National innovation systems: Institutional changes

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The aim of the paper is to discuss changing institutional framework of infrastructure for the support of innovation and contribute the assessment of its impact on innovation performance. Theoretical framework refers to systemic analysis of innovation based fields in the macro-format of national states as well as in meso- and micro-levels of their institutional setting. The article demonstrates application of method of institutional analysis which makes use of sociological and historical studies of modern institutions together with the use of the internationally comparable statistical databases on innovation resources as well as their efficiency. Both the theoretical and the empirical analysis of infrastructure for support of innovation in EU countries has been used to propose the typology of innovation performance, and its evolutionary dimension. The proposed typology has been applied to assess institutional changes of infrastructure for support of innovation in the Czech Republic.

Keywords: Innovation, national innovation system, infrastructure for support of innovation, institution, institutional cluster of modernity, institutional change

Introduction

The presented article is based on outcome of social science studies of the roles of science, technology and innovation in modern societies. Its theoretical frame has been shaped by evolutionary economics and neo-Schumpeterian study of economic role of innovation as well the sociological study of current societies and their institutional tensions mobilized by the growth of techno-economic performance and socio-cultural adaptations. The empirical background of the article is related to comparative study of social transformations in Middle-European countries in the 90’s of last century. Particular attentions focused on institutional analysis of science, technology and education, and the role of innovation in the growth of competitiveness of Czech economy in the last decade. The analytical lesson which has been learned from the above mentioned studies has clearly indicated that the relationship between innovation resources and their economic effects is conditioned by institutional setting which can be in various degrees pro-innovative or innovation aversive. The concept of national innovation system has been chosen to identify current understanding of the institutional framework for the growth of innovation, and the concept of infrastructure for support of innovation is proposed for the study of innovation in the situation of institutional transformations. Institutional transformations are concerning all modern countries which are counting with innovation resources in their advancement. Yet, specific situation is related to post-socialist countries which were challenged by a radical change of their institutional structure. The article

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applies institutional analysis in order to assess infrastructure for support of innovation in last two decades in the Czech Republic, and identifies both the structural (path) dependences and the challenges for an institutional changes.

**Concept of national innovation system and its analytical capacity**

Studies of innovation have been always subject of social sciences, since the social change is a key issue of modern societies. The notion of innovation has been closely related to economic studies, in particular to its Schumpeterian cognitive tradition. Its development in the last decades has brought lot of knowledge about the ways, how sources of modern knowledge have become a key source of competitive advantage in the economic activities and how this fact has influenced other social spheres and the borderlines between market-based forms of social co-ordination and the other institutions. In my view it is well outlined in the so-called *non-reductionist preconditions*, which have been formulated as a cognitive perspective for the study of relationship between technology and economy (Dosi, Pavitt, and Soete, 1990). Besides better understanding the factors, which are influencing the interfaces between economy and technology, also the dispute about science push or market pull has been decided in favour of complementary approach: interactive links between both set of factors are of importance. In this cognitive perspective the concept of national innovation system (NIS) has been proposed. It has been supported by extensive empirical knowledge about national innovation frameworks in the OECD countries and cleared up key institutions for support of innovation and possible relations among them. The NIS concept has helped understand a specific set of *institutional universals* in this field (Nelson, 1993). This approach seems to be appropriate to outline a macro-social framework for a growth of innovation resources and their impact on economic performance. The segments of NIS can be outlined as follows:

- **Complex interconnection of science and technology** distinguished by a specific method of technical design and practices, as well as by a system of growing scientific knowledge surrounding it; the institutional base of this scientific-technical complex is the national education system, which is structured according to it, an effective interaction between the university and industry is, therefore, a source of long-term economic growth;

- **Innovation activity** of private enterprise actors or businesses, which is contemplated as adaptability to new circumstances (thus, it covers in-house technical and research capacities of firms); the technical competency and orientation of businesses has support in supplier and customer links;

- **Activity of government** which supports innovation activities either directly or it creates a favourable innovation environment through monetary, fiscal and industrial policies, as well as by influencing the education system.

In the following decade the concept of NIS was extensively used both in the national innovation polices of EU member countries as well as in the advancement of statistical surveying of innovation (see Community Innovation Surveys). The NIS concept became also the subject of criticism which pointed to its several evident assumptions which were not so evident any more: (i) one assumed that expert knowledge is easily mobile while the current analysis indicates that it is quite bound to locality and not so easily mobilized, ii) large part of knowledge is embodied in organisations, their staff, and interaction among them, (iii) appropriation of innovation is conditioned by process of learning which is dependent on the capacities of relevant actors to be reflexive, (iv) learning does not depend on the availability of economic sources only but is an outcome of socio-
cultural environment in the organisations and relations among them, (v) quality of interfaces among segments of NIS is critical factor of influence on their performance (Lundvall, 2005). Due to critical assessment of NIS concept there has been received view that its original form should be labeled as a linear model, while the current situation should be described by an interactive model. The linear model counts with formative impact of academic science on the other functionally advanced NIS segments (see Figure 1); the interactive model counts with reflexivity and flexibility of all its functionally advanced segments (see Figure 2).

FIGURE 1. NATIONAL INNOVATION SYSTEM: LINEAR MODEL

![National Innovation System – Linear model diagram](image1)

FIGURE 2. NATIONAL INNOVATION SYSTEM: INTERACTIVE MODEL

![National Innovation System – Interactive model diagram](image2)
While discussion structural changes of NIS it is important to take into consideration not only the functional differentiation and power of key institutions but also the role of public/private divide. In this perspective the institutional framework for innovation development is formed by a mix of means of the private enterprise and the public (governmental) sectors. It covers namely the profit oriented role of businesses in the competitive market environment (although a part of the industry is nationalised in some countries), publicly supported education systems (although the private sector exists in this area in many countries), academic research (although the scope of such support varies and is also offered by private industry), and state regulated control as well as financial support of the development of domestic innovation resources (even if such support has to be justified in relation to the expectations of private businesses and citizens). Such knowledge is important for understanding of transformation of existing institutions in post-socialist countries. Namely, their current development has not been challenged by a need of growth of NIS functional capacities only but also by a shift from centralistic (hierarchical) regime to a regime, which is shaped by public/private divide.

Alternative concepts for analysis of innovation performance

The above outlined NIS concept has advantage in analysis of macro-framework of innovation activities. As a matter of fact, it counts with reliable role of relevant institutions. Its interactive model has already problematized this assumption. It does not and cannot offer adequate analytical solution since the analysis of current institutional framework of innovation has to be complemented with methodological instruments of micro- and meso-analysis. Such step has been done by Hollingsworth who suggests to study innovations in full scale of its resources and all levels of their institutional settings: (i) the level of basic norms, rules, conventions and habits; (ii) the level of forms and capacities to co-ordinate, like markets, hierarchies, obligation networks, associations, the state, communities and clans; (iii) the level of the institutional sectors of society, like, for example, suppliers, funding sources, regulators etc.; (iv) the level of organisations and their structures; (v) the level of outputs and the performance of institutional components - their flexibility and variety (Hollingsworth, 2000). The pattern of institutional framework for innovative situations, or innovation based social environments, can be described in a graphic form (see Figure 3). Hollingsworth is suggesting that an institutional analysis should proceed at each level and should identify the specific social contexts, rules, incentives and procedures for enforcing compliance, and measures for reducing the costs of compliance. His recommendation is, however, demanding in methodological terms. The established innovation databases offer quantitative information about functional sub-systems (due to their institutional sedimentation); the data for upper and lower levels of his model are not only available but their design will have to be based on qualitative methodological instruments.

An alternative approach has been suggested also in relation to NIS concept. As mentioned above the situation of NIS in EU member countries is monitored by Community innovation surveys (CIS). Methodological framework of CIS (OSLO manual) is also based on NIS concept. CIS data have been extended by some other internationally comparable data about national educational and business enterprise

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1 Hollingsworth justifies his approach with the assumption, that institutions are “embedded in a culture, in which their logic is symbolically grounded, organisationally structured, technically and materially constrained, politically defended and historically shaped by specific rules, habits, conventions and values” (Hollingsworth 1998:14)
sectors there and presented in the form of European Innovation Scoreboard (EIS) which is annually updated. EXIS (experimental Innovation Survey) critically reassesses the methodology of EIS for its macro-social perspective and suggests that analysis of innovation performance should be based on closer analysis of innovating firms, their non-technical competencies, the variety of the enterprising environments and specific economic circumstances in manufacturing branches and services (Arundel and Hollanders, 2005). The data which have been collected by both methods will be later utilized when the issue of institutional transformation of NIS in the Czech Republic will be discussed.

**Figure 3. Institutional Framework of Innovation Based Societies**

- Self-regulatory pattern
- Regulatory regimes
- Functional social sub-systems
- Networking of organisations
- Organisations

**Historical context of NIS transformation in the Czech Republic**

The above-mentioned concept of innovation which has been proposed by Hollingsworth and later advanced to a concept of institutional changes in current capitalist societies (Hollingsworth and Boyer, 1997) is reflecting a shift from the so-called repressive thesis to a more positive role of institutions in human agency. The “repressive thesis” claims that institutions play disciplining function and that their mission rests in constraining role. New approach - which in fact revives the concept of A. Gehlen having been formulated already the century ago - counts with orienting and enabling functions of institutions. In current times, this positive role of institutions has been recognized not only due to crisis-like development in the most of current institutions but due to better understanding of the structure of the institutions and chances for its change. The institutions become manifest in their organisation pattern but their functioning is founded in latent, specific, self-evident cultural foundations which are not easy to be reflected upon and changed. For the institutional analysis of NIS, of processes which are exposed and oriented to innovative challenges, the study of embedding of institutions in latent patterns is even more urgent and challenging. The above-described transformation of NIS concept from the linear to interactive type (see Figures 1 and 2) as well as the Hollingsworth concept of innovation factors (see Figure 3) are quite instructive to describe the nature of institutional changes in the field of innovation: they pinpoint functional infrastructure for support of innovation and its relation to division between public and private spheres (Figure 1); further on, they indicate...
locations where the borderlines between institutions are transgressed and chances for an inter-institutional cooperation are emerging (Figure 2); and last but not least, the implications of growing interactions among the institutions get diffused and adopted in their internal environment, both in terms of their cultural foundations and the organisational setting (Figure 3).

Let us apply the above-suggested description of institutional changes of innovation setting for the analysis of innovative situation in the Czech Republic in last two decades. The starting point was laid by economic and political changes at the beginning of the 90s in the last century. Domestic institutional setting can be described by linear model of NIS (see Figure 1) with one substantial difference - non-existence of borderline between private and public spheres, since both spheres were earlier suppressed by socialist reforms. This structural deficit, as well the other structural patterns which were shaped during socialist development, have played important role in current transformations to market-based and democratic regulatory regimes. In order to assess these structural implications for current reforms one should be aware of structural setting of NIS which was shaped by socialist reforms. During that time domestic NIS was developed in its functional (academic and industrial science) and strategical terms (concept of science push) but failing in terms of economic and creative motivation which are usually bound to competitive regimes of market and plural politics. In the same way also autonomy of academic sphere was curtailed. Of course, current and radical economic reform and democratization of political regime have formally re-established the public and private spheres, but their functional restoration was rather under influence of appropriated practices and embedded power distribution than an environment of fair competition and effective public governance. During radical economic changes which were mobilised by economic reform (privatisation, liberalisation of price formation) one could observe general implications of any radical social change - resistance of embedded structures, a phenomenon which is described by the term path dependence. The follow up studies of impact of economic reform on domestic NIS (Adamski, Machonin and Zapf 2002; Gorzelak, Ehrlich, Faltan, and Illner 2001; Müller 2002) well indicate how easily the centralistic innovation pattern could be destructed, but with what obstacles a creation of a new innovation pattern and regulatory regime can advance: in the 90s of the last century the public attention and policies were focused on restructuring research sectors (restoration of research at universities); in the first decade of this century a slow shift to the issues of innovation policy can be observed (growth of industrial science and research in business enterprise sector).

If we refer to a concept of evolutionary changes of NIS, and their description by help of suggested figures, it can be claimed that current situation in Czech Republic can be described by a transition from linear model (Figure 1) to an interactive model (Figure 2). It is positively influenced by vivid pro-innovative adaptations in the level of organisations (lower part of Figure 3) and insufficiently supported by institutional reflexivity and interactions among the segments of NIS (middle part of Figure 3). Also a search for an effective regulatory measures and effective innovation policy is at the beginning and evidently not well supported by pro-innovative shifts in value patterns of population (upper part of Figure 3).

The above outlined context of institutional changes in context of innovative economy and modern societies draws a difference between pro-innovative and reproductive social environments and their relatedness to different levels of social

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1 At the beginning of the 90s of last century the size of R&D expenses and staff was comparable with that one of the most technologically advanced countries but these capacities were mostly used for re-engineering (imitating advanced technology of the products which were exported to western markets) rather than inventing new products and processes.
organisation, functional differentiation, regulatory frameworks and cultural embedding (see Figure 3). Such picture reminds us right away that we deal with the issue of historical relevance and long term dimension of social changes. One has to take into account a process of dependence on and disembedding from appropriated structures and formation of and embedding in advanced structures which concern not only level of organisations and inter-organisational relations but also the levels of functional social subsystems, regulatory regimes and cultural / evaluative capacities, as it is described by Hollingsworth model (1998). In order to demonstrate an analytical approach for the study of these long term changes I shall refer to two issues of the mentioned institutional model, and its historical reflection in case of Czech lands: (i) institutional changes of research organisation, and (ii) conditions for institutional reflexivity in terms of the above discussed interactive model of NIS.

The above discussed evolutionary perspective of a transition from linear to an interactive type of NIS has a historical background in more general changes of academic and research institutions in modern European societies. In the other words one can claim that they are embedded in, and conditioned by, differentiation of science and formation of its autonomy in context of different types of power structures and regulatory regimes. While in the Anglo-Saxon context the academic autonomy (and institutions) could be established with descending power of monarchy and pull of practical manufacturing needs (see the role of Scottish enlightenment), the situation in the continental Europe underwent different path of development. Lasting and sovereign monarchic power and push of practical role of scientific knowledge led to specific formation of relations between monarchic power and academic power: a specific compromise between political and academic power was shaped. Such development proceeded, however, in two forms which are labelled as French and German models of academic and research organisation. Both models were based on common knowledge claim: academic science should study nature while the interpretation of social issues should remain in monarchic and religious realms. There was, however, difference between both models as far as form of organisation is concerned: French model was based on centralization of academic organisation and its separation from educational institutions; German model was decentralised and based on location of research at universities (Humboldtian principle of research-education unity). The German model was generally diffused in 19th century, taken over in organisation of academic realm in the USA and advanced there to academy-university-industry framework (Ben-David 1971; Müller, 1999), which is now generally accepted and applied.

The above mentioned interpretation is very instructive for understanding historical context of NIS formation after World War II in advanced countries and the way how it was empirically identified in the concept of NIS (1993). The above-outlined historical context can also be applied in the discussion about the current transformation of NIS in the CR, in particular about the issue of structural dependency and challenges for adaptations to standard (European) institutional pattern. Returning the above discussed evolutionary perspective of academic institutions one can differentiate two periods in the development of academic institutions in the Czech lands: (ii) emancipatory period which preferred the French model (second half of the 19th century, an idea about Academy as a central institution for research), and (ii) formative period in which the context of German model was applied (academic research was located at university, formation of central laboratories under control of state authority, formation of research laboratories in industry). Such development path and structure was radically interrupted by socialist reform in the 50s of last century: research capacities of universities and some industrial laboratories were transferred in the centrally
regulated Academy of Sciences. The implications of socialist reform of R&D system could be well observed during radical economic and political changes in the 90s of last century: self-organized capacity of Academy of Sciences made use of democratization of politics and legitimized its social and executive position, industrial research was extensively “destructed” by economic reform and universities could slowly re-establish their traditional position in domestic research system by means of national R&D policy.

Let us go over to the second issue - conditions for institutional reflexivity in terms of the above discussed interactive model of NIS. The above discussed issue has been concerning the issue of path dependencies, the second issue deals rather with an issue of “path formation” - transformation of linear model to an interactive one. It covers the events of the last decade and political efforts to go over from objectives and provisions of R&D policy to that ones of innovation policy. The issue of institutional reflexivity is understood as a set of institutional competences which enable not only monitoring of their external environment but also implementation of its consequences for internal environment and organisation within the institutions. Hollingsworth concept of innovation framework is also well suited for the description of levels and localities of institutional reflexivity in context of innovation. Its upper layers (see Figure 3) are indicating that institutional reflexivity of innovation sphere is conditioned at least by specific communicative pattern of (functional) social sub-systems, mobilization of different co-ordination and regulatory regimes and valuation pattern. There is already well advanced understanding the ways, how innovation performance can be supported by functional setting of institutions (see concept of NIS) and by different forms of coordination (market, hierarchies, communicative authority, informal networks).

However, the relationship of functional and regulatory forms to possible changes in valuation pattern is less studied and understood (Loudin, Schuch 2009).

Figure 4. Types of culture by social capital performance

<table>
<thead>
<tr>
<th>Reproductive culture</th>
<th>Innovative culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uneven distribution of innovating sources</td>
<td>Balanced distribution of innovating sources</td>
</tr>
<tr>
<td>Low level of social capital formation</td>
<td>High level of social capital formation</td>
</tr>
<tr>
<td>Power-oriented activities of situated actors</td>
<td>Value-oriented activities of situated actors</td>
</tr>
<tr>
<td>Low level of institutional reflexivity</td>
<td>Advanced institutional reflexivity</td>
</tr>
<tr>
<td>Corruption of regulatory forms - clientelism</td>
<td>Co-ordination of regulatory forms</td>
</tr>
<tr>
<td>Self-sustaining strategies of action</td>
<td>De-centralisation, outsourcing, networking</td>
</tr>
<tr>
<td>Loss of „firm-footed” position</td>
<td>Innovation-based firm</td>
</tr>
</tbody>
</table>

Source: Müller, 2009.

With respect to the above discussed notion of institution, ways of institutional change and current context of modern societies the Figure 4 is proposing two ideal types of culture and the set of factors influencing cultural shaping of innovation-based institutions.

Transformation of institutional framework of NIS in the CR: Further empirical support

1 Until this change Academy existed in a form of Learned Society but after the change it was established as the sector of research organisations, with the status of executive body of government and own management. This model was a copy of Russian Academy of Science, ideologically supported as an example of “advanced” practice for socialist development. In historical terms it was a copy of French model and source of destruction of institutional advantages of embedded German model of R&D institutionalization.
So far, the above presented institutional analysis has applied the cognitive perspective of history and sociology, and qualitative methodological framework. Additional cognitive support can be gained by comparative and quantitative methodological approaches. As mentioned above the regular surveying of innovation by EUROSTAT is the most valuable source of such data. The available data are focused on detailed monitoring of innovation resources and selected indicators about innovation effects. Certain deficit of such input-output approach, which is black-boxing the capacity of NIS to transform inputs into outputs, is compensated by the concept of scoreboards which tries to get better insight into trans-formative robustness of single NIS by a more extensive data sources. Such data source can well complement the above applied institutional analysis of innovation field. In particular, two data sources are suitable for such purpose since they describe the situation of the domestic NIS in the middle of the first decade of this century and in a comparative perspective of the selected EU countries. The first one (see Figure 5) is based on data of European Innovation Scoreboard which follows three sets of relationships: the relation between cultural stimulators and knowledge creation; the relation between entrepreneurship and application of innovations (including the role of demand and protection of intellectual property).

**Figure 5. Challenges and barriers for institutional adaptations of NIS in the Czech Republic**

Comparing the domestic situation with Austria and Finland one can claim that domestic infrastructure is available in all monitored dimensions (except the indicator about the protection of intellectual property, the low value has been rather caused by lack of comparable data). In extensive terms, the dimensions of stimulators, knowledge creation and entrepreneurship are sizeable but quite remote from their level in the compared countries. This finding can be interpreted as follows: there are domestic knowledge resources and stimulators for innovation but they are not yet mobilized enough in order to facilitate effective innovation performance. The closer position of domestic situation to that one of Austria in the dimensions of entrepreneurship and demand can be interpreted as a signal of advancing market pull. The role of government can be interpreted in the way of...
former assessment: there are administrative and regulatory capacities but they are not advanced to the level of innovation demands. In a composite perspective the domestic innovation infrastructure is not assessed as lagging behind but approaching the standard situation in EU countries (group of trailing countries).

Another data source is offered by EXIS the cognitive framework of which has been already discussed above. Collection of EXIS data, which are more focused on closer study of innovation performance of firms, suggests to classify innovating firms by 4 types:

- **Strategic innovators**: they perform in-house R&D and employ the other innovation resources; their innovations have impact on national and international markets and on the other firms; they are active in the sale of licenses;

- **Intermittent innovators**: they implement innovation only under suitable conditions; in-house sources of innovations are combined with external sources; they have innovative impact on market but not on the other firms; this type is usually covering smaller firms in vertical production chains;

- **Modifiers**: they are disposing of in-house sources of innovation - except R&D - and modifying globally accepted innovations for local and regional markets;

- **Adopters**: they produce innovated products, which were developed in the other countries and support wider diffusion of innovations

The Table 1 indicates the selection of indicators which have been implemented in EXIS methodology and presents the evaluation of the domestic situation in relation the EU average. The presented data confirm the finding of the above mentioned EIS data: positive domestic position by indicators of knowledge flows, promising position by indicators of market demand and investment and lagging position by indicators of diversity and innovation governance. The latter finding can be compared with outcome of institutional analysis of innovation system by Hollingsworth’s concept (see also Figure 3). Indeed, governance in terms of diversity is the crucial feature and source of performance of innovation systems. The outcome of the above presented institutional analysis has well indicated that reflexivity of innovating firms and effective forms of co-ordination are precondition of governance in complex environments, and that such capacities are in domestic situation still missing. The similar conclusion is also suggested by data of Table 1.

<table>
<thead>
<tr>
<th>Indicator/country</th>
<th>diversity</th>
<th>market demand</th>
<th>knowledge flows</th>
<th>investment</th>
<th>innovative skills</th>
<th>innovation governance</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU</td>
<td>0.41</td>
<td>0.48</td>
<td>0.30</td>
<td>0.45</td>
<td>0.47</td>
<td>0.49</td>
</tr>
<tr>
<td>CR</td>
<td>0.28</td>
<td>0.43</td>
<td>0.30</td>
<td>0.40</td>
<td>.</td>
<td>0.17</td>
</tr>
</tbody>
</table>

Source: Arundel, Hollanders, 2005

**Concluding discussion**

The topic of the paper is related to broader social science efforts to understand the role of innovation in modern societies. So far, they have been focused on the study of techno-economic aspects of innovation and their institutional shaping in the selected (mostly OECD) countries. The empirical surveying of innovation issues for last three decades and economic theorizing led to formulation of the concept of national innovation system (NIS). NIS concept outlined the set of functionally different institutions, which are participating in production, diffusion and
utilization of innovations, and the leading role in this cluster of institutions is attributed to academic and research institutions. The notion of system was used in order to argue that the different institutions can and should be understood as the parts of a more general wholeness. More intensive mobilization of innovation for a growth of economic competitiveness of countries, which can be observed in last two decades, have led to better understanding of innovation resources and their institutional framework: techno-economic resources are related to (more latent) social and institutional resources, which in their turn and in case of deeper structural changes, depend on mobilisation of cultural resources. This structural shift has been, of course, reflected by social studies of innovation and led to the elaboration of an advanced NIS concept which has been labelled as the interactive one (in contrast to the original - linear - one). The concept of interactive NIS draws attention to power distribution of NIS segments and their institutional reflexivity and learning. Uneven distribution of power as well as readiness of actors to institutional reflexivity have started to disintegrate systemic nature of NIS. For this reason it has been suggested to use the notion “infrastructure for support of innovation” - this notion says that innovation process cannot advance if certain functional and structural preconditions (infrastructure) are available, yet counts with conditions of uncertainty of institutional environment and with advanced creative capacities concerning not only technological issues but also cultural ones.

The above outlined discussion has justified the role of institutional analysis in the field of innovation studies as well as the need to understand institution as an open arrangement rather then systemic and closed one. The importance of institutional analysis has been also supported by the outcome of international statistical surveying of innovations. As already indicated above, its methodology is based on input-output approach - the set of input and output indicators is used to identify innovation resources and performance with an expectation that a causal relationship among them can be identified and hence a more effective regulation attained. However, one has come to conclusion there is no causal relationship between input and output sides of NIS. Yet, the available data have offered persuasive picture of variety of institutional arrangements among surveyed countries and stimulated cognitive efforts to identify different types of institutional infrastructure for support of innovation. Such findings have been used in this article in order to design a methodological framework of institutional analysis in the sphere of innovation: historical and sociological approaches have been combined with international comparative analysis of innovation capacities based on data of statistical surveying of innovation.

The main outcome of the paper rests in the assessment of undergoing institutional changes of domestic infrastructure for support of innovation in the Czech Republic. The above suggested methodological design of institutional analysis has been applied in order to identify the factors of path (structure) dependence and path (structure) formation influencing changes of domestic institutional setting for support of innovation. The crucial change happened in the 90s of last century when functional infrastructure for support of innovation was exposed to radical change of its economic and political regulatory regime. This change in regulatory setting was radical but ineffective to change current institutional setting and promote chances for adaptations to standard (EU based) pattern of infrastructure for support of innovation. Historical account has shown that the impact of path dependency has deep roots in ways, how modernization trends were advancing in Middle Europe. Sociological account has been applied to assess the chances for path formation of innovation based institutions, or chances for institutional change of infrastructure for support of innovation. Indeed, in the last decade some positive changes have set through to eliminate the role of key weaknesses of domestic infrastructure for support of innovation: ineffective role of government in support of innovation, and low capacities of governance which would facilitate
cooperative relations among innovating agencies (firms, sectors, institutions). One can observe that there are signs of elimination of these weaknesses in the level of innovation-related organisations. These changes in micro-level are exerting a sort of bottom-up pressure on the meso- and macro levels of institutions and regulatory regimes. The notion of innovation culture has been suggested to identify factors influencing shifts in cultural foundation of innovation-based institutions and synergic (reflective) interfaces in the course of their changes.

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