THE ROLE OF R&D AND INNOVATION IN LOCAL ECONOMIC DEVELOPMENT

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Abstract

The paper looks at the issue of R&D and innovation first from the overall impact on economic growth and development and discusses questions of national innovation system and its constitutive elements. From there we focus more precisely on the concept of innovation capacity, which is a prerequisite for a specific environment if R&D and innovation efforts are to result in economic development. The build-up of innovation capacity depends on the development of innovation infrastructure, R&D capacity, diffusion and assimilation of innovation as well as the level of market development. Each of these elements can be influenced by appropriate innovation policy and a set of innovation support measures provided by the state, regional or/and local government. The ability to successfully implement innovation support measures depends on governance capacity, which is one of the most critical issues in many transition countries, including Bosnia and Herzegovina.

Keywords: Innovation policy, Support measures, Governance capacity, R&D.

Introduction

When discussing R&D and innovation, we usually refer to the national context, especially since the common analytical framework is the national innovation system. Yet important role in promoting R&D and innovation can be played by regional or local level of authorities as well, especially through creating favourable circumstances.

1 According to the Frascati Manual (OECD 2002), R&D “comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.” R&D generally covers three types of activities: basic research, applied research and experimental development. Basic research focuses on exploration of different phenomena and observable facts with the objective to acquire new knowledge without any particular practical objective. The aim of applied research is to acquire new knowledge with a specific practical objective. Experimental development covers “systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed” (OECD 2002).
for the business development. In many contemporary economies we see the level of business investment in R&D and innovation as one of the main determinants of the competitiveness and of the dynamics of economic growth.

The paper looks at the issue of R&D and innovation first from the overall impact on economic growth and development and discusses questions of national innovation system and its constitutive elements. From there we focus more precisely on the concept of innovation capacity, which is a prerequisite for a specific environment if R&D and innovation efforts are to result in economic development. The build-up of innovation capacity depends on the development of innovation infrastructure, R&D capacity, diffusion and assimilation of innovation as well as the level of market development. Each of these elements can be influenced by appropriate innovation policy and a set of innovation support measures provided by the state, regional or/and local government.

Design and implementation of the R&D and innovation policy depends on adequate level of innovation governance. As we will describe in the paper, the public authorities have the opportunity and the responsibility to provide support to innovation, both to public as well as business entities. A set of different policy measures through which the government may/can provide support to innovation is presented.

In many environments, be it at national, regional or local level, we find inadequate capability of innovation governance. This is most commonly reflected in inappropriate policy design, selection of measures which are insufficiently adapted to the local needs and abilities and especially poor implementation of the policies and measures. Developing appropriate innovation governance capability is a task for all levels of government: state, regional or local. The paper shows that this is very likely the most difficult process for the transition countries, which face many challenges: from adaptation to the market economy model, to the changes in educational system, and most complex: changes in value system and culture. This complexity of processes makes the transition to knowledge based economy/society, which today is associated with the successful, developed environment, so difficult that catching-up is more of an exception than a rule.

From national innovation system to national innovative capacity

In economic theory as well as in policy the importance of innovation as one of the key determinants of long-run economic growth is widely recognized. The concepts like national innovation system (Edquist 1997; Nelson 1993; Lundvall 1992) and national innovative capacity as the ability of a country to produce and commercialize a flow of innovative technology over the long term (Furman et al. 2002) receive significant attention. In their ambition to secure long-term sustainable economic and
social development, the countries are looking also at the national innovation systems in an attempt to develop R&D and innovation capacities as important sources and determinants of economic growth.

According to Furman et al. (2002), the national innovative capacity is the ability of a country as both a political and economic entity to produce and commercialize a flow of new-to-the-world technologies over the long term. What is particularly relevant for their definition is that the innovative capacity is not only the level of innovative output per se i.e. number of different innovations, but reflects more fundamental determinants of the innovation process. This by itself makes the development of innovation capacity a more complex endeavour, since many more factors need to be developed to the level of providing adequate support to innovation activity.

Figure 1: National innovation capacity framework (Radošević 2010)

First, innovative capacity depends on a strong common innovation infrastructure which includes overall science and technology policy environment, the mechanisms in place for supporting basic research and higher education, and the cumulative “stock” of technological knowledge upon which new ideas are developed and commercialized. It is important to note, however, that R&D activities are but one input into the complex system of generating and diffusing innovation. Still, the attention paid to R&D and also to policies aimed at raising R&D intensity is justified by two principal reasons. First, there is a widespread consensus on the recognition of R&D as the main engine of long-run economic growth. In particular, the objective of R&D activity is the generation of new knowledge (invention), which may then

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2 Innovations are based on a number of scientific, technological, organisational, financial and commercial activities. Oslo Manual (2005) explains that “innovation comprises a number of activities that are not included in R&D, such as later phases of development for preproduction, production and distribution, development activities with a lesser degree of novelty, support activities such as training and market preparation, and development and implementation activities for innovations such as new marketing methods or new organisational methods which are not product and process innovations. Innovation activities may also include acquisition of external knowledge or capital goods that is not part of R&D.”
be transformed into commercially-viable innovations. In addition, the diffusion process (through adoption by consumers and imitations by firms) induces the long term positive effect of R&D activity on economic growth. R&D has important features which make it different from other types of profit-motivated investments. In particular, the additional “technological uncertainty” embedded in the innovation itself, together with the common “market uncertainty” faced by firms acting in markets, makes R&D activities highly uncertain and risky from a firm’s perspective. In turn, such uncertainty may generate constraints for a firm which aims at accessing external financing. Moreover, R&D is characterised by indivisibilities and economies of scale that create strong incentives for firms to monopolise markets. Finally, returns to R&D investment are partially non-excludable which gives rise to the “appropriability problem”. This undermines the incentives of private firms to invest in research activity (Dasgupta and Stiglitz 1980; Spence 1984) and paves the way to the role of government policy in promoting R&D to its socially desirable level.

Second, a country’s innovative capacity depends on the more specific innovation environments present in a country’s economy. The microeconomic environment in which the firms compete has a significant impact on how innovative they need to be: in the conditions of limited competition, a need for innovation is less pronounced. Yet with increased globalisation and open markets, the competition is rarely local, so innovation becomes an essential element of competitiveness. Innovative capacity depends on existence of industrial clusters – not clusters in a formal institutional sense, but clusters as Porter (1990) defined them. Porter highlights the microeconomic underpinnings of innovation in industrial clusters, including the interaction between input supply and local demand conditions, the presence and orientation of related and supporting industries, and the nature and intensity of local rivalry. For the innovation capacity, existence of such clusters is of crucial importance.

Third, innovative capacity depends on the strength of the linkages between the common innovation infrastructure and specific industrial clusters. For example, a given common innovation infrastructure results in a more productive flow of innovative output when there are mechanisms or institutions, such as a domestic university system or established funding sources for new ventures, which encourage the commercialization of new technologies in particular clusters.

The key task of successful innovation policy is to increase the innovation capacity. As we observed above, this capacity is not dependant only on the development of science and the outputs of the research system, but very much also on the strengths of country’s business sector and the mechanisms and institutions supporting their interaction. The complexity of innovation system requires adequate policy response through well designed innovation support measures.
Innovation support measures

Providing support to innovation is one of the major elements of country’s innovation policy. In theory and practice a wide variety of measures exist, addressing the innovation in different environment, at different stages of economic development of the country or life span of the enterprise. Most commonly, innovation support measures’ main objective is to promote innovation activity in business sector, but since many different factors affect the innovation activity, the scope for intervention is broad. Innovation policy support will have to involve many dimensions and should be understood as a set of instruments. These aim at improving access to financing in support of innovation, at creating an innovation friendly regulatory environment and demand for innovation as well as at reinforcing the activities of institutions relevant for innovation, including the links between research institutions and industry (INOVO 2013b).

Particularly in small economies, market systems by themselves will not provide the full range of support processes that innovating firms require if they are to innovate successfully or to survive unsuccessful innovation projects. Even from a theoretical point of view, public intervention to support business innovation processes may be justified if the existing activities and interactions in the private sector do not result in optimal outcomes from a societal point of view (EC 2009).

In economic theory, there is a case for public support if private activities and interactions lead to too low investments in innovation. This refers to the concept of market and systemic failures, which defines the conditions under which public intervention may be justified in order to improve the efficiency of markets and to overcome practical barriers for innovation. Systemic failures refer to structural, institutional and regulatory deficiencies, which lead to sub-optimal investment in knowledge creation and other innovative activity. Systemic failures may justify government intervention in order to pragmatically address weaknesses of the innovation system (EC 2009).

Due to their risky nature R&D investments thrive disproportionately more under stable and favourable economic environment than in unstable and volatile conditions which increase the risk-aversion of potential investors. Therefore a proactive innovation policy of the country (state/region) is expected especially in the cases where we are faced with unstable conditions, often faced by the transition countries.

Innovation policy focuses on all types of innovation activities and processes in enterprises (at all stages in their development from a business idea to a mature firm seeking to renew its product range, etc.) and not only on R&D or technological innovation (Reid and Peter 2008). Thus, under this definition, the final beneficiaries or targets of innovation policy are, first and foremost, enterprises (together with entrepreneurs seeking to set up an enterprise), although the authors note that, increasingly,
actors from the not for profit and public sectors may also form the targets of innovation policy (Cunningham et al. 2008).

On the one hand, R&D enhances a firm’s innovative potential (thus increasing directly the rate of TFP growth); on the other hand, it improves the absorptive capacity of firms and industries, thus facilitating the adoption of existing technologies and spurring TFP convergence. The idea of absorptive capacity was first discussed by Cohen and Levinthal (1989) who stress that besides facilitating the adoption of existing technologies, absorptive capacity also concerns the “firm’s overall ability to be aware of, identify and take effective advantage of technology”.

At the enterprise level, innovation involves the integration of a range of activities, which must be carried through more or less simultaneously. These activities include market exploration, search for finance of innovation projects, personnel development and training, the acquisition, adaptation and operation of new capital goods, research and development, prototype development and testing, and scaling up from testing to production. In each of these areas, enterprises need to make significant tangible and intangible investments, often in situations of considerable uncertainty. Firms deal with these problems with their specific knowledge and competence bases, but there is no guarantee that the resources they bring to the task will be adequate. There is, therefore, room for public assistance to improve the access of, particularly innovative, SMEs to external sources of financing. Policy measures can be targeted at improving framework conditions (e.g. tax and regulatory environment, IPR regime, demand from potential users of risk capital) or at specific financing instruments. However, it needs to be ensured that public support is, as far as possible, non-distorting, time-limited, non-bureaucratic and regularly evaluated (EC 2003).

According to the PRO INNO approach, three forms of innovation policy measures/mechanisms may be identified based on the types of resources employed:

- financial, human and organisational resources – deployed through or on behalf of innovation-oriented programmes and projects;
- the provision of new information (vision, strategy, coordination, best practice) which is geared towards innovation activities;
- new institutions (legal acts, rules) designed to explicitly affect the innovation process.

This typology is reflected also in the definition of the innovation policy measure, applied by the Trendchart/Erawatch project, where member countries’ innovation policy and the measures are monitored:

“An innovation policy measure is any activity that mobilises: resources (finance, human resources, organisations), information (road-mapping, technology diffusion activities, best practice dissemination) and formal and informal institutional processes

(legal and regulatory) to achieve public policy objectives in the area of innovation. It will do this with some percentage of public funds. Finally, it will predominantly be for the benefit of enterprises.”

There are different ways of structuring/categorising innovation support measures. They can be categorised according to their modality of operation or their targets. Modality of operation is concerned with how measures are implemented, whether through the provision of direct financial and/or structural support, and through the generation and/or transfer of knowledge. The following table shows how the principal mechanisms for the provision of support relate to aspects of the innovation system (Cunningham et al. 2008).

**Table 1: Categorisation of innovation support measures**

<table>
<thead>
<tr>
<th>Modality</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>R&amp;D funds</strong></td>
<td>Provide direct support for innovative activity.</td>
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<tr>
<td><strong>Legal framework</strong></td>
<td>The laws and regulations bearing on innovation</td>
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<td><strong>Tax and Financial Incentives</strong></td>
<td>The provision of financial benefits to encourage innovative activity</td>
</tr>
<tr>
<td><strong>Coordination and Transparency</strong></td>
<td>These relate to the ways in which innovation related policy measures are formulated and implemented, and the steps taken to improve efficiency and effectiveness, and clarity.</td>
</tr>
<tr>
<td><strong>Infrastructural Development</strong></td>
<td>Activities such as the establishment of dedicated intermediary organisations to facilitate technology transfer, and which complement other structural modalities.</td>
</tr>
<tr>
<td><strong>The Mobility of Personnel</strong></td>
<td>Mechanisms to encourage individuals to work, frequently on a temporary basis, within other organisations, with a resulting exchange of knowledge and information.</td>
</tr>
<tr>
<td><strong>Transfer and Exploitation of Research Results</strong></td>
<td>Mechanisms to diffuse and support the application of research in innovation.</td>
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<tr>
<td><strong>Information Diffusion</strong></td>
<td>Mechanisms aimed at more general awareness of scientific and technological opportunities, and of related support schemes.</td>
</tr>
<tr>
<td><strong>Demonstrator Projects</strong></td>
<td>A more direct mechanism to diffuse and promote the adoption of innovations.</td>
</tr>
<tr>
<td><strong>Networks and Clusters</strong></td>
<td>The establishment and development of inter-organisational pathways used in the transfer of knowledge.</td>
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</table>

Adopted from Cunningham et al. (2008).

Another approach is to classify the support measures according to the level to which the support is directed. This kind of “mapping” has been carried out by the European Commission.
### Table 2: A Mapping of Policy Actions in Support to Innovation

<table>
<thead>
<tr>
<th>Activity level</th>
<th>Firm level</th>
<th>Sector level</th>
<th>Market level</th>
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<tbody>
<tr>
<td><strong>Specific support policies</strong></td>
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<tr>
<td>– Statistical and stakeholder based analysis on innovation performance</td>
<td>– Innovation benchmarking and technology foresight</td>
<td>– Sectoral industry policy initiatives in specific sectors, including innovation</td>
<td>– Standardisation and certification</td>
</tr>
<tr>
<td>– Support to public RTD</td>
<td>– Business incubation</td>
<td>– Specific cluster policies and/or initiatives in specific sectors</td>
<td>– Legal and regulatory framework for innovative activities</td>
</tr>
<tr>
<td>– Facilitation of knowledge transfer</td>
<td>– Innovation management training and support for protection of intellectual property (IP)</td>
<td></td>
<td>– Better regulation/liberalisation of specific markets</td>
</tr>
<tr>
<td>– Promotion of ICT use (e-business)</td>
<td>– Access to finance</td>
<td></td>
<td>– Lead market initiatives on new markets</td>
</tr>
<tr>
<td>– Market replication projects, such as on eco-innovation</td>
<td>– Interactions with other firms or research bodies / universities</td>
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<td></td>
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<tr>
<td><strong>Horizontal support policies</strong></td>
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<tr>
<td>– Tax incentives</td>
<td>Entrepreneurship policies for start ups</td>
<td>– IPR policy</td>
<td>– Internal Market</td>
</tr>
<tr>
<td>– State aids</td>
<td>– Mobility programmes</td>
<td>– Sector-specific standardisation, such as in ICT</td>
<td>– Trade and competition policy, including merger controls</td>
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<tr>
<td>– Public procurement</td>
<td>– Public procurement</td>
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<tr>
<td>– Education and training</td>
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</table>

(EC 2009 : 12)

Probably most elaborate specification of the support measures is the one applied by the ERAWATCH project, where each stage of the innovation activity is captured as well as research and development aspects of the country’s policy. This was designed with the intention of producing a single over-arching and comprehensive framework under which policy measures for both the research domain and the innovation domain could be co-located. This approach is the reflection of developments in innovation system’s definition, where a broad, all-encompassing approach has gained in importance in theory and practice.

For the enterprise-focused innovation support measures, it is useful to arrange the schematic overview of the measures along the life span of an enterprise: from the support to start-ups to the support provided to “adult” enterprises in specific phases of the innovation process. This enables the policy makers to relatively quickly identify the missing measures in their support schemes and respond with design of a new, targeted measure(s), if so decided. We can identify three major stages in the life-span of an enterprise where different types of support are welcome. Certain measures can be applied across more than one stage.
Table 3: Classification of innovation support measures according to the life span of an enterprise (example of selected measures per category)

<table>
<thead>
<tr>
<th>Types of stages</th>
<th>Seed stage</th>
<th>Start-up stage</th>
<th>Development and growth stage</th>
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<tbody>
<tr>
<td><strong>Support environment</strong></td>
<td>University/ business incubators</td>
<td>Innovation centres</td>
<td>Technology centres/ platforms/ networks</td>
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<tr>
<td></td>
<td>Technology parks</td>
<td>Clusters</td>
<td></td>
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<tr>
<td></td>
<td>Innovation vouchers</td>
<td>Innovation vouchers</td>
<td>Innovation vouchers&lt;sup&gt;4&lt;/sup&gt;</td>
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<td></td>
<td></td>
<td></td>
<td>Internationalisation support</td>
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<tr>
<td><strong>Introduction of innovative business models</strong></td>
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<tr>
<td><strong>Financial support</strong></td>
<td></td>
<td></td>
<td>Venture capital</td>
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<tr>
<td></td>
<td>Financial subsidy for establishing an enterprise in innovative environment (incubator, innovation centre, technology park)</td>
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<tr>
<td></td>
<td>Subsidised credit for investment in new equipment/ technology</td>
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<tr>
<td></td>
<td>R&amp;D subsidies</td>
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<tr>
<td></td>
<td>Guarantee schemes</td>
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<tr>
<td></td>
<td>R&amp;D tax subsidy</td>
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<tr>
<td><strong>Human resources</strong></td>
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<tr>
<td></td>
<td>Young researchers from business sector</td>
<td></td>
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<tr>
<td></td>
<td>Support to strengthening R&amp;D capacities of enterprise</td>
<td></td>
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<tr>
<td></td>
<td>Students’ innovation/ entrepreneurial trainings</td>
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<tr>
<td></td>
<td>Mobility schemes</td>
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<td></td>
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<tr>
<td></td>
<td>Competition of “best idea” type</td>
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</table>

Jaklič et al. 2012.

As we can observe, there are numerous possible measures to support innovation and entrepreneurship which can be applied at the national level or at the level of region or local community. It is important for the policy makers to coordinate the policy solutions adopted at different levels with clear demarcation what is best achieved at which level. For example, the introduction of tax subsidy is the issue of centralised

<sup>4</sup>In the literature and practice of different countries, many different types of measures are labelled the same. *Innovation vouchers* can be very different in their set-up: in the “seed” stage they may help potential entrepreneur to cover costs of advisory services, in start-up stage and adult stage, cover part of R&D costs or intellectual property protection costs (for example, co-finance patenting costs).
government decision, but support for various trainings and build-up of suitable human resources can be a measure at all levels, each aiming at specific action.

Innovation governance capability

Adequate innovation governance capability is essential for the successful adoption and implementation of innovation instruments and innovation support measures. The effectiveness of influencing the innovation capabilities and behaviour of enterprises relies on the “governance” of these policies (EC 2003). Innovation governance incorporates a broad set of mechanisms, instruments and institutions in the field of R&D, education, and entrepreneurship. It focuses on the interplay between the various actors that together determine the priorities, strategies, activities and outcomes in innovation (Boekholt 2004). Successful governance requires, among other things, coordination and interaction across different organisations affecting innovation capabilities: we talk of horizontal and vertical coherence of innovation policy. Horizontality of innovation policy in practice means that all the measures introduced in other policy areas (for example in fiscal policy or in educational policies) are checked for their impact on innovation. On the other hand, the vertical coherence relates to coordination of policies among different levels of actors (national, regional) in the field of innovation. The concept of good governance assumes openness, participation, accountability, effectiveness and policy coherence among different participating actors (stakeholders).

The practice, especially in transition countries (and BIH can be named as such as well) often reveals that the awareness of the need for coherent innovation policy among politicians is low, leading consequently to insufficient allocation of resources for the R&D and innovation support measures, lack of coordination of policies within the government and poorly understood issue of horizontality of the policies (Bučar and Stare 2010). The insufficiently developed governance capability can be detected in the introduction of overlapping policy schemes, insufficient transparency of measures or of poorly adjusted mechanisms, transferred from other countries. Lack of coordination is problematic not only because of limited financial and human resources available, but also since it on one hand lowers the transparency of the government led activities and on the other makes the creation of synergies impossible.

In assessing innovation governance capability, ERAWATCH country reports of the EU-15 member states (which are transition countries) pointed out significant discrepancies from the policy papers adopted by the governments to the actual practice: while in various strategic papers innovation is highly praised, the public budget allocation seldom follows this praise. This results in the so called “implementation
deficit”, where even well-designed innovation support measures never become operational.

One of the most significant characteristics of innovation and R&D systems in transition countries is poor cooperation between public research sector and the business sector, which could not be resolved by the newly formed bridging institutions, partly due to their novelty and lack of experience and partly due to the conflicting policies in other areas. In many transition countries the level of investment of business sector in R&D and innovation is low and support measures inadequately developed, giving more attention to the public research institutions than business sector. Business sector has to rely more on technology solutions from abroad or innovates at a much slower pace, which makes it less competitive. Closer links between public research organisations with business sector and more focus in academic and R&D institutions on the business needs could channel some of the business sector R&D investment in the public sector and help in more dynamic technological restructuring. This would contribute to higher growth and revenue, both for business and R&D sector.

The improvement of innovation governance capability is a central task for the administrations in transition countries. As long as the staff of various governments, from local to state level, have only limited governance capability, the design and implementation of innovation strategy and support measures depend largely on external expertise and is insufficient to provide the necessary break-through for more dynamic economic development.

Innovation capacity of BIH as a source of economic growth

An important index assessing innovation performance is the Global Innovation Index, the result of the collaboration between INSEAD and the World Intellectual Property Organization (WIPO). In 2012 the GII model includes 141 economies, which represent 94.9% of the world’s population and 99.4% of the world’s GDP (in current US dollars). In 2012 Report, Bosnia and Herzegovina’s overall innovation index is 34.2(0-100) and the rank 72nd out of 141 countries. According to innovation input sub-index, BIH index is 44 and the country is at 44th place of the 141 countries. Yet the innovation output index is 26.6 and the ranking 66th. Innovation efficiency index is negative for the country and lists BIH among underperformers. Of particular concern is the assessment of the business environment, where the rank of the country is as low as 101, right after Syria and in front of Guyana. While one can debate the methodological approach of such rankings, still the indicators reveal the major bottlenecks the country is facing in its attempts as a prospective member to catch-up with the EU members.

7 The lower the score, the better country is appraised.
Since no statistics is available on R&D indicators at the state level, no valid evaluation of the research capacity, a key component of the basic innovation infrastructure can be made. Overall science and technology environment in BIH can be assessed according to several partial sources as modest. Partly, this is due to the fact that already limited human resources (as reflected in staff numbers of the research institutes, identified in our survey), involved in research and development activity at higher education institutions are primarily involved in teaching and perform research on top of their teaching commitments. Partly this limited capacity is caused by the available funding for R&D projects, which suggests (estimated on the basis of the average grant) insufficient resources for basic research (INOVO 2013a).

BIH has moved from “relatively developed industry R&D oriented RTD system towards decimated and dominantly HES oriented research system” (Radosevic 2010) with all negative consequences this brings for the innovation capacity. The research at the existing institutions (universities, institutes) is not seen by the business firms as relevant for their needs and therefore as potential partners in innovation processes. Similar attitude to the relevance of public research organisations as source of information for innovation was found in the pilot survey on innovation activity, carried out by the Statistical Institute of RS (Innovation survey of RS 2008–2010). Partly, the reason for such attitude can be found in lack of information on the research potential of the public research organisations, but often the research priorities at universities are not geared towards topics relevant for local business.

One of the significant deficiencies of BIH R&D system is the absence of business sector as an investor in R&D/innovation. No official data exist but estimates provided by the Entities (RS and FBIH) in their strategies support this statement. The low level of technological capabilities and of industrial research in BIH resulted in rather weak ties between science and industry. The low levels of the technology, the innovative and absorptive capabilities of the companies as well as their financial restrictions, seem to be main reasons for this weak private sector involvement in research policy-making.

During the transition process to a market economy, the industrial R&D sector was largely destroyed. Prior to 1990 BIH had an economy in which industry was significant, with important industrial companies that had established their international competitiveness on a technological basis (Energoinvest was the most prestigious and important). These companies had created and developed large research laboratories with hundreds of researchers each. Almost all this technical expertise disappeared during and after the war, and only a few companies have been able to maintain a minimum of research activity in metallurgy (steel and aluminium), electricity

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8 In a detailed analysis of innovation-active SMEs, carried out in Tuzla canton, only one company recognised public research institution as relevant partner in their innovation efforts. (Centar za razvoj poduzetništva Tuzla, 2011)
production, pharmaceuticals and food production. It has retained a mining industry (iron ore and coal), and agricultural resources and forests represent an important asset (BIH exports wood). Only a few like Bosnalijek, pharmaceutical industry, are now strong enough to develop in-house research (Kaminski and Francis 2010), but even for them no reliable data can be obtained.

In increasing the innovation capacity, one of the important strategic actions should be rebuilding of industrial R&D by stimulating business sector to resume/start investing in R&D and innovation. Entrepreneurs are particularly important actors in innovation, as they help to turn ideas into commercial applications. In many developed countries, the data reveals that firms less than five years old accounted for nearly two-thirds of net new jobs. This is why the entrepreneurial environment and strength of business firms is an important segment of innovation capacity of any economy. And the support for entrepreneurship can be provided at the local, regional or state level.

EC Progress Report of 2012 stated that the “country lacks a comprehensive industrial policy and an updated framework for SME policy. Coordination between the Entities remains the key issue for promoting enterprise development. Overall, preparations in the fields of industrial policy and SMEs remain at an early stage” (EC 2012). While the strategies for promotion of SMEs are being developed by each entity, the studies assessing their R&D potential warn that most of the enterprises are too small and understaffed to be able to participate in implementation of R&D projects (MAPEER 2011; CPU 2010). As noted by the MAPEER project: “More concentrated on the short term goals, SMEs choose programs and activities which could bring them fast benefits, rather than R&D opportunities important for their long term competitiveness. Adopting standards of Quality Management System and other production and administrative certificates were, and still is, one of the most popular activities demanded by the SMEs to be supported by the programs of Entity ministries. Additionally, missing of the dialogue with Universities and Institutes, determines their objectives and intentions towards the activities other than R&D.”

Sponsored by various international founders, a number of cluster initiatives have taken place over the recent years, yet only limited numbers of the clusters still exist. Most of them have not been able to develop towards the clusters in “Porter sense”: the vertically and horizontally integrated firms, which are reinforcing each other’s competitive position through R&D and innovation.

As limiting factors to innovation activity of SMEs the lack of qualified personnel has been reported by some studies, including poor entrepreneurial education. Especially lack of knowledge on innovation processes, marketing analysis and opportunities as well as contemporary management techniques were identified, along with lack of external technical support. Firms cite difficulties in finding partners in innovation
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process as one of the obstacles to undertaking innovation projects (Preduzetnički centar Tuzla 2011). Education and training policies should help foster an entrepreneurial culture by instilling the skills and attitudes needed for creative enterprise. This opens another area of possible cooperation between universities and business firms and can importantly contribute to increasing the potential for further development of project-based cooperation.

Among the reasons cited for low degree of cooperation between business sector and public research organisations has often been the lack of information on the research activities as well as possible service which could be provided by the PROs. The business sector sees universities primarily or exclusively as educational institutions and do not see them as entities where potential assistance for their relatively specific and often short-term problems can be obtained.

Similar problem can be identified at the site of higher education institutions which don’t have developed technology transfer offices or other intermediary mechanisms to offer services to business sector. Firms complain that the services offered by the PROs are expensive and too slow in implementation. Often the reasons for poor cooperation lie in already identified poor capacity of the firms for innovation activity due to limited human resources.

In most transition countries, similar or same observations were found. The standard policy response is the formation of intermediary institutions, like innovation centres, technology centres or parks, incubators, etc. This has been taking place also in BIH. The question which remains is the coordination of various institutions put in place by different stakeholders, their networking and especially their capacity to implement fully a demanding task of providing a bridge between public R&D and business as well as promoter of innovation activity. Increased involvement of the local government in the formation of intermediary institutions is important, since this way a better incorporation of the local economic strengths and weaknesses is possible.

The increasing importance of innovation governance stems from the new role of governments as facilitators and equal partners, rather than controllers of research and innovation systems changing (EC 2009). Existing governance system in the RTDI area in BIH is complex, since it follows the political and administrative set-up of the country. Responsibilities over different segments of the policy are scattered and divided among the state, entity and canton level. Such heterogeneity necessary entails a much more complicated and time consuming coordination and can often result in less than optimal transparency and insufficient complementarity of the support measures at various organisational levels.

While the impact of various international practices/consultancies, including “Europeanization” of innovation policies may have many positive impacts, it also
poses a danger of uncritical imitation of institutions, measures and instruments, without needed reflection on own capabilities and resources. Yet the capability to adjust the measures and instruments—best practices, seen in other environments, to one’s own environment and circumstances is one of the essential elements of good governance. This calls for careful assessment and critical “import” of good practices, suitable for the local environment.

Conclusions

The complexity of innovation processes and systems provides few shortcuts if one tries to put R&D and innovation in service of local development. Yet, systematic and continuous approach with a clear goal of improving innovation capacity at all levels should bring about positive results.

There is considerable scope to improve the efficiency of government spending and innovate in the delivery of public services. Reforms of education and training systems and public research institutions, for example, can help increase returns from public investment in innovation. Moreover, many policy actions that can help strengthen innovation do not require additional or significant public investment. Structural policy reforms of the framework conditions that support innovation, such as the removal of regulatory barriers to innovation and entrepreneurship, including administrative regulations, as well pro-growth tax reforms, can do much to strengthen innovation and growth.

The innovation policy must take the existing industrial structure as a starting point, developing existing competences in a more productive and innovative direction. The institutions for research and education should be encouraged to develop competences that can strengthen these processes (Knell 2012), since human capital is the essence of innovation. Empowering people to innovate relies on broad and relevant education as well as on the development of wide-ranging skills that complement formal education (OECD 2010). Universities, colleges and vocational training centres are essential nodes in the innovation system, both producing and attracting the human capital needed for innovation. These institutions act as essential bridges between players – businesses and governments.

It is essential that the concrete set-up of the policy mix is tailored to the specific needs of a given country, region or local entity. There is not a one-fit-all solution and, therefore, the recommendations/conclusions for success proposed in this literature survey will mostly remain rather broad and inconclusive. The generic lesson for all, however, is that while many considerations will dictate the choice of specific options in the short-term, all of these choices should be made within the context of longer-term strategies that foresee the balanced development of all parts of R&D
and innovation systems. The experience of transition countries shows that they have broadened the scope of instruments, mechanism, actors and institutions that are relevant for the efficient innovation policy, however, due to underdeveloped framework for innovations in the past they have based their innovation policy to a much more pronounced extent on the EU policy recommendations. Further, lack of experience and tradition in innovation governance seems to limit their ability to successfully integrate transferred policy to national environment. Country-specific factors (institutional set-up, structural characteristics, relations between stakeholders) are very important in innovative capacity building and accordingly also in shaping innovation policy and governing it at the national or EU level (Bučar and Stare 2010).

The analysis of the countries that in the history were successful in catching-up with more developed countries by leap-frogging certain development stages shows that this was never achieved without a conscious action of the government. The transformation of R&D and educational systems towards innovation does not occur by spontaneous activity of the free market or even by increased investment in R&D. Contrary to this, the very nature of innovation as an endogenous process calls for the type of economic growth which is imbedded in the overall social, cultural and institutional framework of a country (Švarc 2006: 337). A pro-active role of the government as well as wider society is therefore needed, or in the words of (Abramovitz 1986) sufficient “social capability”, which in turn determines the ability for technological and structural transformation of a country and thus opens a possibility for catching up and a transition to knowledge-based economy/society (Bučar 2011).

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9 Freeman (1989) points out the complexity of such undertakings: The success of any country to catch-up within next decades depends crucially on their ability for institutional innovation, infrastructure, investment in education, S&T and last, but not least, on the international economic system.


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