Work in progress

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Development of Innovation Policy in Central and Eastern Europe: A Research Framework

Central and Eastern European countries (CEECs) in the twentieth-century have been described as "unsuccessful peripheries, which were humiliated by economic backwardness and the increasing gap which separated them from the advanced Western core"[1]. It is argued that the analogy of "periphery" being dependent on the economy of "core" is still relevant today to describe relationship between CEECs and the old European Union (EU) countries[2]. However, today there are several new characteristics in the efforts of CEECs to catch up: the opportunities provided by IT revolution; new patterns and modes of catching-up dominated by networks and alliances; as well as the accession of the CEECs to the EU which could act as an inducement of development and under appropriate conditions could enable catching up. One of crucial elements in catching up is national system of innovation.

Although many authors emphasise importance of research, technological development and innovation (RTDI) policy for long-term economic development and progression towards knowledge-based economy in CEECs, doubts have been expressed whether policies designed and implemented in the region so far address the real needs and bottlenecks in these small and "catching-up" countries[3].

In the RTDI literature several types of policy are identified: policy can be either more science or technology or innovation oriented; it can be mission oriented or diffusion oriented; it can be either laissez-fair or systematic innovation policy; it can also be more oriented towards large companies or small and medium-sized enterprises (SMEs) or towards high-tech or low and medium-tech sectors. In the case of small and "catching up" countries it is argued that more suitable would be diffusion-oriented RTDI policy which aims at building innovation capabilities in SMEs in a wide range of sectors including low and medium-tech sectors rather than narrowly defined science-based policy, which only address the needs of large companies in high-tech sectors[4]. The type of innovation policy chosen by particular country may depend either on rational analysis of economic structure and development needs of national economy or on path-dependencies, vested interests and misconceptions and popular myths of innovations, e.g., when poor country chooses high-tech oriented innovation policy.

In recent years in CEE, it is possible to observe expansion of RTDI policy not only in terms of political attention devoted to this issue but even more importantly – in terms of budgetary allocations and new policy instruments. However, emerging RTDI policy in CEE has been criticized for being dominated by 'high-technology bias' (prioritising ICT, biotechnology and nano-technologies), focused on strengthening science base and large companies leaving untouched majority of firms in their economies[5]. Such policies in economically less developed new Member States might lead to creation of 'islands of excellence' or 'cathedrals in the desert' with little relevance for overall socio-economic development of these countries. Thus,

considerable resources can be spent on innovation policy providing little or no contribution to declared objective of facilitating catching-up of national economy.

However, existing literature also suggests that there might be differences in types of national RTDI policies developed in Central and Eastern European countries, e.g. Radosevic and Reid (2006) suggest that in Estonia RTDI policy is more enterprise oriented while in Latvia there has been very few public support in favour of business innovation. The aim of the Thesis is to study systematically what kind of RTDI policy has emerged in CEECs; what is the balance between support (including financial support) for science-based vs. business-oriented; high-tech vs. low and medium-tech oriented and large companies vs. SMEs oriented RTDI policy; and why certain type of policy and resource-allocation is emerging. On the basis of existing literature several factors explaining type of policy and resource allocation can be assumed: legacies of historical development of national innovation systems (pre-existing institutions) and their transformation during 1990s; dominant policy paradigms among national political elites as well as type of domestic constituency in favour of certain type of RTDI policy[6]. Moreover, there are commonalities as well as differences among CEECs in a way their RTDI policies have developed. As major commonalities one can name their heritage of socialist innovation systems and their reforms during 1990s as well as the influence of the EU more recently (the increase in national R&D funding is largely due to the EU Lisbon strategy and its "3% objective", i.e. R&D funding by 2010 has to reach 3% of GDP). However, there are also important differences in their socialist heritages and reforms as well as development paths chosen by national political elites and national interest constellations. Although several countries increase their R&D funding due to the influence of EU level processes, it will depend on choices of national policy-makers and interest constellations at national level, which groups would benefit from this increased funding. Thus, different types of RTDI policies are emerging in CEECs.

The aim of this paper is to set out research framework for analysis of RTDI policy. Firstly, the evolution of the concept of innovation will be briefly discussed. Secondly, rationales for government intervention will be analysed. Thirdly, evolving understanding of innovation process and its implications for of RTDI policy will be studied. Finally, emergence of innovation policy in CEECs will be discussed. Although there commonalities as well as differences among innovation policies in CEECs, this paper will discuss common features of initial innovation policies, while detailed analysis of differences will be provided later on within this research project.

Development of the concept of innovation

Schumpeter who is sometimes called 'prophet of innovation'[7] argued that process of innovation in its broadest sense is a driving force of capitalism stating that "the fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates"[8]. Thus, Schumpeter understood innovation in a rather broad manner including not only new goods and new methods of production but also new methods of transportation, new markets and new forms of industrial organization.

However, a conventional understanding of innovation for a long time has been rather narrow concentrating on technological product and process innovation. During the

last decades understanding of innovation has broadened. One can follow this development of the concept of innovation by looking at one of the most authoritative sources on innovation issues – the Oslo Manual which so far has experienced three editions (1992, 1997 and 2005) each of them being based on the theoretical thinking on innovation of the respective period[9]. The first edition of the Oslo Manual in 1992 focused on technological product and process innovation in manufacturing, while the second edition in 1997 expanded its coverage to service sectors. The most recent third edition published in 2005 addresses two types of non-technological innovation: marketing and organizational innovation. Thus, according to the most recent version of the Manual innovation is defined as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations"[10]. It is important to add that according to the Manual "the minimum requirement for an innovation is that the product, process, marketing method or organisational method must be new (or significantly improved) to the firm. This includes products, processes and methods that firms are the first to develop and those that have been adopted from other firms or organisations"[11]. This definition ignores distinction, which is sometimes made between 'innovation' and 'imitation', whereas later applies to introduction of innovation in a new context. However, application in a new context often implies considerable adaptation, therefore, can also be considered innovation[12].

An important distinction is made between 'invention' and 'innovation', where former is the first occurrence of an idea for new product or process, while later is the first attempt to carry it out into practice[13]. However, as working out ideas and implementing them might be resource (financial, human, technological) intensive there might be considerable time lags between inventions and innovations. Another important distinction is between 'radical' and 'incremental' innovation based on assessment how radical innovation is compared to current technology[14]. While both radical and incremental innovation can be found in high-technology sectors, innovation in low- and medium as well as service sectors can be more characterised by incremental changes[15].

A lot of attention has been paid not only to defining and identifying innovation but also to exploring ways to measure and compare innovativeness of different countries. As innovation is a complex phenomenon there is no one indicator to measure it. Therefore, summary innovation indexes have been developed consisting of many indicators. One of often cited assessments of innovation performance is the European Innovation Scoreboard (EIS). In its seventh edition, innovation performance of 37 countries including EU member states, neighbouring countries and global competitors such as the US and Japan is assessed on the basis of 25 indicators, which are grouped in five categories: innovation drivers, knowledge creation, innovation and entrepreneurship, applications and intellectual property[16]. Innovation input dimension is measured by indicators on innovation drivers (science and engineering graduates; population with tertiary education; broadband penetration rate, etc.); knowledge creation (public and private R&D expenditures; share of medium-high-tech and high-tech R&D as well as share of enterprises receiving public funding for innovation); and innovation and entrepreneurship (SMEs innovating in-house; innovative SMEs co-operating with others; innovation and ICT expenditures, etc.), while innovation output dimension is measured by indicators on applications (employment in high-tech

services; exports of high technology products, etc.) and intellectual property (patents, trademarks and designs).

Rationales for policy intervention

What is the role of government in innovation process? Edquist (2001) emphasizes that the market mechanism and capitalist firms best fulfil most economic functions in a modern society[17]. However, he adds that sometimes there are reasons to complement or correct (but not replace or duplicate) the market and capitalist firms through public intervention. As regards technical change and innovation, Edquist points to two conditions for public intervention in a market economy. Firstly, the market mechanism and capitalist actors must fail to achieve the objectives formulated; a *problem* must exist, which is not automatically solved by market forces and capitalist actors. Secondly, the state (national, regional, local) and its public agencies must also have the *ability* to solve or mitigate the problem. If the public sector does not have the ability to solve or mitigate a problem, there should be no intervention, since the result would be a government failure. Edquist reminds that issue of what should be performed by the state or public sector and what should not is not subject to ideological judgements, but could and should be discussed in an analytical way.

Thus, various barriers, problems and 'failures' are rationales for innovation policy. Typical barriers to innovation and new technology faced by firms include: "high technical risk associated with the underlying R&D; high capital costs to undertake the underlying R&D; long time to complete the R&D and commercialise the resulting technology; underlying R&D spills over to multiple markets and is not appropriable; market success of the technology depends on technologies in different industries; property rights cannot be assigned to the underlying R&D; resulting technology must be compatible and interoperable with other technologies; and high risk of opportunistic behaviour when sharing information about the technology"[18].

Keith Smith mentions four types of 'failures': failures in infrastructure provision and investment; transition failures; lock-in failures and institutional failures[19]. Firstly, failures in infrastructure provision and investment arise when there is problematic under-investment in two types of infrastructure with which firms interact, namely, physical infrastructure (like communications and transport), and science-technology infrastructure (like universities, regulatory agencies, publicly supported laboratories). Public action should be directed towards setting up incentives for and controls on private provision, subsidies for private provision or direct public provision. Secondly, it is possible to talk about transition failures when firms are highly competent within their own technological area but not in other related areas. Public action generally aims to solve this problem implicitly and devise special measures for this type of failure. Thirdly, lock-in failures are situations when firms are not able to switch away from their existing technologies and get 'locked-in' to a particular technological paradigm or trajectory. The rationale for public action is to generate incentives, develop technological alternatives and nurture emerging technological systems in order to make it easier for firms to move away from lock-ins. Finally, institutional failures are present when the institutional and regulatory context is having an unexpected and negative impact on innovation in the system. Public action here should concentrate on monitoring and assessing regulatory performance.

Another typology of failures has been developed by Dodgson and Bessant (1996), who identify various failures in technology transfer as an absence of certain capabilities at firm level[20]. They have identified following technology transfer problems:

- Inappropriate choice of technology. In this case firm lacks adequate capabilities in searching, selecting negotiating;
- Acquisition of technology hardware but inability to implement this successfully – lack of skills, supporting know-how, etc. Firms are missing capabilities in negotiating, implementing, integrating;
- Entry into a joint venture but no long-term learning or absorption of technology or development of competence. Learning and integrating capabilities are absent;
- Acquisition of inappropriate technology – lack of fit with existing operations or technology base. Aligning capability is missing;
- Acquisition of technology with no or little impact on competitive performance. In this case firms lack capabilities of aligning and combining;
- Unforeseen problems in using and deploying technologies acquired from outside. Selecting and implementing capabilities have to be developed.
- Late or non-adoption of critical technologies points to missing capabilities in searching and selecting.

To sum up, various problems and failures in innovation process create a need for government intervention in the forms of funding, infrastructure, regulation, etc.

Importance of innovation policy today has been widely recognised. Some authors even argue that innovation policy is one of the last resorts of active national economic policy[21]. It has been emphasised that innovation policy is now more important than before because globalisation and liberalisation of financial markets has drastically limited the autonomy of general economic policies like budgetary and monetary policy[22]. According to Lundvall and Borras, the loss in autonomy in trade, monetary and finance policy gives a more important role to labour market policy, social policy, education policy and, not least, innovation policy, as essential factors for guaranteeing sustainable economic growth under these new conditions. In this situation, "the increased importance of innovation reflects the fact that it represents a major response to intensifying competition by enhancing the learning abilities of firms and workers. Neither firms nor regions can establish sustainable growth without innovation and learning"[23].

Innovation policy: changing theoretical assumptions and their practical implications

Design of innovation policy has to a large extent been influenced by changing theoretical assumptions about the nature of innovation process. Two main understandings of innovation process can be distinguished – old linear model of innovation and more contemporary non-linear (chain-link, networked, interactive, systemic) model of innovation. According to the old model innovation process was generally perceived as a linear progression from scientific discovery, through technological development in firms, to the marketplace. This concept of innovation assumed that "more R&D in" resulted in "more successful new products out". Little attention was paid to the transformation process itself or to the role of the marketplace in the process[24].

According to non-linear model, innovation is a process of know-how accumulation, or learning process, involving elements of internal and external learning. Internal learning involves learning by developing, testing, making, failing, using in vertically integrated companies as well as cross-project learning. External or joint internal/external learning involves learning from the literature, competitors' actions, acquisitions or new personal and learning from/with suppliers, lead users, the S&T infrastructure as well as learning through horizontal partnerships, reverse engineering, customer-based prototype trials, servicing/fault finding[25]. Today many new concepts are developed – 'user driven innovation', 'consumer driven innovation', 'citizen driven innovation' and 'society driven innovation' – which emphasise importance of different groups in defining needs taken into account in innovation process[26]. Together with increased importance of external relations of firms and exchange of knowledge the role of social or network capital emphasising importance of trust, values and norms in productive cooperation between different groups in innovation process is recognised[27]. Significant role of social capital and trust played in innovation process suggest that policies aimed at building innovation networks and collaborations are important to facilitate innovative capacities of companies[28].

Important role in contemporary non-linear understanding of innovation process is played by concept of 'system of innovation', which emphasises complex interaction between institutions and economic structure promoting innovation. System of innovation is constituted by "elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge and that national system encompasses elements and relationships, either located within or rooted inside the borders of a nation state"[29].

Changing understanding of innovation process has also changed understanding of appropriate innovation policy design. Linear model of innovation implied that one of main tasks of public policy is to support basic science. Traditionally, report by Vannevar Bush (1945) has been seen as one of classical statements in favour of policy thinking based on linear model. In his report, Bush stated that "the simplest and most effective way in which the Government can strengthen industrial research is to support basic research and to develop scientific talent"[30]. This type of policy thinking is characteristic to traditional science and technology policies, whereas 'science' policy is concerned with the development of science and the training of scientists, and 'technology' policy has as its aims the support, enhancement and development of technology, often with a military and environmental protection focus[31].

In the mid- and late-1990s in most Western European countries new theoretical ideas about non-linear process of innovation led to emergence of innovation policy[32]. In general, innovation policies are aimed at improving the capacity to innovate of firms, networks, industries and entire economies. According to Dodgson and Bessant (1996), innovation policy's principal aim is to facilitate flows of technology and information between multiple actors, including firms of all sizes and public and private research institutes. Innovation policy includes elements of regional policy, infrastructure policy, educational policy, etc. The main objectives of innovation policy are economic growth and international competitiveness. However, more often other objectives such as social cohesion, equality, environment protection and health are also mentioned[33].

Typical tools of public policy to support innovation involve direct financial support: grants, subsidies, loans, provision of equipment or services, loan guarantees; indirect financial support: schemes encouraging investment in innovation, venture capital; information: information networks, advisory centres, consultancy services, specialist libraries, databases, liaison offices; scientific and technical infrastructure: public research laboratories, research associations, learned societies, research grants; educational infrastructure: general education system, universities and polytechnics, technical education system, apprenticeship schemes, retraining system; public procurement: central and local government purchasing and contracts, R&D contracts, etc. Innovation process can also be supported with such instruments as taxation, regulations (e.g., patents, environmental control), public enterprise (e.g., innovation in public-owned industries), political (planning, regional policies, honours and awards for innovation, encouragement of mergers or joint ventures), public services (e.g., innovation in public services such as telecommunications, transport, health care) and trade (trade agreements, tariffs, currency regulations)[34].

According to non-linear understanding, innovation process is based on complex causal relationships. Therefore, it is particular challenge for policy-makers to design appropriate tools to facilitate innovation process. Typical failure factors in innovation policy are related to simplistic assumptions about the way in which technology is transferred; inability to think of innovation as systemic process; limited scope in methods, high levels of centralization, management by a singe agency; lack of attention to sector, region or firm specific variation in needs; lack of mechanisms for reviewing and modifying policies within the period of operation, etc. Successful innovation policy would involve clear understanding of the process – beyond the linear model, formal evaluation against a wide range of performance criteria; international exchange of experience, etc[35].

However, it has to be mentioned that shift towards innovation policy paradigm does not mean abolishment of previous science and technology policy but rather a broader approach to innovation issues. Borras (2003) notes that there is a cumulative process, since the new policy paradigm encompasses previous ones. That is, innovation policy encapsulates the objectives and instruments of both science and technology policies[36]. Today in different countries and organisations we can find these policies under different names – science and technology (S&T), research and technological development (RTD) and innovation policies. Although S&T, RTD and innovation policies are complementary and closely connected in practice they are often separated by organizational lines (sectoral ministries) without necessary coordination.

It has to be emphasised that there is no one ideal-type innovation policy, which is appropriate for all countries. What kind of innovation policy is appropriate will depend on the size of the country, its sectoral structure, political preferences and developmental needs. Even advanced Western countries have chosen different types of innovation policies. E.g., it is sometimes distinguished between ‘laissez faire’ and ‘systemic’ versions of innovation policy, where former promotes relevant framework conditions for innovation – supporting basic research and general education and protecting intellectual property - while the former latter actively promotes linkages between the different elements in the innovation system[37].

Another distinction is made by Ergas (1987) between 'mission oriented' and 'diffusion oriented' policies[38]. He defines policies in the US, the UK and France as 'mission oriented' as they focuses on radical innovation and science and are linked to the way these countries are searching for international strategic leadership. Policies found in Germany, Switzerland and Sweden are primarily 'diffusion oriented' with their focus on incremental adaptation and principal purpose to diffuse broadly based technological capabilities throughout the industrial structure. Important elements of 'diffusion oriented' policies are investments in human resources (e.g., vocational education), co-operative research, the system of industrial standardisation, which places an ongoing pressure on firms to upgrade their products, etc. According to Ergas, 'diffusion oriented policies are characteristic of "open economies where small and medium-sized manufacturing enterprises remain an important economic and political force; and where state, bearing the interests of these firms in mind, aims at facilitating change rather than directing it"[39].

Moreover, for many decades there has been bias in public policy towards large firms or so-called "national champions" as the main producers of new technologies. However, this has changed as small and medium-sized enterprises (SMEs) have become successful in such high-technology fields as biotechnology and genomics, software, advanced instrumentation, etc[40]. Today as more attention is paid to innovation in service and low and medium-tech sectors importance SMEs in innovation policy increases.

Although traditionally innovation studies have mainly focused on advanced Western countries, gradually more attention have been paid also to innovation process in developing, transitional and catching-up countries recognising that innovation process, needs and policies in these countries differs from developed countries[41]. E.g., Lundvall and Borras (2005) argue that "in big high-income countries focus will be on establishing a capacity in *producing* the most recent science-based technologies, as well as applying these innovation. In smaller countries it might be a question about being able to absorb and use these technologies as they come on the market. Catching-up countries may make efforts to enter into specific promising established industries using new technologies in the process of doing so"[42]. Lundvall (2002) has also given a warning against glamorous innovation policy in small and less-developed countries[43].

Also in the third and most recent edition of OECD Oslo Manual a special section has been added on innovation is non-OECD countries arguing that in these countries more important role in innovation process than in advanced economies is played by dissemination mechanisms and acquisition of equipment as well as incremental and organisational changes[44]. In developing countries innovation landscape can be characterised by such factors as "macroeconomic uncertainty; instability; physical infrastructure (lack of basic services such as electricity or "old" communications technologies); institutional fragility; lack of social awareness about innovation; risk-averse nature of enterprises; lack of entrepreneurs; existence of barriers to business start-up; lack of public policy instruments for business support and management training"[45]. Some of these factors are relevant also for transitional and catching-up economies.

Inertia in favour of 'narrow' innovation policy

However, in practice broader approach based on non-linear understanding of innovation policy has not always been implemented, and certain inertia exists in favour of narrow approach based on linear understanding. There are various reasons for this inertia in policy-making. Lundvall and Borras (1997) present two reasons. Firstly, the most of the economists now working in Ministries of Finance were trained in a version of neo-classical economics that systematically misspecified the role of technology in their models. Secondly, the old dominance of neo-classical economics has a negative impact upon the policy debate through its lasting imprint on terminology and conceptual frameworks. Concepts such as market failure, externalities and spill-overs tend to focus the attention on just one side of the learning economy and hamper the understanding of the new economy where networking, interactive learning and communication are absolutely central[46].

Banchoff (2002) emphasizes another important reason for inertia in research policy, namely, the force of institutional legacies. According to him, old research policies generated clienteles attached to the status quo because research funding have spawned powerful policy networks of firms, universities and public laboratories relying on public funding. These networks have established links to civil servants and politicians creating powerful political coalition opposed to shifting research policy off its established path. These institutional legacies undercut efforts to change the policies[47]. Thus, there are strong vested interests in favour of old linear model, which are lobbying for narrow policies favouring science and technology.

Sanz Menendez and Borras (2000) indicate one more obstacle to innovation policy reforms. They remind that conditions of policy innovation usually emerge when there is a persistent perception of "failure" of the previous policy. However, in areas like RTD policy, detecting the effects of the previous policies could take many years. Thus, the pressure for change in innovation policy emerging from analytical point of views need to be complemented with the construction of new coalitions that could change the balance of existing vested interest[48].

To sum up, although a strong theoretical basis exists in favour of non-linear innovation, in practical policy-making from time to time old-linear model still shows up favouring narrow approach to innovation policy. Thus, innovation policy in practice often is not decided only on analytical basis but also is influenced by ideological assumptions and vested interests.

Emergence of innovation policy in Central and Eastern Europe

Although CEECs have experienced high growth rates during the last eighteen years, this growth has been led by, first, a consumption goods based on purchase or copying of western goods, and, second, resource depletion[49]. During the transition period in 1990s innovation policy was largely neglected in CEECs. There were several reasons for this negligence: priority was assigned to macroeconomic reforms (privatisation, liberalization and de-regulation), political agenda was overloaded with short-term problems and ideologically extreme market approach dominated assuming that most if not all problems would be solved by free market. Since the late 1990s, importance of innovation policy increased. Policy-makers have learned that free market also has its shortcomings and failures. Moreover, innovation policy has increasingly been seen as a tool for catching up and building knowledge based economy. EU enlargement has

also been mentioned as one of reasons influencing shift towards more proactive innovation policies[50].

It has to be mentioned that innovation policy is a rather new policy field in CEECs, which emerged in the second half of the1990s. Previously, CEECs had only science and technology policies, which underwent considerable transformations in the early 1990s, which included dramatic cuts in funding, organisational reorganisations, etc.

Design of initial innovation policy in new member states has been strongly influenced by tension between narrow and broad approach to innovation policy. Preliminary evidence suggests that strong elements of narrow approach to innovation policy exist, which favour linear model of innovation. Radosevic and Reid (2006) argue that innovation policy in CEEC is dominated by high-tech bias, which ignores the reality of the need to promote the diffusion of technologies throughout of economy. Most national strategies in CEE cite biotechnology, materials technology and ICT as 'national strengths'. Policy makers in the CEECs would often declare that their country's research and technological development (RTD) priorities are EU priorities, which effectively means carbon copying of EU RTD Framework Programme priority areas. Such approach implies focus of innovation policy on small number of large companies but leaves majority of firms (mostly SMEs) untouched by innovation policy[51].

The main reasons, which support narrow approach to innovation policy, are, firstly, strong institutional legacies in favour of linear model of innovation, and, secondly, lack of understanding of innovation process among policy-makers, which leads to mechanical transfer of some elements of innovation policy from more developed Western countries.

In CEE, there are strong legacies of socialist Science and Technology Systems, which strongly emphasised basic science and where science was largely separated from production process[52]. Comparing adoption of new innovation policy ideas in Western and Eastern European countries, Biegelbauer and Borras (2003) admit that Central European countries (Slovenia and Hungary) have felt the least impact of the new innovation policy ideas. According to them, for both Hungary and Slovenia an important reason for the hesitant adoption of the new innovation policies seems to be the small interest available on the side of the policy-makers and the political elite at large about the ventures of RTD – despite the number of discussions and documents of the first half of the 1990s, which seemed to show an impact of the discussions led in Western European countries about the innovation paradigm. Most political elites did not see the innovation policy paradigm as a politically viable way to 'modernize' their countries. However, the another reason for the two countries' policy evolution seems to lie in the general inertia and vested interests of the existing and well-established institutions which tried to block policy changes in fear of losing (even more) resources[53].

Acha and Balazs (1999) argue that the socialist model of innovation is still shaping innovation policies in the CEE and is evident in the way that policy makers conceptualise innovation, i.e., in policy design, language, measurement and institutional design. They outline three reasons for the persistence of the socialist model based on linear understanding of innovation: (1) the model is embedded in

these societies; (2) the policy tools and targets associated with model remain unchallenged; and (3) vested interests amongst policy makers and researchers encourage a continuation in policy focus. Acha and Balazs argue that the persistence of socialist model of innovation may harm the long-term economic performance of the CEE. Moreover, according to them current innovation policies based on this model in CEE are yielding limited benefits[54].

Another problem in the new EU member states is the attempts to copy mechanically some elements of innovation policy from more developed Western European countries. Mechanical copying can be explained by lack of understanding of innovation process among policy-makers. In such a situation popular stereotypes of innovation and knowledge-based economy, e.g., high-tech, Silicon Valley, prestige, dominates over in-depth analysis of innovation needs in a specific socio-economic context. Havas (2006) emphasizes that impacts of the high-tech myth are more severe in Central Europe than in Western Europe because high-tech myth diverts policy-makers' attention from tackling the catching up challenge by assisting firms in developing their innovation capacities, and, in turn, their competitiveness[55].

Several authors have criticized attempts of CEECs to use high-tech industries as a vehicle for rapid economic growth. Von Tunzelmann and Nassehi (2004) remind that the fact that East Asian countries have used these sectors to develop so rapidly does not mean that strategy can be generalised by straightforward imitation. They mention two main reasons for their scepticism of assigning high hopes to high-tech development in CEECs. Firstly, the amount of output and employment generated in the high-tech sectors is surprisingly small – in Western Europe, narrowly defined, they contributed only about 3% to GDP and employment, a figure which rises to about 8% if medium-high-tech industries are included. Even doubling these sectors is thus going to have comparatively little effect as compared with, e.g., raising productivity across the board in the huge service sectors. Secondly, the competition in these high-tech sectors is intensifying, and returns from their less complex facets, which were the points of entry in East Asia, have diminished to quite low levels. The more complex parts remain highly profitable in many cases, but do not provide easy entry points for a catching up country[56]. Von Tunzelmann and Nassehi (2004) suggest that a more viable strategy for most countries would be to target the use of high technology in a much wider range of industrial and service activities. These are what comprise the bulk of GDP, so the impacts may be far greater. Also, countries can build on their competitive strength rather than attempting to elbow into areas where competition from countries with more abundant knowledge-based resources is already acute.

Therefore, several authors remind that important task of public policy is to facilitate innovation not only in high-tech sectors but also in low and medium-tech (LMT) industries. LMT activities account for more than 90% of all economic activity in Europe[57]. Thus, also innovation in LMT often receives less attention than innovation in high-tech sectors, it can have a substantial impact on economic growth[58]. All LMT industries (furniture, textiles, food processing, etc) are innovative: they generate significant portions of their sales from new and technologically changed products and they use not only practical knowledge and high-grade design skills but also engineering and scientific knowledge. Innovation in LMT is focused on production efficiency, product differentiation and marketing. It often involves incremental

changes and incorporation of high-technology products and technologies (e.g., use of ICT and biotechnology in food processing). Therefore, Von Tunzelmann and Acha (2005) argue that in the modern world there are no true 'low-tech sectors' therefore developing and intermediate countries can develop their comparative advantages and strengths in traditional sectors without facing risk that these would act as a 'block to development'[59]. They remind successful technological development of Switzerland, which went from textiles to dyeing and chemicals and later on to pharmaceuticals and machinery and advanced engineering.

To sum up, the initial innovation policies in CEECs, which emerged in the second half of the nineties, were strongly influenced by path-dependencies from previous science an technology policies as well as mechanistic copying of policies from more advanced countries. Thus, in many cases systemic approach to innovation policy, which would be based on realistic assessment of strengths and needs of CEECs has been still missing. In recent years innovation policies in many CEECs have seen a new boost with influx of considerable resources from national budget and EU Structural Funds. Does this lead to broadening coverage of innovation policy? Is the utilization of increasing resources based on rational assessment of development needs of each country? Does the funds facilitate development of innovation capacities in whole economy and enterprise sectors? Are there important differences among CEECs in this respect? These are some of the issues to be tackled by further research.

Conclusions

The main role in innovation process is played by market mechanisms and capitalist firms. However, in case when market mechanism does not fulfil its function, policy intervention can contribute to the solution of problems or 'failures'. However, an important precondition for policy intervention is capacities of public administration to solve the problem.

As the new EU Member States are considerably lagging behind on many indicators of knowledge-based economy, issue of policy intervention to address existing problems and 'failures' is of particular importance. However, another issue is if public administration in CEECs has enough administrative capacities to remedy existing problems and 'failures': adequate information of the market, systemic understanding of innovation process, skills to design and implement appropriate innovation support schemes. Preliminary evidence of initial innovation policies in CEECs demonstrates limited administrative capacities in innovation policy-making with lack of understanding of innovation process, inadequate analytical capacities and poor implementation skills. Policy-making based on misconceptions of innovation process and needs might lead to 'government failures' and waste of public resources instead of contributing to long-term socio-economic development of these countries.

Further research will tackle issue of role of innovation in catching up and undertake in-depth case studies of development of innovation policy in Hungary, Estonia and Latvia.

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