localization (Enright, 1999). “Empirical studies show that clusters of high technology firms in particular have favorable longer-term economic impacts upon regional and national economies” (Ernst and Yang, 1999).

Cluster is a nation based platform for creating competitive and sustainable society. It would probably start as a government/business/university coordinative seeding initiative, but, certainly, it

¹ A cluster is a small group or bunch of something <http://en.wikipedia.org/wiki/Vocabulary>

² Biotechnology cluster strategy. Western GTA Consortium. www.utm.utoronto.ca/~w3acapln/plans/files/BioTech%20Cluster%20Strategy.pdf

³ Michael E.Porter. From Economic Development Theory to Action: The Process of Cluster Upgrading. www.cit.ms/archive/gov_conf_2001/Porter/workshop.pdf

⁴ Stephen Xingang Xu, Rod B.McNaughton. “High Technology Cluster Evolution: a Network Analyses of Canada’s Technology Triangle”. 2003. P.2-3

would gradually involve more and more companies and individuals simultaneously with the developing capabilities of a national community to create and absorb new knowledge. Cluster starts from a “bee” and evolving into a “swarm of bees”, as J.Schumpeter calls that kind of movement. Creation, selection and adoption of new technologies (as we have underlined above that are the components of national technological policy) is henceforth framed by the cluster profile which enable to properly mobilize the best intellectual resources on shifting economy to a specific competitive highs. It would start from product innovation, or commercially successful implementation of new methods in creating radically new products and then, since a new product is successfully introduced to the market, entails development of process innovation or implementation of “incremental innovations” which enables to improve its cost, design and quality.

Probably, clusters which have been originating a spread (whirl) of a knowledge-based activity throughout national society, involving companies and individuals, young and distinguished researchers from the various field of knowledge and practitioners from the various fields of operations (banks, trade and transport companies, infrastructure organizations and others) would be a step forward towards creation a specific national brand name and for positioning a nation as a distinguished game player on a competitive world market. Anyway, strategic thin tank in that direction would be very prospective even if to think about the prospective budget policy adopted by the EU, “the changing pattern of industrial specialization and location is the subject of debate about the possible re-consideration of the present EU structural policy in the new financial perspective 2007-2013”¹. It would also enforce the process of better allocation of EU funds in a new member state economies, which is also at stake, “the new member states should ensure that the driving force behind the aid strategy is efficient allocation of resources, rather than ensuring absorption of the EU funds”².

The other positive affect from developing a cluster locations in the CEE economies would be related to possible removing from the “low” advantageous in labor cost towards a “high” advantageous in knowledge and human capital, which would enable CEE countries to produce higher value added and therefore to enhance processes of convergence with the EU (15) countries.

Cluster initiative if it is emerged in CEE countries would be very consistent with the EU general strategic visions. “In recent years the Commission has acknowledged the role of clusters in a number of policy documents. In a communication “Industrial Policy in an Enlarged Europe” (EC 2002), the EC clearly states that clusters especially those formed by SMEs are one of the key determinants of competitive potential, play a vital role in industrial landscape and are responsible for knowledge creation. Commission notes that despite their regional embeddness innovative clusters are competing internationally (globally). Therefore, it perceives the development of innovative clusters as a priority for the new industrial policy of the European Community. Acknowledging the role of clusters in enforcing the innovation activity, the EC declares that within the Action Plan on Innovation a series of measures related to the development of European Research and Innovation Area would be implemented (see “Some Key Issues in Europe’s Competitiveness – Towards an Integrated Approach”). The general aim behind this measures lies in increasing the number and effectiveness of clusters in Europe. In one of them proposed actions the EC put forward the

¹ Policy implications in the area of industrial policy (a report prepared by Anna Zielinska-Glebochka in cooperation with Krystyna Gawlikowska-Hueckel, Tomasz Brodzicki, Anna Golejewska, Joanna Kuczewska). Work Package 8. policy Implications of Changes in Competitive Patterns of the Candidate Countries for the EU. Direction of policy modifications in reactions. Project title: Changes in Industrial Competitiveness as a factor of Integration: Identifying Challenges of the Enlarged Single European Market. P.6

² Ibid. P.7

identification of best practices in cluster-based policies and drafting of the quality charter for cluster”¹.

A brief summary. Clusterization of CEE economies would enable the countries to develop their competitive advantageous based on accumulation of human capital within specific market niche. Regarding a long term prospective it is also quite consistent with the general strategic vision for the EU economic development.

FDI and innovation prospective for CEE countries

FDI is probably forms an alternative way of technology based economic development for the CEE countries.

Obviously, foreign companies became a major players in the CEEC economies, directly and indirectly affecting the development of a substantial part in domestic production and trade. Several indicators would prove this general outline. The total realized FDI in 2002 in stock in the CEEC (5) has amounted 129.411 billion of euro, with a lead of Poland (45.729 billion of euro), followed by Czech republic (36.911 billion of euro) and Hungary (34.518 billion of euro) (table 1). The total amount of FDI for the CEEC 7 in 2002 has amounted 23.459 of billion euro.

The striking fact is related to the increasing proportion of FDI to GDP in all observed countries towards increasing their substantial role in national economies. The following figures for the year 2002 reveal that fact: Hungary – 55.5%, Czech Republic- 44%, Slovakia – 27.7%, Poland 21.9%².

The assessment of FDI role in national economies might be twofold: on the one hand the short term glance would reveal quite positive impact of FDI on national economies in terms of new jobs, growth of income, increasing export of commodities and increasing inflow of technologies; on the other hand the long term prospective related to FDI would be quite vague and controversial. Among a huge variety of consequences on national economies caused by FDI³ we would emphasis only those, which would affect the innovation capabilities of the observed countries, although some of the hypothesis needs a further investigations.

1. **FDI plays a very controversial role in advancing the CEEC industries.** The increasing share of FDI in the national economies of CEEC leads to loosing positions of the national champions rather than seeding up a new champions. To some extent this evidence is reflected in the remark of Gabor Hunya, who writes about FDI/national production nexus, that “in all four countries (Czech Republic, Hungary, Slovak Republic and Slovenia) it was mainly the dominance of the leading industry which diminished”⁴.
2. **In terms of innovation advancement, FDI has been prolonging a life cycle of existing technologies rather than giving rise to a new, “cutting age” technologies.** Michael Faust, Ulrich Voskamp and Volker Wittke clarifies that fact by stating, “The CEE branch of contract manufacturing was to focus on a certain stage of the value chain-manufacturing and little else- while the more demanding and sophisticated tasks- process development, “industrialization” of the product, prototyping, production planning, and ramp-up of

¹ Ibid.P.12

² Eurostat (cited in C.Perugini, F.Pompei, M.Signorelli. FDI, R&D and Human Capital in the Central and Eastern European Countries. EACES Working papers. No 6.December 2005.)

³ More in detail in the book “The Emerging Industrial Structure of the Wider Europe”. London.2004.

⁴ Gabor Hunya. Foreign direct investment in CEEC manufacturing. In “ Structural development in Central and Eastern Europe. WIIW. 2000. P.169.

production – would stay in the Western branch of those cross-border chain of activities, close to the customer and leaning on the highly sophisticated skill base and innovative resources of western locations. Concerning the product segment the Eastern locations would specialize in high volume/low mix manufacturing of mature products of limited complexity, while the low to medium volume/high mix production of complex, innovative and customized products would remain in Western locations”¹. The role of followers spontaneously accepted by the CEEC in a technological race is also a way towards increasing **divergence rather than convergence** within enlarged Europe.

3. **Most probably, the CEEC pattern of economic development affected by FDI would be hardly identified as a catching up.** Catching up pattern of economic development rests on imitation (selection, adoption and diffusion) of “state of the art technologies” for the purposes of overcoming a specific economic “bottlenecks”, which “imitating” countries meet while striving to reduce a gap with the more developed countries. Rapid growth of commercial benefits enable imitating countries to cover their import needs (or to pay an external debt) while fostering an improvement in national technological capabilities (which subsequently leads to a development of an applied knowledge and a certain fields in higher education). Catching up countries are usually focus their national policy on developing their indigenous capabilities therefore preferring a method of “analytical design” (screening and remodeling of some western made equipment) and exploiting their national advantageous in scale and cost for large scale production of that “copies”, meanwhile neglecting the welcoming of foreign invested enterprises (FIE). Strategic goal for catching up countries is to sustain an economic independence by creating a national technological chain (cluster) simultaneously improving technological absorptive capacity needed to adopt more sophisticated technologies. Thus it would be quite questionable whether FDI - related path of economic development of CEEC countries would be identified as catching up growth. Michael Faust, Ulrich Voskamp and Volker Wittke are quite explicit on this matter, “In some cases Western firms use their own or majority controlled CEE locations as a base for conquering CEE markets with special labels. In these cases functions and occupational groups will be affected by relocation which in the notion of complementary specialization would have been expected to remain in Western locations. On the other hand Western companies hesitate to upgrade CEE partners to a degree which could make them competitors or enable them to use their newly acquired capabilities to offer extended services for other Western customers, while the ability of the local firms to develop as full package suppliers or even as branded firms addressing Western markets on their own seem to be rather restricted².” “Regarding the backward supply chain, the heavy use of OPT³ (indicates that raw materials from the textile industry still come to a high degree from of Fabrics and often trimming and having control over the backward value chain. This means both that most CEE subcontractors are restricted to manufacturing activities and show a rather narrow functional spectrum, and that CEE is lacking a wider textile supply base regarding the materials that are obligatory for apparel products to be sold on Western markets”⁴. Relying on these facts it

¹ Michael Faust, Ulrich Voskamp and Volker Wittke. Globalization and the Future of National Systems: Exploring Patterns of Industrial Reorganization and Relocation in an Enlarged Europe”. P.62-63.

² Michael Faust, Ulrich Voskamp and Volker Wittke. Globalization and the Future of National Systems: Exploring Patterns of Industrial Reorganization and Relocation in an Enlarged Europe”. P.68

³ Outward Processing Trade (OPT)

⁴ Ibid. P.69.

would be hardly seen any sign from the foreign invested enterprises towards construction a preconditions for the further take off of the CEE countries to innovation led economy.

4. **Increasing technological dependence on foreign companies, reflected in technology trade balance, diminishes a space for prospective development of national technological capabilities of the CEE countries.**
5. **Foreign companies are mostly exploiting spatial proximity to the west European markets and an existing labor wage/cost advantageous provided by CEE countries when launching their business in that region.** This labor intensive specialization would lead to an emergence of quite unfavorable conditions for the future development of CEE countries. To preserve a cost comparative advantageous FIEs would probably be inclined to restrict a wage limit in these countries, which would, in turn, make a social conditions in these countries worse. If wage restrictions is problematic to set up by some reasons, FIEs are free in shifting their capital to the other destination with the better “wage” conditions, like Ukraine, China and other countries, which already happens. Michael Faust, Ulrich Voskamp and Volker Wittke, observing the apparel industry write, “the center of subcontracting within CEE shifted eastwards during the 1990s, following wage-cost differentials, from the early favorites like Poland to Romania. More recently locations even further East are selected, e.g. Ukraina...”¹. China represents a specific caution, “China is perceived as becoming the global low-wage manufacturing base for electronics – not only serving Asian but European countries as well”². “The window of opportunity is smaller and more likely to be closed faster given the new WTO agreements and the advantageous of China as both an extreme low-cost region and a extraordinarily promising market”³.

Evidently, the flexibility of FDI and inability to control their movement by recipient countries has been substantially increasing vulnerability and uncertainly for CEEC. Moreover, “some authors raise doubts that positive effects of FDI suggested by the theory will materialize in Central and East European countries (CEECs). This may be result of: a conflict between motives of investors and expectations of host countries; replacement rather than expansionary FDI, transfer of low-end value-added stages, limited spillovers from FDI to domestic firms”⁴.

Most probably, a new pattern, adopted by these countries as technological followers dependent from FDI has been depleting the old industrial structure meanwhile squeezing a polygon for creating and testing new technologies for a new technological, industrial and innovative start up. Uncertainty about the future industrial development of CEE countries is also troubling the countries of FDI origins, “what we see clearly is that certainty on the East-West division of labour is fading away. The strategic leeway regarding how to develop and how to use Eastern locations is broader than expected; the grey area of what can be done there as well here is also broader than expected”⁵.

Even from the FDI prospective operations in the CEE countries the later need to upgrade their post soviet pattern of economic development but in a way of increasing their own industrial capabilities, “viewed from the perspective of West European locations, further upgrading of CEE locations would inevitably change the pattern of specialization based on continuing wage-cost advantage compared to the West. CEE locations would then compete with a wider range of tasks and functions at Western locations, and eventually CEE companies could even become competitors for West European companies, at least in some industries and markets”⁶.

¹ Ibid. P.66.

² Ibid. P.64.

³ Ibid. P.71.

⁴ Ibid. P.16

⁵ Ibid. P.65

⁶ Ibid.P.73.

A brief summary.

Foreign Invested Enterprises plays a dominant role in pushing contemporary technological drive in CEE countries, however, it would diminish a space for elaborating a prospective national path of innovation driven development.

Catching up and forging ahead through building a national innovation cluster

Our hypothesis which might be further tested regards a nation based technological cluster as a vivid alternative to the FDI related technological path of development and a decent response on any skeptical perceptions over CEE nations capabilities to gain a prominent role in promotion the EU innovation performance.

Cluster is a national based platform to bring together the best national intellectual resources from the various kind of activities (government, business, science&education) to decide what the national competence should be and how to get the excellence in that specific type of competence by mobilizing the best think tankers and practitioners. Some of the “blind spot” is to be filled out during a further face-to-face cooperation with specialists in a various related fields of knowledge Step by step, incrementally increasing capabilities, overcoming shortcomings and extending a market share. The technological core for starting this spiral alike movement is extremely important. False start would cause a tremendous economic problems for catching up society and, quite contrary, right start would yield a fascinating results.

Framing a national technological cluster is an extremely challenging and specific task which would be resolved within cooperation of many different specialists. It would be hard to pretend on any “scientific approach” prior. Therefore, in our paper “biotechnological cluster” is just a vague hypothesis.

Biotechnology: case study

Most prominent researchers consider a biotechnological production together with information technologies (IT) as the leaders in the technological drive of 21 century.

At a first glance the development of biotech production has a very good perspective in CEE countries by several reasons:

- comparative advantageous of these countries in biodiversity;
- high qualified specialists and R&D capabilities in the related fields of knowledge;
- advantageous in relatively low cost of biotechnological production in combination with a special market perspective for the new products (for creation of a new market niche);
- relatively low dependence on financial resources (biotechnological production usually depends on universities facilities to conduct a cutting age research, therefore it is usually located close to the leading universities);
- diversification of traditional bio production by moving from the low value added chain towards a higher value added chain rested on a technological variety of production, which, in turn, makes the economy more sustainable/less vulnerable and squeeze a space for competition with the other European rivalries;
- by-product positive effects related to biotech production, namely wasteless of resources and a high ecological quality of production.

What might be a “comparative advantageous” of CEE countries specifically in biotech production?

Human capital (innovation capabilities) in general¹

Human capital is usually performed by the universities and research laboratories.

Hungary has 4 universities, 14 specialized universities and 36 institutes. Hungary has a network of 52 research institutes of the Academy of Sciences, which support basic research. Priorities in scientific research include basic research in material science, biological basic research and biotechnology, computerization, telecommunications, automation facilities, information systems, and research on environment protection.

The Czech Republic has a well-developed university system, including Charles University in Prague (1348), the oldest university in Central Europe, as well as the Czech University of Technology (1717), the first school of engineering in Central Europe. The Czech Academy of Sciences and Arts (founded in 1888) managed basic research until 1992 when it was reformed and the Czech Grant Agency was established.

Slovakia's Comenius University was established in 1919. The main focus of the university is on engineering. Over 40 percent of the university degree are in fields of engineering.

In the past 50 years, **Polish** universities developed a strong concentration in the natural sciences and engineering, following the Russian model. The S&T policy of the Polish government is to stimulate science areas that will benefit the country's economy. Those areas include expansion of electronics in the national economy, automation and robotics for manufacturing processes, nuclear energetics and technology, new materials, biotechnology, food management, and environmental protection. Poland's S&T policy is to strengthen support of small innovative enterprises, which supply pharmaceuticals, electronic medical equipment, new materials, and other modern products.

In Bulgaria the field of natural sciences and engineering were given the highest priority. University enrollments increased even more sharply in post-totalitarian Bulgaria in the 1990s. In 1992, 20.2 percent of the college-age cohort received a university degree; 7.6 percent in fields of natural sciences or engineering.

Romanian universities were also greatly influenced by the former USSR, and most higher education degrees were given in technical fields.²

Human capital and R&D capacities specifically in bio production³

Central and East European countries are becoming hot-spots for pharmaceutical research. Countries such as Czech Republic and Hungary have many universities and research institutes focusing on life sciences. The pharmaceutical R&D structure in the CEE is likely to improve in the coming years mainly because of the low cost manufacturing in those countries. CEE countries boast qualified medical practitioners who are willing to conduct clinical studies. Patient recruitment for clinical trials is yet another positive factor for the CEE countries. As the clinical trial results comply with the EU regulations, more pharmaceutical companies are now focusing on conducting research in the CEE countries. The quantity of research that was conducted in these countries has increased dramatically and currently Poland, Hungary and Czech Republic host around 950 studies altogether on an annual basis.

¹ Probably, this data has to be updated.

² This observation is taken from "Human Resources for Science&Technology: The European Region". <http://www.nsf.gov/statistics/nsf96316/central.htm>

³ Sylvia Miriyam. Central and Eastern Europe Pharmaceutical Industry – an Overview. http://pharmalicensing.com/articles/disp/1169475631_45b4c82f37694

However, for the purposes of building the biotechnological cluster the quality indicators would be more relevant than the quantity indicators. In other words, to know about specialization in bio and related fields of science, to have a list of the leading research laboratories and leading researchers with their prospective research projects, to know about innovative companies in biotech production and to accumulate the other quality data would be more useful for supporting the perspective national research profile, to make a perception towards “sunrise industries” (targeting industries, as they are called in the US) and business climate, to shape a future cooperation with the various foundations (including EU) and with the other sponsorship organization and to clarify a specific mission for any certain CEE country within enlarging Europe.

A brief summary

Biotech production would be very perspective way to concentrate the best intellectual resources of CEE countries. But processes of practical decision making need to undertake a further deliberate examination of natural resources, intellectual capital, R&D facilities, markets facilities and many other dimensions, embracing the biotech production.

Summary

Innovations is a path to unknown, this is a leapfrog from the everyday routine of the life to the invigorating innovative future. Going through this path became inevitable when the current order of things is no longer fulfill the expectations of societies and it wouldn't serve well as a frame for responding on a contemporary challenges. Most probably, the centripetal movement among the European countries, building a common economic and political space, would be substantially enforced by rethinking and revising a role and mission of the every national society, no matter how long its memberships lasts. Anyway, since there is no appropriate theory of innovation and regional development as well as theoretical foundation to understand and foster the cross-countries integration processes, probably it has to be actions, which would primarily constitute a better response on extremely strong contemporary challenges. In this regard, think tanking over creation of biotech clusters in the CEE countries, undertaken together with elaboration of theoretical frame would be probably significant endowment of these countries into fostering the EU shift towards innovation economy.