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GOVERNANCE OF REGIONAL INNOVATION SYSTEMS THROUGH KEY PERFORMANCE INDICATORS

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Abstract: The governance process of regional innovation systems requires outcome-based measurability of actions. These managerial outcomes are reflected in the functions of goal-setting, organization, control, and motivation. Therefore, governance decisions aimed at fostering the development of regional innovation systems must be made along the lines of these functional dimensions.

The article substantiates the formulation of indicators for economic innovation systems, which enables the outcome-oriented measurability and monitoring of regional innovation system (RIS) development, and allows for the adoption of appropriate decisions based on progress achieved.

Keywords: regional innovation systems, key performance indicators, managerial function cycle, governance decisions for innovation system development

JEL code: O18

Research aims: The aim of the research is to develop the managerial functions of regional innovation systems using key performance indicators.

Research novelty: New governance approaches for regional innovation systems are proposed based on the application of a composite indicator of RIS development potential.

Introduction

In general, the measurability hierarchy of innovation systems in the economy can be presented in the form of a pyramid, at the base of which lie the indicators of regional innovation system (RIS) development (see Figure 1). These indicators are primarily formed within a national framework; however, in practice, there is also the potential to establish supranational corporations in specific regions that can actively participate in the development of regional innovation systems (Gust-Bardon, N. 2012).

By utilizing appropriate indicators, it becomes possible to render general assessments of RIS development measurable at the national level (Lenchuk, E., B., Vlaskin, G., A. 2010). Examples of such indicators include innovation investments in the regions relative to GDP, the share of regional innovation expenditures in the state budget, and others. However, using composite indicators complicates the comprehensive assessment of RIS development outcomes, as they are typically presented in a synthetic and aggregated manner (Anderton, D. 2016).

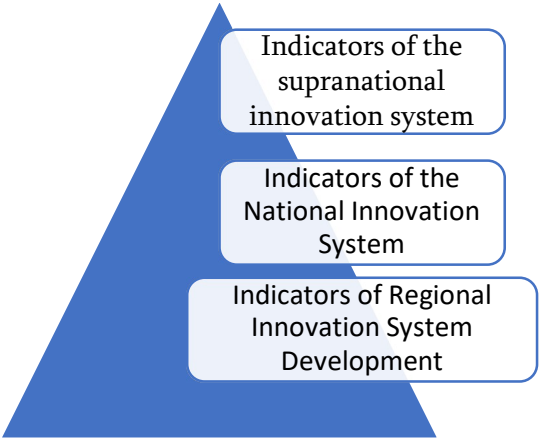

Figure 1. The Hierarchy of Innovation System Indicators in the Economy[12]

Therefore, our approach places particular emphasis on the analytical evaluation of the indicators located at the base of the hierarchyofinnovation system indicator (see Figure 1).

Research results

From the standpoint of managing regional innovation systems (RIS), the application of key performance indicators (KPIs) is deemed appropriate. KPIs began to be widely used in industrial systems starting from the first decades of the 20th century (Leydesdorff, L. 2012). Their primary purpose was to enable the measurability and monitoring of performance against set targets. However, today KPIs are used not only for tactical but also for strategic purposes. In particular, long-term monitoring of KPI

[12] Composed by author

dynamics reveals the barriers to the development of innovation systems, and it also helps assess the risks associated with innovation implementation - risks that are also typical of RIS (Svensson, P. 2010). Ultimately, KPIs allow for the identification and targeting of development pathways. Therefore, we emphasize the construction of a hierarchy of key indicators proposed for RIS governance (see Figure 2).

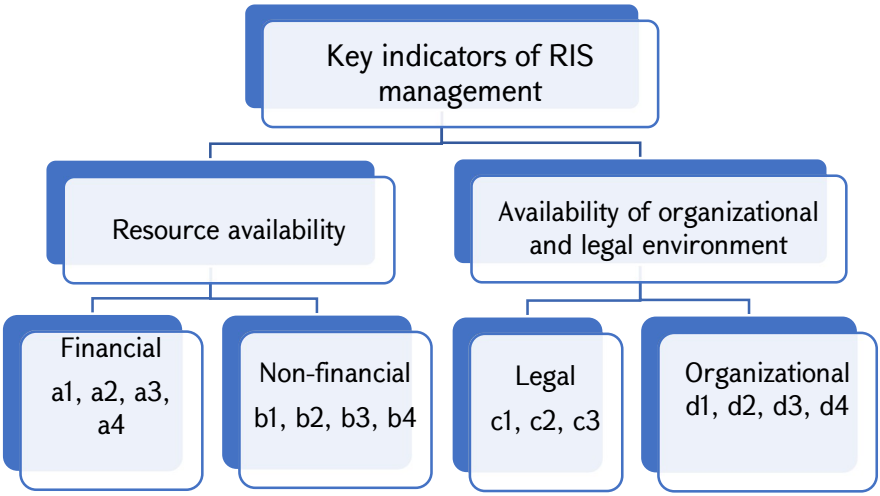

Figure 2. Hierarchy of proposed KPIs for RIS governance[13]

a1 – community funding
a2 – business financing
a3 – financing from venture capital funds
a4 – access to low-interest credit resources
b1 – access to innovative technologies

[13] Composed by author

b2 – availability of mechanisms for commercialization of innovations

b3 – patenting of regional innovations

b4 – digital transformation and transparency

c1 – legislative initiatives for regional development reform

c2 – revisions in local budgeting procedures for self-government

c3 – provision of tax incentives for RIS activities

d1 – marketing initiatives targeting innovation markets

d2 – establishment of startup incubators

d3 – establishment of university-based research centers

d4 – establishment of techno parks

The sustainable development of RIS does not depend solely on the availability of necessary resources, but also requires an appropriate organizational and legal support environment (see Figure 2.). Therefore, actions in these two areas must be interconnected and harmonized to shape a conducive environment for RIS development. This interconnection can be interpreted through the use of relevant KPIs (Asheim, B., T., Smith, H., L. 2011).

RIS funding beneficiaries include not only the state and local communities, but also the private sector (Edquist, C. 2005). Thus, it becomes important to record the diversification of funding sources supporting RIS formation and development through KPIs. Such support may come from municipal budgets, venture funds, and business partnerships. Importantly, diversification does not imply mere financial stability during RIS formation; it also anticipates stimulating and motivating directions. Private

companies, for example, can act as RIS support partners by providing direct investment and financial assistance (Furman, J., Porter, M., Stern, S. 2002). Similarly, commercial banks may provide RIS with low-interest loans, aiming to stimulate regional socio-economic development and gain opportunities for participatory governance of innovation processes (Parto, Saeed & Doloreux, David. 2004).

The potential for RIS formation is not limited to financial resources - it also depends on non-financial ones. In this context, access to innovative technologies and the availability of commercialization mechanisms are particularly important. Challenges frequently arise in the commercialization and market introduction of innovative products, which require specific marketing efforts due to their unpredictability.

Non-financial support also includes the digitalization of governance functions and the presence of transparent accountability mechanisms (Sallet, J. and Paisley, E., 2009). These aspects, too, require the application of KPIs. Stakeholders involved in RIS development expect not only digital transformation in governance but also accountability mechanisms based on feedback, which serve as the informational foundation for decision-making in RIS development.

We also propose establishing KPIs for the organizational structures related to RIS activities, such as regional startup incubators, university-affiliated laboratories, and operating techno parks. RIS management cannot remain detached from the formation of such research environments, as they are typically the

source of innovation ideas tied to regional socio-economic development (Romanovski, M., Shkuta, D. 2013).

Taking all this into consideration, we propose the formation of an information system for evaluating RIS activity based on key performance indicators. This system should first establish the target values for RIS development KPIs and subsequently calculate their performance levels based on actual outcomes. We suggest grouping RIS-related indicators into resource-based and organizational-legal categories, and then calculating the average sub-indicator value for each group.

By introducing this system, it becomes possible to calculate a composite key performance indicator (PI) for assessing RIS development potential:

$$\mathbf{Ip = \sum(Ia + I_b + Ic + I_d)/n}$$

Where:

Ip – Composite indicator of RIS development potential Ia, Ib, Ic, Id – Financial, non-financial, legal, and organizational sub-indicators;

n – Number of sub-indicators

The managerial functions of regional innovation systems based on key performance indicators are proposed to follow a dynamic, stage-based cycle (see Figure 3):

First stage - Characterization of the RIS development potential through KPIs, by recording target values related to the availability of resource and organizational capacities necessary for the generation and commercialization of regional innovations.

Second stage - Defining sub-indicators related to comprehensible operational factors of the RIS and, based on these, assessing the composite indicator of RIS development potential.

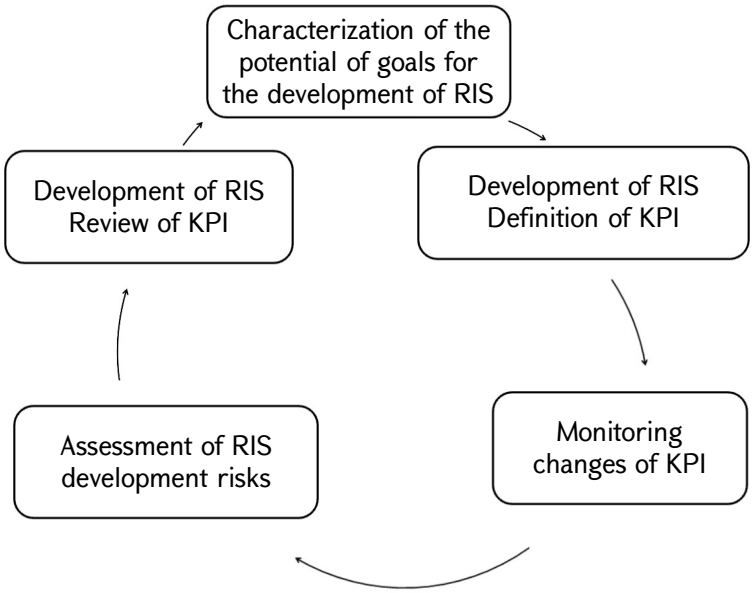

Figure 3. Proposed Functional Cycle of RIS Managerial Activities[14]

Third stage - Continuous monitoring of the changes in the defined KPIs for RIS development and identifying factor-based obstacles that hinder innovation implementation.

Fourth stage - Evaluation of the risks associated with RIS development and mitigation of the uncertainties in realizing innovation opportunities.

[14] Composed by author

Fifth stage - Periodic revision of the defined KPIs in light of the competitive environment of RIS activities and the adoption of appropriate governance decisions to support further progress.

Therefore, managing a regional innovation system through key performance indicators provides the dual benefit of enabling regular, measurable evaluation of the system's supportive functions and of facilitating informed decisions that promote the advancement of regional innovation activities.

Conclusion

Thus, the proposed composite indicator of regional innovation system (RIS) development potential is constructed based on key performance sub-indicators that support the system—taking into account both resource-related and organizational-legal factors.

The closer the value of this indicator is to one, the more favorable the RIS development process is assessed, as it reflects that the governance-defined strategic directions are approaching their intended targets.

It is important to highlight that the proposed **PL** indicator does not serve a solely monitoring function within the governance system. Through the distribution of sub-indicators across specific managerial functions, it enables the identification of risk-related barriers to RIS development and provides a foundation for making appropriate governance decisions aimed at their mitigation.

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ՏԱՐԱԾՔԱՅԻՆ ԻՆՈՎԱՑԻՈՆ ՀԱՄԱԿԱՐԳԻ ԿԱՌԱՎԱՐՈՒՄԸ ԿԱՏԱՐՈՂԱԿԱՆԻ ԱՌԱՆՑՔԱՅԻՆ ՑՈՒՑԻՉՆԵՐՈՎ

Նարեկ Սարատիկյան
Հայաստանի գիտությունների ազգային ակադեմիա,
Մ. Քոթանյանի անվան տնտեսագիտության ինստիտուտ,
ասպիրնատ

Բանալի բառեր - տարածքային ինովացիոն համակարգեր, կատարողականի առանցքային ցուցիչներ, կառավարչական գործառույթների պարբերաշրջան, ինովացիոն համակարգի առաջնթացի կառավարչական որոշումներ

Տարածքային ինովացիոն համակարգի կառավարման գործընթացը պահանջում է գործողությունների արդյունքային չափելիություն: Ընդ որում, կառավարման նման արդյունքները դրսևորվում են նպատակադրման, կազմակերպման, վերահսկողության և շահադրդման գործառույթներում: Հետևաբար, տարածքային ինովացիոն համակարգի զարգացումների նպաստման գծով կառավարչական որոշումները անհրաժեշտ է կայացնել վերոնշյալ գործառույթների կտրվածքով:

Հոդվածում հիմնավորվում է տնտեսության ինովացիոն համակարգերի ցուցիչների մշակումը, որով հնարավորություն է ստեղծվում ապահովելու ՏԻՀ-երի զարգացման արդյունքային չափելիությունը, մոնիտորնգը և դրանց հիման վրա կայացնելու առաջընթացի համապատասխան որոշումներ:

Առաջարկվող ՏԻՀ զարգացման հնարավորությունների համընդհանուր ցուցիչը կառուցվում է մարզային ինովացիոն համակարգին աջակցող կատարողականի ենթացուցիչների հիման վրա՝ հաշվի առնելով ռեսուրսային և կազմակերպչաիրավական գործոնների համախումբը: Ընդ որում, որքան այդ ցուցիչը մոտենում է մեկին, այնքան բարձր է գնահատվում ՏԻՀ զարգացման գործընթացը, քանի որ կառավարման կողմից այդ ուղղությամբ սահմանված թիրախային ուղղությունները մոտենում են իրենց նպատակակետին:

Առաջարկվող (Ip) ցուցիչը կառավարման համակարգում միայն վերահսկողական դերակատարում չի ստանձնում, այլև կառավարման առանձին գործառույթների միջև իր ենթացուցիչների բաշխումով հնարավորություն է ստեղծում բացահայտելու տարածքային ինովացիոն համակարգի զարգացման ռիսկային խոչընդոտները և կայացնելու համապատասխան կառավարչական որոշումներ՝ դրանց մեղղման համար):

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