

SmartEIZ – H2020-TWINN-2015

**Strengthening scientific and research capacity of the Institute of Economics, Zagreb
as a cornerstone for Croatian socioeconomic growth through the implementation of
Smart Specialisation Strategy**

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Introduction

To compile a list of best practices, approaches and methods in the management of innovation and technology transfer is not an easy task given the enormous literature and approaches available. All research argues in their own favour and in some cases criticises other research, thus identifying best practices based on consensus found in the literature is practically impossible. However what can be done is examine the literature to identify common approaches and links across different topics.

The approach taken in this report is to carefully re-examine the extensive work conducted for deliverable D2.4 Twinning strategy for EIZ by taking the “Description of the selected topics in EMIT” as a reference point. For the selected topics in the field of “Economics and Management of Innovation and Technology” (EMIT) we identify trends and connections between the eight selected topics. The first element in the best practices that will be developed from this is a description of how the eight topics together form a coherent agenda for the advancement of the economy and society in a broad sense by means of innovation. The second element of the best practices is to show how the eight topics interconnect at a more detailed level, and how, by this interaction, they form a starting point for developing the twinning tools of the SmartEIZ project.

The eight selected topics in EMIT that have been selected for the SmartEIZ form the basis and focal point. These are the following:

1. The role of clusters in RIS3
2. Public Policies in the attraction of FDI and foster Strategic Alliances for RIS3
3. Global Value Chains

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4. Technology, Growth and Productivity
5. Science – Industry links
6. Skills and Technological Change: Policy issues
7. National Innovation Systems
8. Technology, Skills and Employment

In the next section, we will describe how these eight topics can be grouped and linked to cover different aspect of a development strategy based on innovation. This provides the broad conceptual basis for the development of the twinning tools of the project. Section 3 then describes a number of possible linkages between the topics that can be explored in the detailed design of the twinning tools.

A conceptual framework that united the topics of SmartEIZ

The eight topics can naturally be grouped into three broad headings: (1) how innovation and technological change affect the general level of well-being and the distribution of income; (2) how the innovation system works in terms of interactions between different categories of actors, and (3) how globalization and international interactions affect the working of the innovation system. Under the first group, we take on board topics 4 (*Technology, Growth and Productivity*), 6 (*Skills and Technological Change: Policy issues*) and 8 (*Technology, Skills and Employment*). Under the second group, we list topics 1 (*The role of clusters in RIS3*), 5 (*Science – industry links*) and 7 (*National innovation systems*) and under the third group we look at topics 2 (*Public Policies in the attraction of FDI and foster Strategic Alliances for RIS3*) and 3 (*Global Value Chains*).

Productivity growth, skills and labour demand, which are the main topics in the first group, are the direct drivers of economic well-being, as reflected in income (both at

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the national and personal level) and in the distribution of income across individuals (families) or regions. Productivity growth is the source of income growth, as it measures the amount of value added (which is equal to income) relative to the amount of inputs (labour and capital). Increasing productivity will lead to an increase of average income. This is addressed by Topic 4, and D2.4 of the SmartEIZ project summarizes the literature on this issue.

How total income generated in the economic process is divided between individuals depends to an important extent on the skills of individual workers, because these skills determine wages and other rewards for the provision of production factors (e.g., entrepreneurial income). Again, this is described in D2.4, in particular in the literature survey for Topic 8. This deliverable also described the stylized facts that high-skilled labour has seen a general uprise in supply over the past decades, and that many instances of technological change seem to save especially on low-skilled labour, leading to a general tendency for low-skilled labour to capture a smaller share of total economic value. The literature survey in D2.4 for Topic 6 summarizes how these and other trends (such as the increasing knowledge intensity of the economy) generally leads to skill mismatch (an inefficient allocation of skills across the many tasks that are performed in an economy), and how this may be addressed by public policy.

While the group of these three topics describes the direct determinants of the level of economic well-being, or the development level in general, and the distribution of income, they do not address in much detail the issue of how innovation and technological change actually emerge in modern age market economies. This is the domain of the second group of topics, which is generally concerned with the notion of innovation systems. At the most basic level, the D2.4 literature survey for Topic 7 describes how interaction between a diversity of economic agents is the basic ingredient in innovation systems. It also outlines how innovation systems theory is

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evolving, and how it may benefit from cross-fertilization with other literatures (in particular on entrepreneurship).

The other two topics in this group address more specific aspects of the innovation system. Topic 5 is concerned with the role of universities (and more generally public research organizations) and their interaction with the private sector (firms). The D2.4 literature survey for this topic shows how this form of interaction may be shaped according to a set of distinct innovation modes, and how this is ideally linked to the development stage of an innovation system. Topic 1 addresses the issue of regional system of innovation, which may lead to regional clusters of economic activity. The D2.4 literature survey on topic 1 shows how the notion of smart specialization strategies (S3) may be applied to public policy aimed at the generation and evolution of regional innovation systems.

The final group of topics looks at the effects of globalization and openness in innovation systems. Topic 2 addresses the role of Foreign Direct Investment (FDI) and the policies aimed at attracting it. The D2.4 literature survey on Topic 2 discusses how FDI affects innovation systems, both by enhancing their efficiency, and possibly by negatively affecting domestic capabilities. Topic 3 is concerned with the rise of global value chains. This D2.4 survey summarizes how GVCs affect interaction between systems, and how GVCs may be organized and can be measured.

The sequence of these three thematic groups of SmartEIZ topics provides a logical chain starting at the broad conceptual level of how innovation affects our economies, to the specific working of innovation as a systemic process, to the question how this system, and its outcomes, can be influenced by public policy. This sequence of analysis is an attractive way of organizing the topics in the twinning tools that need to be developed. Hence it is put forward here in its basic form so that future deliverables

of the project can use it to provide a coherent overview of how the topics are related to each other in a grand vision of the economic effects of innovation on development.

A best practice agenda for SmartEIZ twinning tools

In this section we will discuss the main topics that come under the heading of each of the three thematic groups presented in the previous section. Once again, the main source of inspiration will be the literature surveys of D2.4 of SmartEIZ, but we will be looking for unifying concepts within and between the groups. Such unifying concepts will be particularly relevant for the development of the twinning tools, as they provide avenues along which knowledge transfer in the workshop, courses and the like can be organized. In other words, these unifying concepts are presented with the aim to help the implementation of the twinning tools later on in the project.

Thematic group 1: building blocks

In this group, a first unifying concept can be found in the form of basic economic theory. All three topics in this theme build heavily on basic economic theory and the concepts that it proposes. This includes, for example, the notion of a production function and how it helps in both the theory of production and the theory of income distribution; the notions of production factors and in particular the role of human capital and knowledge as production factors that are crucially related to innovation; how the notion of an economic equilibrium and the dynamic evolution of such an equilibrium helps understanding a wide variety of processes, such as economic growth, (un)employment and income distribution; and finally what can and cannot be measured and what data requirements are posed by the desire to adequately measure the effects of innovation.

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While most of these detailed topics do not play a direct role in the literature on innovation systems, they are important building blocks in understanding how innovation systems work. For example, the understanding of productivity growth – including the associated notions of production functions and production factors – is the building block for analysing the performance of firms and how they are affected by interaction in the innovation system. The entire microeconomic literature on firm performance builds heavily on these building blocks, which makes this theme the best place to start the process of knowledge transfer in SmartEIZ.

Similar arguments apply to the topics of skill matching and their effect on (unemployment) and the income distribution. The innovation system literature rarely addresses these topics directly, but the tools under this heading are crucial for understanding how the productivity gains that are generated in the innovation system will be transferred to individuals.

Thematic group 2: innovation systems

This group looks in detail at the working of the innovation system. It also includes specific application areas to CEE countries, and Croatia in particular. This starts from a basic coverage of the innovation system. It stresses interaction between economic agents as the way in which innovation works, but also covers how over time the way of analysing the innovation system has changed. In particular, we cover how the development of the new notion of an innovation ecosystem puts much more emphasis on the dynamic evolution of the system than the original idea of a national innovation system did. We also look at how the incorporation of the analysis of entrepreneurship may help to make the innovation (eco)system approach more relevant.

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Entrepreneurship has traditionally been a field of study that developed independently of the analysis of innovation systems. It was also more focused at the micro level of analysis, looking at motivations of individual entrepreneurs, or the way in which individual start-up firms operate in the market. Innovation systems analysis, on the other hand, looked more at the aggregate level of a country, a region or a sector, and it tended to ignore the role of young firms and entrepreneurial start-ups. Thus, a loser incorporation of the entrepreneurship phenomenon in innovation systems will both extend the coverage of the set of agents that are active in the system, and enrich the analysis in terms of making it more multi-level.

The analysis of science-industry links is an application within the innovation systems theme, and provides a good opportunity to make the topic specifically relevant for Croatia. This is done by the recognition that firms will generally apply one of a number of distinct learning modes, that these learning modes are found more often in particular stages of development, and that they require different forms of interaction between industry and science. In particular, we can distinguish a Doing, Using and Interacting (DUI) mode of learning vs. a Science, Technology and Innovation (STI) mode of learning. In the former of these two, firms rely to a large extent on learning methods that are close to their normal production practice, while in the latter mode they rely to a larger extent on scientific knowledge.

The DUI mode is better equipped for firms working on a developing innovation system that relies on imitation and adaptation of foreign knowledge to the local system, while the STI mode works better in more advanced innovation systems that operate closer to the frontier. It is observed that in Croatia, firms, universities and public research organizations operate more often in a joint DUI mode.

The final topic under this theme brings the notion of innovation systems to the local level. This starts from the idea that local clusters of economic activity are a good unit

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of analysis because they can be characterized on the basis of a multitude of factors, including geographical proximity and the interaction that it facilitates, social and cultural factors, and political and institutional factors. The way in which the organization of local clusters is implemented may enable these clusters to act as growth engines in which knowledge flows relatively freely and hence will lead to high productivity growth. These clusters are also the relevant units for the application for smart specialization strategies, which aim to strengthen existing capabilities of the cluster as well as develop new ones.

The smart specialization framework has already been applied to Croatia, by identifying a number of strategic priority areas, and cross-cutting themes. This provides an important avenue for the implementation of knowledge transfer activities in the SmartEIZ project, as it enables to apply the broad notion of innovation systems along with the specific issues of industry – science interaction and regional development to the local context.

Thematic group 3: openness and globalization

The final thematic group looks at two specific areas that consider the position of the innovation system in the broader international environment. It looks at (attracting) FDI to the local environment, and the effects that this may have on local actors and the performance of the system. FDI may bring technology transfer, but only so if local firms have sufficient absorptive capacity. Thus, FDI may be an important element in the development of smart specialization strategies in local clusters. Policies for attracting FDI often include direct incentives such as tax favours, but this is unlikely to result in benefits for the local innovation system if there are no accompanying policies aimed at the quality of institutions and the local business environment.

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FDI must often be seen in the context of the emerging phenomenon of global value chains. This refers to the slicing up of production over many locations across the globe, and leads to regions or countries becoming specialized in functions of the production process (such as production or product development) rather than being specialized in a particular industry. How value is distributed over the locations that contribute to a global value chain depends on many factors, including how the chain is organized, and is also subject to change over time when particular firms try to upgrade.

Overall, with increasing openness and globalization, understanding the relationship between FDI and GVC is increasingly important. Some maintain that policies that encourage domestic firms to innovate are often conflicting with policies aimed at attracting FDI. On the other hand it is argued that R&D may be distributed along the global value chain, and co-location synergies that may be lost in this process may be compensated for by infrastructure and ICT, enabling efficient communication over distance and between the various tiers in the relevant supply chain. The specific details of how each GVC and industry react and behave do among others depend on the maturity of the industry, and as such it requires careful considerations for the specific context and industry. There is no one size fits all, and policy makers need to carefully identify and account for the various factors and interactions when designing policies aimed at FDI and GVC in the increasingly open and globalized world.

How FDI and global value chains work out for Croatia specifically can be analysed by a number of measurement and analytical tools that have been summarized in D2.4 of the project, and which can be implemented in the twinning tools that will be developed in the next stage.

Conclusions

This document has proposed a conceptual grouping of the eight topics that have been identified as the main agenda of the knowledge transfer activities of the SmartEIZ project. This conceptual grouping provides a logical sequencing of how innovation affects the economy and social system, and how public policy can affect this. The conceptual grouping can be used to put each specific knowledge transfer activity in a broad context that represents the best practice in the field.

A more detailed analysis of each of the themes has described which particular topics need to be addressed in the knowledge transfer activities. These detailed topics and the way in which they interact in the larger framework represented by the three broad themes are the other side of the best practice that will be the content of the twinning activities of the project.

List of acronyms

CEE: Central and Eastern Europe

CIS: Community Innovation Survey

BEEPS: Business Environment and Enterprise Performance Survey

DUI: “doing, using and interacting based innovation”

EBRD: European Bank for Reconstruction and Development

EMIT: Economics and Management of Innovation and Technology

FDI: Foreign Direct Investment

HRST: Human resources in science and Technology

KIE: Knowledge Intensive Entrepreneurship

KBC: Knowledge-based capital

NIS: National Innovation Systems

RIS3: Research and Innovation Strategies for Smart Specialization

SBTC: Skill Biased Technical Change

SEEC: South Eastern European Countries

VET: Vocational Education and Training