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## ***A PROPOSED FRAMEWORK OF REGIONAL INNOVATION SYSTEM: THE CASE OF THE KHARKIV REGION IN EASTERN UKRAINE***

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### **■ Abstract:**

*Regional Innovation System (RIS) model of economic growth, seeks to promote increased interaction across the government, business and academia. The importance of RIS stems from the increasing interaction of regional actors on the outcome of the innovation process. This paper proposes a framework of regional innovation system for the Kharkiv region in the Eastern Ukraine. A thorough theoretical analysis was conducted to apply the most appropriate scientific approach to the study. Qualitative research approach was applied to cover the purpose of the study and answer the research questions raised. Interviews and documentation review were carried out using research questions based on previous studies. It is concluded that the main components of the regional innovation system in the investigated region are knowledge application and exploitation subsystem, knowledge generation and diffusion subsystem. The major stakeholders of regional innovation system (academic universities; research institutes; public organizations; regional state administration; non-governmental agencies and private firms) and specific component of regional innovation system (knowledge support and promotion subsystem) are identified in the Kharkiv region. The specific paper contributes to the knowledge in region by providing a proposed framework for the Kharkiv region.*

### **■ Keywords:**

*Regional Innovation System, Regional Innovation Development, Regional Competitiveness, Regional Systems of Innovation, Governmental and Regional Policies*

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### **■ INTRODUCTION**

*Regions are increasingly seen as essential parts of the global society [1]; innovation evolved as part of sustainable development [2] has become a driver of the competitiveness within the regions [3]. The concept of Regional Innovation System (RIS) has been the central goal of the European technology and innovation policy. This concept is considered to contribute to the Lisbon strategy by enhancing European regional competitiveness (RC) [4].*

*RISs have been successfully implemented in regions of the EU [5], [6], [7], [8], USA and*

*Canada [9], [10], Taiwan and Japan [11]. Research in Central and Eastern Europe suggests the establishment of RIS on the network organizers and close linkages between the actors that lead business in the region [12], [13].*

*The Eastern Ukraine has one of the densest industrial concentrations in the world and is also homeland of numerous scientific and research institutions [14], [15]. In particular, the Kharkiv region is one of the leading industrial, educational and scientific centres in a whole country [16]. However, some attempts to establish regional innovation environment in the*

Eastern Ukraine have failed [17], [18]. This provides an opportunity to analyze the current situation in the region and to compare with other regional development studies. This poses challenges and it is important to propose a framework of RIS for the Kharkiv region in the Eastern Ukraine that would be useful to decision-makers in developing appropriate regional innovation policies.

The paper is organised as follows: The next section begins by reviewing some of the key theoretical issues relating to regional innovation systems. This is followed by the methodology used and analysis of the study. The final section presents the proposed framework for the Kharkiv region and concludes with some key recommendations.

**FRAMEWORKS OF REGIONAL INNOVATION SYSTEMS**

One of the core ideas of the RIS approach is that different innovative businesses that function within regional networks, cooperate with consumers, suppliers, rivals, and interplay also with many research institutions, technology centres, innovation support agencies, venture capitalists, local and regional government representatives [19], [20], [21]. The literature suggests that RIS possesses two sides: the supply side and the demand side [22], [23], [24]. The supply side includes institutional sources of knowledge generation and institutions accountable for the preparation of qualified labour. The demand side incorporates the productive systems, companies that apply the scientific output of the supply side [25].

Andersson and Karlsson studied RISs in small and medium-sized regions of the UK and posited that the core of RIS formulated companies within the regional cluster is surrounded by supporting and additional organizations [26]. The main components of RIS are institutions, infrastructure, incentives (illustrated in Figure 1 - adopted from Andersson and Karlsson, 2004).

The rationale behind a "Complete RIS" is to capture synergies from the university-industry-government relationship. Different types of the institutions play the role of normative structures. The main task of these institutions is to support the cooperation between the actors and to facilitate knowledge exchange [27]. Etzkowitz and Leyesdorff mentioned the university-industry-government relationship as the "Triple

Helix" and stated that it forms "knowledge infrastructure in terms of overlapping institutional spheres, with each taking the role of the other with hybrid organizations emerging at the interface" (p. 115) [28].

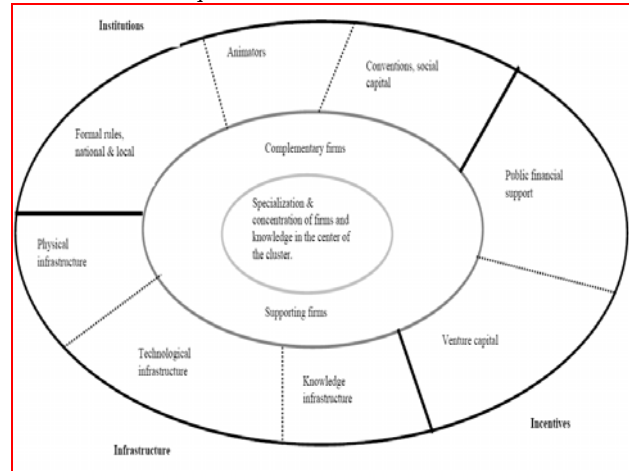


Figure 1. Complete RIS (Adopted from Andersson and Karlsson, 2004)

Cook and Memedovic investigated the regional innovation system-building processes in Europe and stressed that firms of RIS possess sizable opportunities to access or test knowledge that has been generated within the specific geographic area or outside of it. Regional Innovation Development (RID) plays an essential role for the successful development of RIS in a region [29]. Moreover, a later study across European regions by Cook and Memedovic highlighted that RIS consists of two subsystems: Knowledge Application and Exploitation System (KAES) and Knowledge Generation and Diffusion System (KGDS). KAES includes mainly companies and KGDS incorporates public and private research institutions, universities, technology transfer agencies (illustrated in Figure 2 - adopted from Cook and Memedovic, 2006) [30].

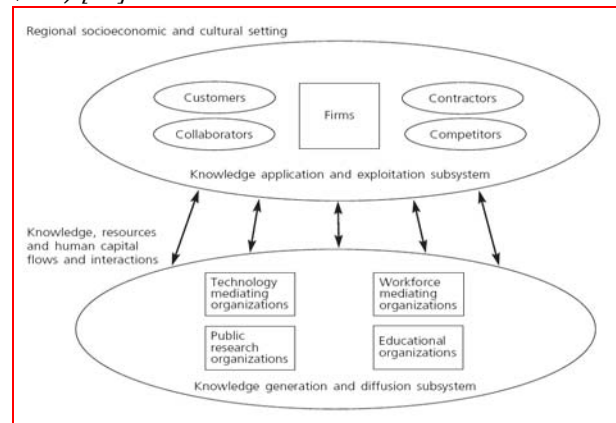


Figure 2 RIS: A Schematic Illustration (Adopted from Cook and Memedovic, 2006)

However, several authors consider two potential dangers regarding the development of RIS: weak research institutes with poor cooperation prospects and integration of core elements of the system [31], [32], [33].

Similar work in Grodno region in Byelorussia suggests that RIS can be described as a composition of interrelated subsystems facilitating access to various resources and services to the economic players. The author asserts that RIS has a multilevel character and that it should be regarded as a process of interconnected subsystems increasing access to different resources and activities to all economic players of RIS (illustrated in Figure 3 - adopted from Opekun, 2006) [34].

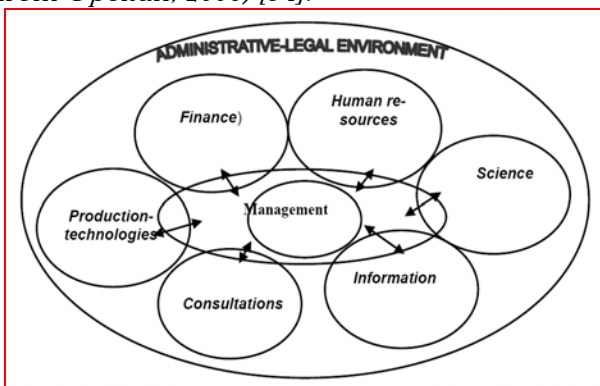


Figure 3 RIS (Adopted from Opekun, 2006)

The author proposed that RIS approach enables the augmentation of the spheres of promotion and stimulation of regional innovation processes as a composition of the nest subsystems: production-technologies; finance; services; science; human resources; information; expert consultations; and management, incorporating the sphere of their interplay. Nevertheless, Oughton and Morgan argue that nowadays a lot of regions are victims of “the regional innovation paradox” due to the lack of integration between the two sides of RIS: the supply side and the demand side [35], [36]. Several authors assert that the framework of RIS shapes the learning process in a region [37], [38], [39]. Therefore, a policy approach which connects major actors and influences both sides of RIS should be developed in order to solve the “regional innovation paradox” [40].

**METHODOLOGY**  
**Research Purpose and Objectives of the Study**

The purpose of this paper is to propose a RIS framework for the Kharkiv region in the Eastern

Ukraine. The objective of the present paper is to develop a framework of RIS for the Kharkiv region in the Eastern Ukraine. The research process included the following steps: state-of-the-art literature review, taxonomy of literature, setting the objective of the study and research questions, research design (preparation for data collection, data collection, and limitations), data analysis, reliability and validity of the study, development of a framework of RIS. The main research question was - What kind of RIS framework is needed in order to develop the framework of RIS for the Kharkiv region in the Eastern Ukraine? Our research questions can be specified: What are the major components of RIS? What functions do RIS perform? Who are the main stakeholders of RIS? What role could intellectual capital play in converting knowledge and intangible assets into innovation? How RIS can contribute to regional development?

**Study Design**

The research framework of RIS that covers the purpose and research questions of the study was adopted from Cook and Memedovic [41]. A qualitative exploratory research approach was adopted. Based on a literature review the data of this research were collected through a number of in-depth case studies. Unstructured interviews and documentation review were used in order to collect qualitative data. In addition, semi-structured face-to-face interviews were held with key personnel within the organisations and triangulated with additional available information, such as governmental reports and governmental websites. Research questions which were in line with the study objectives have been answered by the interviewees during the interviews. Within-case analysis was used in the present study for analysis of qualitative data and content analysis was used for the quantitative data. Two governmental organisations, three universities, and two private firms of the Kharkiv region participated in the study.

**ANALYSIS OF THE STUDY**  
**The Region: Facts of Regional Innovation Development**

During the 2007 the turnout of industrial goods increased by 8,1 per cent against 2006 in the Kharkiv region. The productivity growth was reached in seven general branches that formed

73 per cent of the total turnout. In fact, more than a half of regional companies and firms (53 per cent) have improved their turnout [42]. The amount of the industrial firms of the Kharkiv region that were engaged in the innovation activities is 9, 6 per cent in 2007. Regional enterprises have developed 175 innovative products including 74 items of innovative machines, equipment, and devices in 2007 [43]. The majority of the innovative products are the products of machine building branch of industry (64 per cent) and the products of the equipment building branch of industry (19 per cent) [44].

**■ Description of the Knowledge Application and Exploitation Subsystem (KAES) of the Kharkiv Region**

The KAES of the Kharkiv region includes 11,700 SMEs and 604 large firms employing 244,200 people in the Kharkiv region. The region can be decomposed into three major industrial zones: Central, Eastern and Southern [45]. First, the Central zone includes Kharkivskiy district and the neighboring districts. It is characterised by the high level of industry agglomeration and specialisation. This zone is Ukraine's state-of-the-art center of energy industries, transport, electromechanical and agriculture mechanical engineering. Second, the Eastern zone, is located around the town of Kupyansk. Mechanical engineering is the dominating industry in this zone. Third, the Southern zone, is characterised by large natural gas deposits such as Krestishchenske, Shebelynske, Yefremovske and others. The cities of this zone are mainly focused on chemical industry, construction materials production and mechanical engineering. Cement and roofing slates production plant of Balakiya is one of the biggest in Europe [46]. Regarding the structure of material production, the largest shares belong to metal building and machine building (33, 5 per cent of the total regional industrial production), power industry (22, 2 per cent), fuel industry (14, 5 per cent), food production industry (18 per cent), materials construction industry (3,1 per cent), and light industry (0,9 per cent) [47].

**■ The Knowledge Generation and Diffusion Subsystem (KGDS) of the Kharkiv Region**

KGDS of the Kharkiv region includes nine business centres, three business support

organisations, three public research organisations, and fourteen academic universities with 36,000 specialists and around 15 research centres with 30 Full Members and Corresponding Members of The National Academy of Sciences, with 9,000 Doctors of Philosophy, and 1,496 Doctors of Sciences. Fifty six per cent of R&D centres of Ukraine are located in the Kharkiv region. Then, around 56 per cent of fixed assets for research and technological activities (by their value in the state) are located in the Kharkiv region, in particular 15 per cent of equipment for scientific experiments. In fact, ten per cent of the total R&D projects of Ukraine are executed in the Kharkiv region. It is on the first place among the regions of Ukraine and on the second place on the national level after the city of Kyiv with regard to scientific capacity [48], [49]. Therefore, intellectual capital could be considered as one of the core drivers of the economic value creation, competitiveness and profitability in the investigated region.

**■ The Stakeholders**

The major stakeholders of RIS model of the Kharkiv region are academic universities, research institutes, public research organizations, governmental organizations, non-governmental agencies and private firms. If we categorize the stakeholders of RIS model of the Kharkiv region the main groups that derive will be universities, research institutions, business incubators / firms, and governmental and regional agencies. As indicated by Morgan "recognizing of RIS stakeholders becomes complicated because they do not take one form in reality" (p.561) [50]. While there are only several regions which can be considered true RISs [51] in general, more studies will be required to define what forms RIS, who are its major stakeholders, and what constitute its core functions as a system [52].

**■ THE PROPOSED FRAMEWORK OF REGIONAL INNOVATION SYSTEM FOR THE KHARKIV REGION**

Previous attempts to develop a regional innovation environment in the Kharkiv region has failed due to lack of financial support from the regional administration [53]. Considering that, it seems appropriate to include the knowledge support and promotion subsystem

(KSPS) in the proposed framework of RIS for the Kharkiv region. This subsystem could regulate the target-program financing mechanisms focused on realization of innovation and regional development priorities in accordance with legislation of Ukraine. The KSPS includes public financial funds of the regional administration (KOSA). The proposed framework of RIS for the Kharkiv region includes three subsystems: KAES, KGDS and KSPS with systemic connections between sources of knowledge production, firms of large and small sizes, and regional administration (see Figure 4). It will perform five major functions. Firstly, it will organise the interaction between scientific, research and innovation enterprises, institutions and firms, and state authorities. Secondly, it will provide scientific and other support for innovation development in the region. Thirdly, it will provide information and consulting services for firms. Fourthly, it will regulate the target-program financing mechanisms focused on realization of innovation and regional development priorities in accordance with the legislation of Ukraine. Last, but not least, it will establish regional innovation infrastructure. In short, it could positively influence the regional innovation activities and innovation knowledge utility in the investigated region. Consequently, RDC, RIC could be formed and overall RC of the Kharkiv region may be increased.

In terms of future policy directions, it appears that research performers believe that 'creating better networks that link companies with universities and other R&D performing organisations' together with 'making more R&D finance available to companies enabling them to become involved further in R&D and knowledge related activities' should form the core policy issues. Significant importance is also attached to the creation of start up companies, attraction of high value foreign investment and an improved system of business support and advice. This result shows the increasing awareness of research performers of the need to address corporate requirements through stronger links between companies and R&D performing organizations. There are some implications and opportunities for academia, research, business and government to develop collaborative links. Primarily, an explicit regional innovation policy has to be compiled to assist the development of

reactive economic networks from one side and of proactive research institutes from another side. The next step is the enhancement of clustering support policies related to research and development (R&D) activities among R&D researchers and targeted business sectors; this will strengthen the role of intermediaries in the cluster building process. Also, the creation of the new technological firms should be considered as a means to support the introduction of new ideas and innovation processes into the marketplace through new or already existing firms. New areas need to be identified in between traditional sectors where innovation can flourish, capitalizing in new technologies and shifting to new activities. Finally, a culture of innovation should be fostered throughout the whole region. Cultural changes toward innovation and entrepreneurship should be promoted, especially in the community of young generation of scientists.

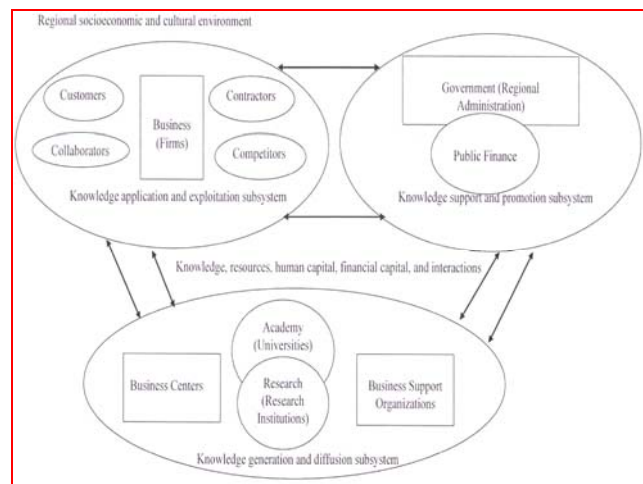


Figure 4 The Proposed Framework of RIS for the Kharkiv region (built on the Framework of RIS by Cook and Memedovic, 2006)

## CONCLUSION

In terms of practical implications this study contributes to the knowledge in region by providing a framework for the development of a regional innovation system. In this study we have proposed a framework of regional innovation system for the Kharkiv region in the Eastern Ukraine. The present study revealed some important findings, but is not free of methodological limitations. Firstly, a relatively small sample of respondents was used and this rendered impossible the use of more sophisticated statistical analysis. By clarifying the limitations of this paper, we suggest directions

for future research. It would be interesting to carry out a survey of universities, research laboratories and research centres in the region, collecting data on knowledge assets, knowledge flows and interaction with relevant organisations and regional business. The specific research in that area could help to examine data in knowledge stock within the organisations and their competitiveness in order to benchmark the importance and effectiveness of various factors. In addition, the analysis of data on knowledge transfer would assess how knowledge is transferred by the research organisations to the regional economy. Furthermore, it would examine the barriers faced by the organisations in terms of transferring knowledge to firms in the region and their perceptions of barriers faced by firms with respect to acquiring or creating knowledge. Finally, their opinion about what should form the core policy for the development of R&D in the region could be examined in order to draw further conclusions. This research is part of a larger study examining/gathering data on knowledge assets, knowledge flows and interaction with support organisations in the manufacturing and services sectors, including sectors that are commonly identified as "knowledge-based". Moreover, it would be interesting to carry out similar studies in less favoured regions of the Eastern Ukraine in order to compare with the present investigation.

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■ **AUTHORS & AFFILIATION**

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<sup>1</sup> PANAYIOTIS H. KETIKIDIS,  
<sup>2</sup> IVAN MIROSHNYCHENKO,  
<sup>3</sup> SOTIRIS ZYGIARIS

<sup>1</sup> CITY COLLEGE – INTERNATIONAL FACULTY OF THE UNIVERSITY OF SHEFFIELD, THESSALONIKI, GREECE

<sup>2</sup> SOUTH EAST EUROPEAN RESEARCH CENTRE (SEERC), THESSALONIKI, GREECE

<sup>3</sup> URENIO RESEARCH UNIT - ARISTOTLE UNIVERSITY OF THESSALONIKI, FACULTY OF ENGINEERING, THESSALONIKI, GREECE



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