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The Benefits and Limitations of Triple-Helix Collaboration: The Case Of Zagreb

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Abstract

In their development of national systems of innovation, catching up countries with low or moderate innovation performance usually focus on top-down approach and centralized implementation of innovation policy instruments. Given the limited resources and knowledge, there is a strong rationale for such an approach. However, this paper explores opportunities for a bottom-up approach based on co-ordination of different projects based on an evolving collaboration of research institutions, companies and local administration. Under certain conditions, a dense collaboration network offers a potential for a strong contribution to the national innovation system. In Croatia, such opportunities emerge from access to European Structural and Investments Funds (ESIF) and Horizon 2020 which complement limited availability of national sources.

The paper is built upon two methodological pillars – an analysis of innovation policy in Croatia (mostly based on RIO reports) and a case study of the City of Zagreb as a key contributor to innovative activities. The paper analyses the actual and potential contribution of the innovation system of the City of Zagreb to the implementation of the national innovation strategy and smart specialisation strategy. Based on ongoing collaboration between the University of Zagreb, the Ruđer Bošković Institute (the largest public research institute in Croatia) and local administration, key R&D and innovation (RDI) projects which are co-financed by ESIF and business sector are being gradually interconnected, with a potential to integrate them into a mutually reinforcing ecosystem. Although the projects are developed locally, their approval, monitoring and evaluation are done at the national and EU levels.

Initial results indicate that local triple helix initiatives in key cities/regions contribute to bridging the gap between science and industry, foster an increased number of proposed and implemented RDI projects and enable a stronger ecosystem for innovative start-ups. That also contributes to the effectiveness of the national system of innovation, as well to the implementation of the innovation policy. However, the strength of these effects is likely to vary and depend upon specific conditions in a given environment.

To be successful, such initiatives need a critical mass of resources and existing linkages. However, there are also risks and limitations involved. Too strong reliance on external financing may lead to suboptimal choice of projects, and synergies with Horizon 2020 and market-driven innovation are sometimes difficult to achieve and sustain over time. Furthermore, the development of the start-up population is not necessarily linked to RDI, as their development patterns tend to differ and have shorter time horizons. Finally, the success

of local triple helix partnerships can also lead to disproportionate utilisation of ESIF by metropolitan regions and thereby can increase regional disparities within a country.

Keywords: Croatia, innovation system, innovation policy, smart specialisation, triple helix
Track: Governance

Word count: 7.062

1. Introduction

A novel element of the EU policy for the period 2014-2020 was the introduction of preconditions (*ex ante* conditionalities) for member states to be fulfilled, in order to receive funding from the European Structural and Investment Funds (ESIF). This mechanism was conceived in order to allocate public funding in an optimal manner, which would yield the maximum impact of Cohesion policies.

Preconditions covered a wide variety of thematic objectives (TO). *Ex ante* conditionality for Research and innovation, TO “Strengthening research, technological development and innovation“, asked member states to identify specialisation areas which best fit their innovation potential, based on local resources and capabilities, i.e. to devise a national or regional smart specialisation strategy.

This paper assesses the implementation of Smart Specialisation Strategy (S3) at the local level in Croatia, via a novel hybrid organisation called “centre of competence” (CEKOM, by the Croatian acronym), which is tasked with a role of being one of key mechanisms of S3 implementation, on a local level. The City of Zagreb represent a crucial local environment for S3 implementation in Croatia as the economic and social centre of the country. Therefore, the underlying concepts of the local implementation of S3 are based on the two-dimensional model - place-based approach of S3 implementation (in which CEKOMs are viewed as geographically and spatially conditioned phenomena), and local innovation system (emphasising the bottom-up governance and devolution of responsibilities). These elements are analysed in more detail in the following sections.

The economic performance of a country is determined by several factors, one of which is its innovation capability. The number of actors, dynamics and infrastructures that make up innovation systems seems to be volatile: their creation and disappearance are a manifestation of broader societal forces, which are constantly in flux. This is accordingly reflected in cooperation between academia, industry and public administration, known as the “Triple Helix”. These interactions are known to be adaptable and unstable, thus avoiding over-determination (Etzkowitz & Leydesdorff, 2005).

Due to the fact that S3 in Croatia is still in its infancy (the Strategy was adopted in April 2016, and CEKOMs are in their formative phase), this paper assesses the context of the CEKOMs’ evolution/development. Namely, the paper is based on observations gained during the preparation of three CEKOM project proposals, which involved production of comprehensive study documentation, feasibility studies, cost-benefit analyses and supporting documentation.

Centres of competence, which present a type of a hybrid organisations (in line with ‘Triple Helix III’ configuration), networked entities managed by the industry, with a purpose to support capacity building of the business sector (mostly small and medium sized enterprises lacking internal R&D capacities) for the implementation of R&D projects (in particular those dealing with development and applied research and commercialisation of results), as well as their cooperation with research organisations, in line with the thematic areas identified in the Smart Specialisation Strategy.

2. Innovation Policy and National Innovation System in Croatia

2.1 An Overview of Innovation Policy

Croatia’s lagging behind of EU R&D investment efforts puts it into a „moderate innovator“ (European Innovation Scoreboard, 2017) group of countries. In order to intensify the efforts of getting closer to more R&D-intensive and competitive countries, Croatia should strengthen its research and innovation capacities and increase its R&D funding. However, in this respect, Croatia arguably follows the well-known paradox, recognized by (Oughton, Landabaso & Morgan, 2002), which is the „apparent contradiction between the comparatively greater need to spend on innovation in lagging regions and their relatively lower capacity to absorb public funds earmarked for the promotion of innovation and to invest in innovation related activities, compared to more advanced regions.

Croatia’s economy is currently growing, whereas the share of public debt in GDP is decreasing. The positive financial situation Croatia is going through, after adverse effects of economic crisis and a prolonged recession which lasted for six years, provides an optimistic mid-term outlook. For the first time since its independence, Croatia has in 2017 delivered a budget surplus (HINA, 2018). Croatia should use the momentum of these positive tailwinds to push through RDI policy reforms, and more ambitiously focus on absorption of available ESI funds and coupling them with private investments. In spite of being a lagging country, the potential impact of expected public and private investments in RDI on Croatia’s economic growth is actually higher than in developed countries with front running innovation systems, due to larger opportunities for catching up. Namely, (social) rates of return to R&D gradually decline as country’s development levels and per capita GDP rise, as demonstrated by (Lederman & Maloney, 2003). This could allow Croatia to leapfrog from the current low rank of R&D intensity, towards the upper tier of R&D intense economies.

On the global level, Global Competitiveness Index for the period 2014-2015, conducted by World Economic Forum, ranks Croatia as the 77th, out of 144 analysed countries. World Bank’s Doing Business ranking for 2018, measuring the ease of doing business, showed serious decline of Croatia’s position: it deteriorated to 51 in 2017 from 43 in 2016.

When compared to European counterparts, Croatia has one of the lowest levels of R&D intensity. Croatian gross domestic expenditure on R&D (GERD) remains well below the national target of 1.4% of GDP, with the EU target (Europe 2020 Strategy) being set much higher, at 3% of GDP. Nevertheless, GERD, which is used to measure the R&D intensity, has

been steadily increasing for the past three years in Croatia; in 2016 it amounted to €388m, compared to €375m in 2015 and €340m in 2014. (JRC, 2017).

The major impediment to more ambitious R&D performance is the lack of sufficient funding, as well as an unfavourable composition of funding streams. Implementation of Croatian innovation policy, first and foremost is dependent upon one dominant stream of funding, i.e. ESIF, primarily via Operational Programme "Competitiveness and Cohesion" (OPCC) 2014 - 2020. Allocation from ESIF for OPCC 2014-2020 totals €6.8bn, presenting significant means of addressing the needs and opportunities within designated prioritized policy sectors. Over-reliance on ESIF is indicative of very poor business expenditures on R&D, which in 2015 amounted to 0.44% of GDP, much lower than the EU 28 average (1.3%).

In order to increase investments in R&D under OPCC, about 57% of ERDF resources (OPCC, 2014) are allocated to supporting R&D, technological development and innovation, the digital agenda, the competitiveness of small and medium-sized enterprises (SMEs), and the shift to low-carbon economy, which presents about 12% of structural funds allocation to Croatia.

Croatia's RDI policy has suffered from the lack of co-ordination and continuity. Low commitment has contributed to low levels and high volatility of R&D funding and has hampered long-term orientations as regards human resources, and investment in innovation (OECD, 2014). Fragmentation of national research and innovation system has not been adequately addressed since the initiation of innovation policy in 2001, due to the lack of synergies between ministries and agencies responsible for research on the one hand and entrepreneurship and economy on the other. More recently, in the context of preparation of framework for ESIF absorption, reforms targeted at building a more coherent and integrated RDI policy framework has been undertaken. The 2014-2020 programming period is Croatia's first full cycle with access to ESIF, which will provide an important source of financing for both public and private sectors. As it has been observed in (Račić *et al*), the reforms led to certain improvements of RDI governance, primarily through the adoption of new strategic documents (with a focus on Smart Specialisation Strategy), re-organisation of management structures and support instruments. It remains to be seen whether that will lead to improvement of resources' allocation efficiency and the framework conditions for business.

Given the fact that Croatia's degree of innovation performance is still significantly lower than the EU average, it is fair to say that centralized, top-down approach to governing has proved to be unsuccessful. Therefore, opportunities to reform/upgrade this system by introducing bottom-up approach should be explored.

The gap at the regional and local levels has been particularly pronounced. Despite a reasonably well-developed network of universities (including their technology transfer offices) and entrepreneurship support institutions, only one innovation policy measure (Proof of Concept) has ever been implemented with strong participation from the local level. Despite positive experiences in terms of widening participation and growth of local capabilities, this approach has not been extended further, and the Croatian innovation policy remains heavily

centralised. Given that key public and private RDI actors also tend to be located in major urban centres, this creates a challenge to regional development as well.

In 2011, an evaluation by Švarc (Švarc, 2011) indicated that in Croatia, the systemic model of national innovation system was substituted by a fractionalised and narrow-scope version. The identified factors included a complex set of mutually interconnected factors, including economic deficiencies, public administration deficits, mind-set of the political elite and socio-cultural factors not conducive to innovation. Despite significant changes and some improvements in the meantime, it can be argued that these criticisms are still at least partly relevant.

Main mechanisms comprising national innovation systems, as identified by Doloreux (Doloreux, 2002) reflect four innovation pillars -: companies, academia and research institutions, governing bodies, knowledge infrastructures, and innovative policy (Doloreux, 2002). In Croatia, the vast majority of companies (99%; S3, 2013) are small and medium enterprises (however, with limited capacities to absorb and promote innovation). While relatively high number of institutions (184¹) are registered to perform scientific activities, their cooperation with industry should be improved and facilitated. Governing bodies primarily include government organisations (e.g. ministries, agencies, etc.), which dedicate (EU and national) funding for development of research and innovation infrastructures, as well as funding for research, development and innovation activities. Abundant amount of different strategic documents has been developed and adopted to ensure complementarity with different requirements of the European Commission to facilitate funding for dedicated scope of innovation-related activities (e.g. S3, Strategy for Fostering Innovation in the Republic of Croatia, Industrial Strategy of the Republic of Croatia 2014-2020, etc.). These documents have provided frameworks and mechanisms for facilitating innovation development, as well as enabling EU-funding for relatively large scope of innovation activities. However, the practical mechanisms (such as innovation vouchers, public procurement for innovation and other supply-side policies) still have not been put into practice. In addition, the administrative requirements and criteria set to evaluate innovation project proposals for EU-funding have been set in a way that administrative requirements differ from the ordinary business practice, while some of the criteria leave the possibility of provisional assessment.

- When it comes to knowledge infrastructures, these are relatively well developed in Croatia and comprise different types of organisations, such as: Technology parks (e.g. Technology Park Zagreb (TPZ), Technology park Varaždin, The Science and technology park of the University of Rijeka – Step Ri),
- Technology transfer centres (e.g. Technology transfer Centre at Faculty of Mechanical Engineering and Naval Architecture of the University of Zagreb, TERA Tehnopolis (co-founded by the University of Osijek), Technology Innovation Centre Međimurje (founded by the by the Regional Development Agency Međimurje – REDEA),

¹ They consist of various organizational models: 25 public research institutes and 91 higher education institutions; several research institutes which are state owned and oriented to market research; around 25 private research organisations (either independent institutes or part of corporations). Private sector R&D activities are primarily concentrated in a few large multinational companies: PLIVA (pharmaceuticals), Ericsson Nikola Tesla (ICT), Podravka (food industry) and Končar – Electrical Engineering Institute (electrical engineering)

Technological-Innovation Center Rijeka, The Research Centre for Material in the Region of Istria - METRIS (founded by the Istria County and Istrian development agency), Ruđer innovations (Ruđer Bošković Institute's company specializing in the commercialization of innovations and technology transfer), Technology centre Split and Mariculture Business Innovation Center of the University of Dubrovnik – MARIBIC),

- Technology transfer offices (TTOs) at Universities (Centre for Research, Development and Technology Transfer of the University of Zagreb, Technology transfer office at the University of Rijeka and the Centre for Science and Technology Development of the University of Split), and
- Business incubators (Business incubator BIOS, Osijek and Business-technology incubator, Industrial park Nova Gradiška) (Bačić & Aralica, 2017).

2.2 Challenges within the National Innovation System

As reported in RIO report (Račić, Švarc & Hristov, 2017), in 2016 there were four key challenges hindering Croatian innovation performance: Increasing the R&I funding and improving the absorption of ESIF; Building a coherent and integrated R&I policy framework; Strengthening the private sector's R&I capability and improving the business innovation environment; and lastly Strengthening the public R&I capability.

Out of four prevalent challenges, the one receiving most attention is the one concerning lack of funding. This is not surprising as it is a straightforward issue, therefore the most under public scrutiny. Increasing the R&I funding and improving the absorption of ESIF (Račić, Švarc & Hristov, 2017) hasn't progressed much since Croatia joined the EU. Insufficient capacities, both human and financial, may turn out to be a tough nut to crack. Namely, ESIF represents a fiscal transfer system to underdeveloped regions by attaching a set of strings to recipients. Those could be managed by putting in place adequate capacities for absorption of ESIF for the benefits of national development. However, absorption of funding per se is not a solution: investing into R&D infrastructure, which might officially contribute to enlarged absorption figures, will not automatically lead to improved R&D performance.

The second challenge addresses lack of favourable business climate, or, broadly put, business enhancing ecosystem. Strengthening the private sector R&I capabilities and improving the business innovation environment (Račić *et al*) looks at the private sector from dual perspective: active - private investments in RDI, and passive – public funding for growth of business RDI; they both remain low. An important structural deficit hindering business innovation environment is the imbalance between labour demand and supply. On the one hand, this is a question of securing a sufficient number of skilled workers, and on the other, securing they have the right mix of skills. This challenge requires conducting a thorough needs assessment of the business sector which would result in a (re)design and implementation of policy instruments in a more coherent and strategic manner, which leads to the third challenge. Inadequate framework conditions, including unpredictable and complex institutional and regulatory configurations, as well as frequent alterations of policies and their mutual unalignment, obstruct innovation performance. Therefore, they should also be improved, especially for new market entrants who can offer innovative products, services and technologies and challenge the incumbents.

The final challenge analysed here involves strengthening of the public RDI capability. Public research and its transfer into the economy remains essential for innovation despite the challenges to the traditional linear science-push models of innovation development in favour of market-pull and open innovation, as well as the nonlinear dynamics due to ongoing interaction of actors involved - cf. (Etzkowitz & Leydesdorff, 2000). Largest Croatian universities remain fragmented, with faculties usually organised as separate legal entities. Coherent long-term planning, setting research priorities and facilitating innovation and science-industry collaboration remain a challenge which is successfully addressed only by some faculties and departments. Public research institutes are somewhat more flexible in their management practices. They mostly focus on basic research, and remain weakly linked to both universities and companies. Although public research is still largely underfunded and fragmented, there have been improvements in governance. Responsibility for financing competitive research projects was transferred to the Croatian Science Foundation, which implemented a more rigorous project evaluation process aimed at selection of fewer high quality research projects. Moreover, thirteen centres of research excellence were established in 2014 and 2015. Following their financing from the state budget, a restricted call made ESIF funding available to them as well (Račić *et al*).

3. Smart Specialisation Strategy

Smart specialisation strategies are a relatively new instrument in national and regional policies, with no predecessor in their full scope anywhere in Europe, which would then act as a demonstrator and steer towards certain practices and turn away from the others. As Radosevic and Ciampi Stancova rightly state, „Smart specialisation is currently probably the largest innovation policy experiment in the world.“ (Radosevic & Ciampi Stancova, 2015).

Croatian S3 (Official Gazette 32/2016) focuses on five thematic priorities, as determined through the entrepreneurial discovery process (EDP), which let business sector decide on a limited number of RDI priorities, holding most relevance for developmental directions. Those five thematic areas are: health and quality of life, energy and sustainable environment, transport and mobility, security, and finally food and bio-economy. ICT and Key enabling technologies (KETs) are recognized as horizontal themes, linking the five thematic priorities.

By building upon relevant aspects from other national strategies, it provided continuity of policy measures, upgraded into a single coherent strategic framework. Due to its emphasis on the process of entrepreneurial discovery, whereby private sector gets to decide which context-dependent activities will be in the spotlight in the upcoming periods, it is fair to say that S3 recognizes the importance of bottom-up processes.

Limited number of selected thematic priorities is in line with one of the basic postulates of smart specialisation, the “related variety“ concept (Frenken, van Oort & Verburg, 2007) which states that benefits, in the way of knowledge spillovers, occur among related sectors as they draw on similar knowledge, and much less among disparate sectors, with no common ground to tie them. S3 thematic priorities are, similarly, based on preferential support to such activities that build upon (productivity enhancing) existing assets, capabilities and skills, which will allow recombination across industries and inter-industry knowledge transfer, with

the main objective of impacting RDI performance and consequently economic growth. Even more so, this is strongly pertinent to smart specialisation as it allows for targeted and selected concentration on particular priorities to adhere to, in order to reap the benefits, i.e. achieve greater potential impact on regional development (Foray, 2015). Not of less importance, this approach would help adjust appropriate funding to designated selected priorities, which would hence contribute to more robust planning of EU financial period 2104-2020, i.e. prevent or decrease the dissipation of public resources and funding.

The linkages and interdependency of industry–academia (and research organisations)–government, as the most commonly considered actors in knowledge-based economies, have been known to form a policy configuration of Triple helix. As was demonstrated by (Etzkowitz & Leydesdorff, 2005), the predominant and most desirable form of their collaboration is “Triple Helix III”, i.e. a knowledge infrastructure of intersecting institutional spheres, whereby academia, state and industry each take the role of the other and whereby hybrid organisations emerge at the interfaces. This model stands in contrast to the “statist” model (“Triple Helix I”) whereby government controls industry and academia, and to the “laissez-faire” model (“Triple Helix II”), in which government is limited to addressing market failures. Three of the most relevant hybrid organisations in Croatian context are embodied in Centres of competence (CEKOMs), Centres of research excellence and Competitiveness clusters. As such, they are important building blocks for the implementation of the Smart Specialisation Strategy.

Centres of competence, which present a type of a hybrid organisation (in line with ‘Triple Helix III’ configuration), networked entities managed by the industry, whose purpose is to support capacity building of the business sector (mostly small and medium sized enterprises lacking internal R&D capacities) for the implementation of R&D projects (in particular those dealing with development and applied research and commercialisation of results) in line with the thematic areas identified in the Smart Specialisation Strategy. Their main objective is to increase the competitiveness of the business sector through investing in R & D and increase spending on research and development of the business sector. They consist of, in various combinations, all classes of stakeholders (private, academia, research organisations, local administration), and present a potential leveraging tool for boosting innovation and productivity.

During 2016, the Ministry of Economy, Entrepreneurship and Crafts and Ministry of Science and Education have launched first ESIF calls, including Competency and development of SMEs, Innovations in newly established SMEs, Increasing the development of new products and services resulting from R&D activities. Those calls were soon after followed by the restricted calls Support to the development of centres of competence and centres of research excellence. In addition to preparation of research infrastructure call, which was expected in 2017 but postponed to 2018, the calls for centres of research excellence and centres of competence are crucial for setting the foundation of Croatian research infrastructure ecosystem, covering all R&D phases, from basic to applied research and experimental development over the next 3-5 years.

MSE established thirteen centres of research excellence in 2014 and 2015. They gather the best researchers in particular (sub-)fields of science and are focused on contemporary research topics. They are expected to act as internationally competitive and recognizable research groups in terms of quality and scope of scientific production and to engage in effective international cooperation

Centres of competence are envisaged as networked entities managed by the business sector, whose purpose is to support companies 'capacity building (primarily in small and medium sized enterprises lacking internal R&D capacities) for the implementation of R&D projects in line with the thematic areas identified in the Smart Specialisation Strategy. Their main objective is to increase the competitiveness of the business sector by investing in R&D as well as their expenditure for research and development. There were four models of CEKOMs, depending on the type of legal entity of the applicant and project partners, which could be industry, higher education and research organisations, local government and business associations.

Competitiveness clusters² have been established according to sectors of strategic importance to Croatia, as defined in the Industrial Strategy 2014–2020, with the aim of implementing Triple-Helix collaborations and strengthening of sectoral competitiveness. Clusters had an important role in initial support to potential centres of competence, as they were responsible for awarding the status of projects of national interest, which was a requirement for centres to apply and participate in public calls of centres of competence.

The process of entrepreneurial discovery (EDP) is corresponding with today's Zeitgeist. Namely, which niches and industries should businesses orientate towards is best discerned via interactive process of EDP, whereby companies themselves, together with other innovation system stakeholders, identify and choose their desired lines of business activities and future developmental agenda. The process of discovering such activities, through which the region is most likely to excel, rests on exploiting region's existing capabilities and productive assets. It therefore does not rely on former, "set in stone" advantages, and considers history as a source of pride, but not an anchor. Public bodies' role is to evaluate the results of EDP and assess the capabilities of business sector for achieving the potential in development of new niches and emerging industries. This indicates that the task of selecting and prioritising the sectors and niches has slipped from the hands of the (before ever-so-present) comprehensive planner (Foray & Goenega, 2003), and has been equalled to entrepreneurial self-discovery (Hausmann & Rodrik, 2003).

3.1 Centres of competence (CEKOMs)

This section explores the potential of centres of competence to contribute to efficient RDI co-operation among different stakeholders and the innovation system as a whole and become

² Today, there are 13 competitiveness clusters, as follows: food processing, wood processing, automotive industry, creative and cultural industries, textile, leather goods and footwear, defence, construction, electrical and mechanical machinery and technology, healthcare, chemical, plastics and rubber, ICT, maritime industry and personalized medicine.

change agents which act as a mobilizing element in Croatian innovation system. The complexity of its implementation will require strong commitment of relevant institutions and development of policy implementation capabilities at national and regional levels.

As already outlined, in August 2016 MEEC launched a restricted call for project proposals for grants for Support to the development of centres of competence. The overall budget of the public call totalled €105m, while maximum grant amount per applicant was €15m. The call was a two-stage process. The first stage was intended for collecting expressions of interest, whereby each applicant had to prepare a Strategy of R&D projects, expected final results, proposed commercialisation strategies, accompanied by the Action plan, which defined project duration phases and indicative project value. The second stage was opened for the 34 pre-selected applicants only, who were asked to apply with their project proposals by the end of 2017.

Centres of competence shall bring about multiple opportunities to foster R&D cooperation and RDI activities in general. That will include establishment of new RDI partnerships, involvement of new companies (in particular SMEs) into RDI, for whom co-financing reduces costs and risks, commercialisation of intellectual property developed both previously and during RDI activities, creation of new research jobs in public and private sectors, strengthening of human capital and organisational capabilities and contribution to regional development and internationalisation.

- A staple concept underlying CEKOMs is a notion of “efficient cooperation”, which had to be proven by signing the Pre-Selection Agreement on applicants’ alliance. While the basic term “efficient cooperation” has primarily been set by the EC (Commission Regulation (EU) No 651/2014 (General Block Exemption Regulation) within the regulation related to issues of State Aid in supporting RDI, Croatian MEEC insisted on setting additional criteria to prove the “efficient cooperation” as a precondition for achieving the maximum rate of co-funding of RDI activities within the CEKOM projects. For example, the organisations for research and knowledge dissemination, which have the maximum co-funding rate between 85% and 100% of eligible costs, need to participate in total costs in the amount between 10 and 50 % of total costs and are entitled to publish scientific publications based on the research conducted within the project. However, they are not entitled to claim intellectual property on the research results – these are to be claimed by the companies participating in RDI projects within the CEKOM.

During the project preparation phase, several problematic issues emerged, which could be summed up as adhering to Commission Regulation (EU) No 651/2014 (General Block Exemption Regulation) rules too strictly. They include the following:

1. The process of receiving applications was based on a rolling basis, which ran a risk of evaluating applications solely according to the order in which they arrived („first come first serve“ model). Instead, satisfactory solution would have been to wait for the deadline to pass and then benchmark all applications in parallel, giving them the same starting position.

As no decision on financing CEKOMs was yet made, it is unknown whether evaluation criteria would reward the timing of applying or quality.

2. Taking into account that (a) Croatia is a small country and that there is no surplus of experts in any specialized field, and (b) majority of experts were already taken by participating themselves in prospective CEKOMs therefore competing for the same stream of funding, it is questionable who those evaluators will be? Evaluators can be only domestic experts, as translating large quantities of CEKOM documentation to English would be cost intensive. Another issue represents the potential conflict of interest, as it is possible that due to earlier unresolved issues, evaluators grade some prospective CEKOMs poorly.
3. Quality assessment awards an increase of exporting revenue from all partners, with more than 50% increase bringing the highest score. This is a hostile criterion for companies that are big exporters already, as it is highly unrealistic that any such company would be able to increase its export by more than 50%.
4. According to the rules of the Call, intellectual property arising from collaborative projects solely and exclusively belongs to entrepreneurs, i.e. private sector. Given that intellectual property will be the result of joint R&D activities between entrepreneurs and academic researchers, whereby researchers' contribution can involve significant inputs, knowledge and creativity, all participating parties should be recognized as equal, and awarded accordingly.

While CEKOMs are intended to leverage greater cooperation among main innovation system actors, they have been envisaged as significantly complex hybrid organisations – from one side supported by the policy-making level, at the other side not recognised as “official” organisations defined in relevant legislation, in any form other than consortia of different business subjects unified in joint purpose. In its initial idea, CEKOMs should have provided an efficient framework and facilitating environment for development of innovative products, services and processes. However, the initial rules set by the EC have been additionally complicated in relation to the development and application of CEKOM projects, with scarce information on the rules of their actual implementation and reporting,

As a first of their kind, with no similar antecedents, it remains to be seen whether CEKOMs will bring about any significant change, although expectations are high.

3.2 Place based approach

Place based approach underpins the EU Cohesion 2014-2020 policy, where economic transformation is devised to happen as a territorialised process, respecting the key priority sectors of each country and region. The shift towards more place-based agenda in EU policymaking was building up since 2000s, but especially came to the fore with the Barca report in 2009 (Barca, 2009). The report proposed measures to reform the EU Cohesion policy, post 2013 period and highlighted locally grounded, context specific and territorial approach to investments, leading to “a place-based approach to meeting European Union challenges”. Another impetus for place-based policy-making has been the EU Territorial Agenda from 2011.

Place-based approach to development holds particular importance in regards to innovation, due to the agglomeration economies and proximity of main RDI actors. As is a known staple in developmental policies, RDI actors tend to geographically cluster together, as “ideas move

imperfectly over space”, as aptly put by Glaeser (Glaeser & Gottlieb, 2009). Agglomeration benefits thus accrue from RDI actors clustering together and sharing technological and non-technological know-how. The inherent concept behind smart specialisation is taking advantage of local knowledge-enhancement mechanisms, which are specific to different countries and regions, and tailoring economic growth policies as a custom-built approach. Therefore, S3 represents a tool for applying place-based policies intended to achieve economic progress.

As the capital, Zagreb is endowed with a critical mass of resources and actors in academia, business and public-sector organisations, which have a potential to foster knowledge-based development. The co-operation projects which emerge currently mostly target financing from ESIF, including research infrastructure, science-industry RDI co-operation, centres of competence, business support institutions (with a focus on new technology-based firms and start-ups). This agglomeration of resources and projects is primarily path-dependent and often stems from centralisation which characterises Croatia, rather than from strategic rationales of the actors involved.

As was earlier stated, CEKOMs are spatially conditioned and adjusted to the local context in which they are envisaged to operate. They feed off local assets, local skilled workers and local knowledge infrastructure. Although they are envisaged to bring forward productivity enhancing measures at the national scale, they are, nonetheless, to be implemented at the local level and will initially have local effects. For example, 11 out of 34 proposed centres of competence are based in Zagreb, as well as 11 out of 13 centres of research excellence. This points to a high degree of centralisation within the RDI system, but also creates opportunities for synergies at the local level which can spill over to the national innovation system as well. Realisation of the potential for triple-helix collaboration involves a complex process of reform, co-development and mutual adaptation. In some cases, co-operation is motivated by risk minimisation and joint advocacy (e.g. in the case of collaborative research and science-industry projects in particular), whereas in others expected benefits and synergies are more pronounced. Some initiatives are also proposed by external actors (e.g. civil society, business angels, consultants etc.). Access to ESIF can play a useful role of providing tangible incentives and synergies to the aforementioned processes.

3.3 Local innovation system

As is often the case, metropolitan cities often outperform the state they are in. The City of Zagreb is no exception. GDP per capita in 2014 in the City of Zagreb amounted to 17.908 EUR, whereas Croatian average was 10.152 EUR (State Bureau of Statistics, 2014). Average monthly paid off net earnings in 2014 in the City of Zagreb were 860 EUR, i.e. above Croatia's average of 737 EUR. This favourable position is also reflected in RDI activities; as demonstrated by Bačić and Aralica (Bačić & Aralica, 2017), the City of Zagreb has the most favourable conditions in place for RDI activities.

Local innovation systems (LIS) could be analysed from two standpoints. First, LIS as an innovation signifier of an administrative unit (local administration) in abstracto, and second, as a specific, concrete geographical area of a particular city observed, time and space bound

(City of Zagreb), place based/place-specific. Strengthening local innovation ecosystems presupposes sufficient capacities for managing such systems. As a small and lagging economy, Croatia has historically been strengthening its central government structures. In the situation with scarce financial and human resources needed to run the whole cycle of such a policy (program, implement and monitor it), there was a strong rationale for such an approach.

Although it is focused on RDI activities, the implementation of the Smart Specialisation strategy should create positive spillovers on regional development. Although many projects (e.g. research infrastructure, centres of competence and excellence, RDI projects) are based in Zagreb, their reach extends throughout Croatia, where different partners and collaborators of such projects are based; these partners can profit from such linkages and develop them further in their local context, therefore contributing to regional competitiveness. Both knowledge and technology, arising in hubs, can be transferred to regional partners, leading to spill-over effects and locally created jobs in Croatian regions, especially in those where regional universities (e.g. Split, Rijeka, Osijek etc.) and SMEs are based. S3, as a predominately RDI boosting instrument, rewards excellence and therefore does not by itself serve as a compensation mechanism for regional disparities. However, if its implementation fosters RDI throughout Croatia, and is balanced by additional regional policy measures and instruments, the over effect on regional development in Croatia should be beneficial.

Although the projects around which Triple-Helix collaboration revolves around are in line with national strategies and the Zagreb development strategy, they are not directly related to their (top-down) implementation. The co-operation is based on a co-operation agreement between the academia and local government, signed in September 2015, which covers supporting the start-up and spin-off companies that arise as a result of research, supporting students in their independent entrepreneurial ventures, organising specialised events, networking scientists and students with innovative entrepreneurs, linking research infrastructure and further development of the University Innovation Network (which involves university faculties, companies and support institutions). Specific projects which often involve start-ups or other business ventures are covered by separate agreements and joint project applications.

4. Concluding remarks

Initial results indicate that local triple helix initiatives in key regions can contribute to bridging the gap between science and industry, foster an increased number of proposed and implemented RDI projects and enable a stronger ecosystem for innovative start-ups. That can also contribute to the effectiveness of the national system of innovation, as well to the implementation of the innovation policy. However, the strength of these effects is likely to vary and depend upon specific conditions in a given environment. To be successful, such initiatives need a critical mass of resources and existing linkages.

However, there are also risks and limitations involved. Too strong reliance on external financing may lead to suboptimal choice of projects, and synergies with Horizon 2020 and market-driven innovation are sometimes difficult to achieve and sustain over time. RDI projects, which are expected to contribute the most to the economic performance of the

country, are predominately financed via EU funds, while private funding of RDI, as demonstrated earlier, is insufficiently represented in the overall financial horizon. Private sector companies, in order to grow and invest further into RDI, can benefit from various incentives. However, as has recent research on reindustrialisation of Croatian economy, conducted by (Bačić & Aralica, 2017) has shown, the single most important incentive is tax exemption. Tax exemptions can complement direct support to specific projects and contribute to reindustrialisation; the impact of tax cuts on job creation in the industry is almost five times higher than the targeted subsidies for certain industrial sectors.

Furthermore, the development of the population of innovative start-ups is not necessarily linked to complex RDI, as their development patterns tend to differ and their founders and investors may face shorter time horizons. Finally, the success of local Triple-Helix partnerships can also lead to disproportionate utilisation of ESIF by metropolitan regions and thereby can increase regional disparities within a country.

Once the implementation of multiple ESIF-funded projects is up and running, it will be possible to thoroughly evaluate the policy behind it. Financial resources designated for its implementation should boost the innovation performance of the country, given the satisfactorily absorption of the ESIF, and contribute to resolving outstanding RDI challenges.

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