

COMPARATIVE ANALYSIS OF AVAILABLE METHODS FOR ANALYZING SOCIO-ECONOMIC AND INNOVATIVE CAPACITIES OF TERRITORIES

Mustafakulov Sherzod Igamberdievich*

Abstracts: The article focuses on stable development of territories as well as theoretical and methodical analysis aimed at socio-economic conditions of regions. Moreover, the author provided insight into essence of integral indicators used for appraising regional capacities.

There have been developed recommendations for comparing complex appraisal methods of regional potentials, and on the base of their comparison to determine group of indicators for appraising socio-economic potentials of national territories

Key words: socio-economic conditions of territories, methods of appraising socio-economic conditions, sustaining stable socio-economic development of regions, key indicators for complex appraisal of the level of regional potential, global competitiveness.

* Dean of “Qualification Upgrading” faculty, Banking and Finance Academy of the Republic of Uzbekistan, Candidate of Economics, Associate Professor.

Introduction

The acceleration of the globalization process has significant impact on the development of national economies. Through active participation in global division of labor, most countries try to increase their GDP's and exports by increasing competitiveness of goods and services produced in their regions. However, along with its evident positive impact, this process can possess several concealed threats on the overall economic condition and long run sustainable development of small economies. Moreover, the existence of such hazards requires from national policymakers to conduct comprehensive quantitative assessment of all parameters and indexes measuring economic growth and development, in order to mitigate and limit the impact of possible threats within acceptable norms.

Analysis of socio-economic transformations shows that the process of modernization of the economy has a significant impact on the development and prosperity of the country. Therefore, creation of effective system for managing socio-economic development of the country, as well as learning theoretical and methodological foundations for assessing regional capacities has great importance.

At the same time, while considering trends in territorial development the existence of large differences in natural demographic, administrative and economic conditions of territories, as well as the presence of regions unable to be self-sustained in provision of resources, and most of which are unable to adapt to a market economy, the problem of thorough assessment of the modernization programs possesses large opportunities for scientific study.

Thus, taking into account the fact that modernization is a socio-historical process, serving for transformation of classical society to advanced industrial one, questions on reforming the methodology for assessing social and economic capacities of regions and development of theoretical as well as methodological recommendations on the effective development of territories is one of the urgent issues today.

Review of the literature

While tackling research we revealed various methodic approaches elaborated by international financial and economic organizations, economists and foreign scientific-research institutions, which are devoted to assessment of the degree of sustainable regional development and their socio-economic conditions. Some of these studies are analyzed in this paper.

Method	System of indicators used in assesment
<i>1. Evaluation of sustainable development on the basis of a single parameter</i>	
<i>Genuine saving</i> (or " <i>Net adjusted savings</i> " calculated by the World Bank)	GS (Genuine saving) = (GDS-CFC) + EDE-DRNR-DME, where: GDS - gross domestic savings, CFC – reduction in the cost of productive assets (due to wear), EDE –expenditure on education, DRNR - the disappearance of natural resources, DME - losses from environmental degradation
<i>2. Evaluation of sustainable development on the basis of system performance indicators</i>	
<i>System performance indicators</i> developed by the Commission on Sustainable Development of the United Nations (UN)	60 indicators in four areas: social, economic, environmental and institutional.
<i>3. Methodic approaches for evaluation of the stable development of regional socio-economic systems</i>	
<i>"Integral indicators reflecting the stability of socio-economic development of the region,"</i> proposed by S.A. Zarubin	Indicators on 3 areas: economic, social and environmental.
<i>Method of comprehensive assessment of socio-economic development of the region</i> proposed by O.V. Skotarenko	11 indicators: GRP, Investments to fixed capital per capita; volume of exports and imports per capita; financial security of the region from the prospective of PPP per capita; share of the average number of

	workers employed in small companies; registered unemployment rate and others.
<i>Method of assessment of socio-economic capacity</i> proposed I.V.Taranenko	Five sectors: real sector, investment, foreign economic activity, the final financial results of companies, social sector, consumer market.
Methods of assessing the <i>socio-economic capacity of regions</i> proposed by A.N.Syrov	Six areas: labor, production, natural resources, finance, transportation, infrastructure.

Through comparison and comprehensive investigation of studies focused on the methodical assessment of socio-economic condition of territories and methodologic analysis' of socio-economic regional development, allowed us to generalize following subjective approaches. Analysis of methodic approaches related to stable development of regional socio-economic systems allows to emphasize **three approaches** on this issue.

The first approach is the *evaluation of sustainable development on the basis of a single parameter*. An example of this method is the method of "Genuine saving" (or "Net Adjusted Savings" index). Its aim is to take into account net value of total assets' change, which are important for the development: production assets, natural resources, the state of the environment and human capital.

Calculation of the final value (GS) is carried out in two stages. The first stage involves calculation of the net domestic investment (NDS). In the second stage the growth of NDS determined by spending on education, and its decrease by loss of natural resources and environmental pollution.

The advantage of this method is that it allows to get an unambiguous, positive or negative results. Persistence of negative indicators can suggest that country is on an unsustainable path of development. However, as a shortfall of GS method in comparison with other methods, it can be pointed out that, it is not appropriate for evaluating of stable development of region, by determining welfare of the country on a wide scale.

The second approach is referred as methods of *system performance indicators*. This approach can be represented by the one of the most comprehensive system of indicators measuring stability of growth which was proposed by the UN Committee on Sustainable Development (UN CSD) in 1996. It selected four 4 areas of assessment: social, economic, ecologic and institutional. The initial list consisted of 134 indicators in 4 categories, later the list had been reduced to 60 indicators as a result of enhancing their relevance and inclusion of classifications by description. Both aforementioned approaches aimed at evaluating the stability of regional socio-economic development systems, unambiguously are effective and in some sense are universal. They are effective in assessing the stability of regional development from perspectives of globalization of the economy and impact of external threats to the regional development process. However, taking into account the differences in the conditions and development of Uzbekistan's regions, the use of such techniques, as they have to be exploited, may be inappropriate and deceptive. Therefore, based on the specifics of the country it would be appropriate to use methods for assessing development by adapting them to the national model of socio-economic development of our country.

The aforementioned features are inherent in the third type of approaches, which can be referred as methodic approaches for evaluation of the stable development of regional socio-economic systems.

Research Methodology

Methodic approaches for evaluation of the stable development of regional socio-economic systems used in assessing potential competitiveness of territories can be divided into two large groups. First group of methods are based on calculation of *integral indicators of socio-economic development of regions* and second group of methods are based on *evaluation of innovative capacities of territories*.

a) *Integral indicators of socio-economic development of regions*

Methods of calculating integral indicators of socio-economic development of regions have been widely exploited by many Russian economists. And these methods greatly differ from each other not only by factors included in their estimations, but also by methods of calculations. Thus if

some methods are based on the calculation of simple arithmetic means of parameter values, some are calculated by multiplication of fractions of relative measures and some complex methods are carried by calculating principal n th roots of the product of values of available resources.

The common approach for calculating integral indicators of socio-economic development of regions has following stages:

The first stage - justification of selected parameters;

The second stage - assessment of sustainability of the region for each indicator (1.2).

$$k_i = \frac{x_i}{\max(x_i)} \text{ direct index (1)}$$

$$k_i = \frac{\min(x_i)}{x_i} \text{ reverse index (2)}$$

Where, x_i - value of indicator for the region i ;

$\max(x_i)$, $\min(x_i)$ - a standard measure (benchmark), that can be chosen the optimal (critical) value for the territorial development.

The third stage - calculation of indexes of economic, social and environmental sustainability (I_{econ} , I_{social} , I_{ecolog}) through multidimensional comparative analysis.

The fourth stage - the formation of the integral index.

Integral indicator of sustainability calculated by the following formula:

$$I_{\text{set}} = \sqrt[3]{(I_{\text{econ}} * I_{\text{social}} * I_{\text{ecolog}})} \quad (3)$$

The value of integrated indicators will vary between 0 and 1.

The fifth stage - the interpretation of results on Harrington's universal desirability function¹: starting from the highest (territories sufficient in financial and intellectual resources with the potential development, diversified economy and favorable environmental conditions), and down to the lowest indicators of sustainable development.

However some researchers based on long time and deep investigations of socio-economic development of regions have elaborated alternative methods of evaluation. Thus economists like O.V. Skotarenko recommend 3 staged method of evaluation.

On the first stage calculated base indicators of the complex assessment of the capacity of areas. The group of indicators include 12 indicators such as GDP per capita; investments in fixed capital per capita; the volume of foreign trade turnover per capita; financial security in the region, on purchasing power parity per capita basis; share of the mean number of workers employed in small enterprises; registered rate of unemployment; the ratio of per capita income and the minimum subsistence level; proportion of people with incomes below the subsistence level; gross turnover of retail trade, public catering and paid services per capita; fixed assets of branches per capita population of economy; density of roads coefficient; consolidated indicator of the level of development of social infrastructure sectors

On the second stage calculated indicators of capacities for development of regional social infrastructures: the consolidated indicator of development of social infrastructures; mining of minerals per capita; manufacture production per capita; commissioning of residential houses per capita; discharge of polluted sewage water into the surface water objects per capita and etc.;

3. The value of the overall assessment.

$$\text{SCORE} = \sum \frac{\text{SCORE}_r}{n} \quad (4)$$

Where: SCORE_r - the value of scoring;

n - number of indicators.

This method has got decently large number of instruments for describing region from various perspectives, but at the same time some parameters repeat each others, which cast some doubt on reliability of the results of assessments.

Another method of assessment is proposed by researcher I.V. Taranenko (Taranenko, 2014). Under this method, the level of socio-economic capacity is assessed on the base of the figures for following 5 areas: the real sector; Investment and foreign economic activities; the final financial results of enterprises; social sector and consumer market.

The mathematic tool for assessing the socio-economic capacity of the region is expressed in following comparative figures (5) and (6):

$$qi = \frac{Pri}{Psti}, \quad (5)$$

$$\bar{qi} = \frac{Psti}{Pri}, \quad (6)$$

Where: the P_{ii} - the value of i^{th} parameter of socioeconomic capacity for the region;

P_{STI} - the mean value of i^{th} parameter of socioeconomic capacity for the country.

Thus, if the growth of indicator has a positive effect on change of economic capacity for the region, then we use formula (5), otherwise formula (6).

Determining of the final rating score of existing level of socioeconomic capacity computed by the following equation

$$Rr = \prod_{i=1}^n qi, \quad (7)$$

Where: Rr - the final score (rating) of the development capacity of the territory;

n - number of comparative socioeconomic indicators.

The advantage of this methodological apparatus is that it enables to determine contribution of selected region's to overall national capacity separately

A.N.Syrov's method of evaluation of socioeconomic capacity of territories, based on assessment of the components of development capacities with assistance of indicators, reflecting the existing value of the capacity and its exploitation.

The value of the assessment is determined by the integral formula.

$$F(\varphi(T))j = \sqrt[m]{\prod_{i=1}^m \varphi(T)tj}, \quad (8)$$

Where, $F(\varphi(T))j$ - function determining integral value of the capacity of territory-j;

m - volume of resources characterizing capacity of the territory;

$\varphi(T)$ - the value of t -resource for the j -territory.

The value of the capacity for a single resource of the territory is calculated by the following formula (9):

$$\varphi(T)tj = \frac{1}{a} \sum_{i=1}^a Tij, \quad (9)$$

Where, a - the number of parameters used in calculating the value of the resource;

Tij - i indicator for the potential of the territory j .

b) Evaluation of innovative capacities of territories.

At present, the assessment of territorial capacity includes not only quantity of the population in the specified area, but also it includes assessment of their incomes, savings, the value of the acquired

property and intellectual capacity of the population. And that is why, the allocation of workforce and elaboration of investment programs will be based on the level of intellectual potential, quantity of the population, their mean age, income levels and after determining the amount of available production resources in the area.

In modern conditions of growing global competition, the priority directions and efforts of the executive authorities should be designed to ensure fast and stable economic growth through the innovational development, and directing the scientific potential to the activation of innovative activity in existing industries.

The study of the sources of innovative development is a complex issue requiring analysis and synthesis of already shaped innovative capacity, and this, in turn, reflects the potentials of such development. Therefore, the importance of the evaluation of innovative capacity is continuously growing.

One of the best known methods for measuring the innovative potential of territory is a 'sub-index of innovative potential' of the Global Competitiveness Index calculated by the International Economic Forum (WEF) for the Global Competitiveness Report.

Growth Competitive Index (GCI) - along with a reflection of the current level of economic development, is aimed at determining the ability to achieve stable economic growth of the national economy in the short term. Global Competitiveness Index is based on three categories that have impact on short-term and long-term development of countries: technologies, public institutions and macroeconomic environment.

(GCI) summarizes more than 90 variables and is based on 9 indices, one of which is innovation. Index of global competitiveness on the basis of per capita GDP, divides all countries into 3 main and 2 auxiliary groups: Depending on the stage of resources (per capita GDP < \$ 2,000), the stage of increase of efficiency (GDP per capita of US \$ 3000-9000) and stage of innovation development (per capita GDP of > 17,000 US dollars) (The Global Competitiveness Report 2016-2017).

According to the WEF methodology, the ability to achieve a stable short-term and long-term development of the countries depends on three variables categories: macroeconomic environment, public institutions and technology. Economy without scientific and technical potential can not be successive in development in the long term. Innovative component for countries "Innovators" (such as USA, Japan, Korea and Canada) is $\frac{1}{2}$, for the rest of countries is $\frac{1}{3}$ (The Global Competitiveness Report 2008-2009).

Estimation of innovative potential of the region

Algorithm for evaluation of innovative potential at the regional level can be described by 3 types of consequently implemented phases. Hereinafter we will explain our analysis by integrated regulative methods for assessment of innovative capacity of regions of economists (Varshavskiy and Makarov, 2004)

Algorithm for evaluation of innovative potential at the regional level can be implemented in 3 stages (Moskvina, 2015)

Table-1

The algorithm for evaluating innovative capacity of the region

The name of the stage	The objectives of phase
1. Description of the regulatory model of the state of innovative capacity through quantitative and (or) qualitative requirements to resources and performance characteristics	Determination of the list of indicators and their limiting characteristics used for the evaluation of innovative potential of the region
2. Assessment of the actual (current) state of innovative capacity (taking into account the elaborated regulatory model)	Analysis of mismatches between the regulative and actual parameters of the potential - highlighting its strengths and weaknesses
3. The characteristics of possible directions for strengthening the innovative capacity of the region (taking into account the results of the analysis)	Formation of innovational profile of the region and its division into zones. Identification of directions for the implementation of innovative transformations

However, the application of the provided algorithm requires solution of several methodological problems.

The first problem is associated with the requirement to select a set of indicators, characterizing the resource and performance components of innovational capacity.

The solution of this problem requires that the set of parameters should be two tiered –and consist of comprehensive (herein after referred as integrated) and individual parameters. The first type of parameters are the base characteristics and require the determination of boundary conditions, the second type play a supporting role and serve mainly to explain the revealed trends of innovative development of the region.

Selection of integrated indicators is based on the following provisions:

1. The system of indicators should provide a comprehensive characterization of innovative processes, including all its main stages, "science - innovation - production and distribution chain".
2. The set of indicators should be flexible, i.e. to reflect the changes taking place in the innovation sphere of the region (including resource and productive characteristics).
3. The quantity of indicators should be limited and associated with the specifics of regional statistics and its capabilities for conducting of comparative assessments of innovative capacity in territorial aspect.

Therefore, all integrated parameters grouped to 5 assessment blocks, characterizing innovational capacity of the region.

The second problem comes from the requirement to determine the border conditions of the selected parameters.

Table 2 illustrates the aggregated assessment features, elaborated and presented by leading scientists of RAofSc.

Table 2**System of integrated indicators, characterizing innovative capacity of the region**

Group of indicators	Indicators	The symbol of indicator	The limiting characteristics of indicators	
			R	Z
<i>HR component</i>	Share of officers with higher education among the total industrial personnel	K1	0,25	0,8
	Share of expenses on professional training in total cost of labour	K2	0,15	0,5
	Quantity of university students per 10000 persons of population, persons	K3	100	150
<i>Technical and technological component</i>	The level of depreciation of fixed assets, in %	T1	60	25
	The coefficient of renewal of fixed production assets, in %	T2	4,5	12,0
	The share of equipment with a service life up to 10 years	T3	0,33	0,7
<i>The financial component</i>	The share of expenses on science, research and elaboration in GRP, in %	Φ1	2,5	5
	The share of expenditures on innovations in total volume of production, in %	Φ2	2,5	5
	The share of investment volumes in industry to GRP, in %	Φ3	2,4	11,8
<i>The scientific component</i>	Number of workers carrying out scientific research, per 10000 persons of population, persons	H1	13	40
	The number of PhDs per 10000 persons of regional population, people.	H2	0,4	4,0
	The share of the cost of machinery and equipment in total fixed assets of the "Science and scientific	H3	16	35

	services" sector , in %			
<i>Result component</i>	Quantity of applications for inventions patent per 10000 persons of population, in %	P1	2,5	5
	The level of innovative activity of industrial enterprises, in %	P2	40	10
	The share of innovative products in total volume of industrial production, in %	P3	8	15

The third problem is associated with the formation of a regulative model of innovative capacity. Its solution can be represented in determining the system of inequalities, linking the integrated indicators with their boundary characteristics. (Table 3).

Table 3

The regulative model of assessing innovational capacity of the region (Kogut A., 1995)

Type of inequation	Characteristics of the state of innovational capacity
$I < = R$	Unsatisfactory condition that requires radical transformation, classified as a weakness of innovative capacity
$R < I < Z$	The critical state that requires limited changes to achieve innovative development goals
$I > = Z$	Satisfactory condition, adequate to determined tactical innovation goals. Requires changes aimed at maintaining positive dynamics, and classified as a strong point of innovative capacity.

Where:

I –the value of integrated indicator, which characterize the resource and result component of innovative capacity;

R –boundary value of integrated indicator of innovative capacity, expressed via characteristics of the indicator, which represents minimum acceptable level of its critical condition;

Z - boundary value of integrated indicator of innovative capacity, expressed via characteristics of the indicator, which represents the boundary of its pre-crisis state.

Table 4

Determining the coordinates of integrated indicator of the innovative capacity*

Type of inequation	Computation of coordinates (i) of integrated indicators
For all indicators (except for T1 and T3)	
$I \leq R$	$i = R / I$, in this case, the coordinate value is assigned a sign "-"
$R < I < Z$	$i = I / Z$ - the range of values of the coordinates will vary from 0 to 1
$I \geq Z$	$i = Z / I$ - the range of coordinate value is always above 1
For indicators T1 and T3	
$I \leq R$	$i = I / R$, in this case, the coordinate value is assigned a sign "-"
$R < I < Z$	$i = Z / I$ - the range of values of the coordinates will vary from 0 to 1
$I \geq Z$	$i = I / Z$ - the range of coordinate value is always above 1

* - The division of indicators into two groups performed due to the peculiarities of their economic essence. All indicators (except for T1 and T3) are characterized by the following dependence: the higher is their level, the more positive is the situation's assessment. For T1 and T3 – it is an inverse relationship.

The fourth problem is associated with analysis of mismatches between the regulative and actual parameters of the capacity. The priority here is given to the problem of comparability of the results of integrated indicators obtained during the assessment. For this purpose can be employed an approach that allows to aggregate individual characteristics of the capacity and to display them graphically as a set of coordinates of unified scale (i). Methodologically, this approach can be represented as follows(look at table. 4).

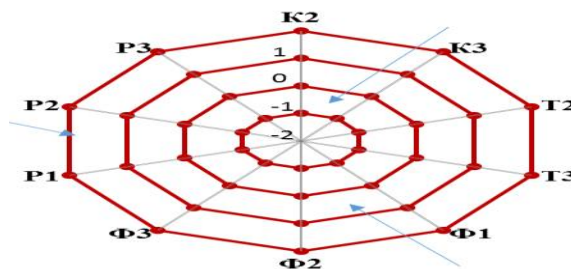


Figure 1. Zoning of innovative profile of the region. (Moskovina, 2015).

The coordinates of the capacity can be graphically displayed in the form of the innovative profile of the region. Depending on the concentration level of the calculated coordinates there can be highlighted three zones (Fig. 1).

1. Zone of unsatisfactory state of innovative capacity ($i < 0$). It reflects the negative trends in the formation of an innovative economy, which requires development of a system of measures aimed at improving the resource and, consequently, result component of the region's innovative capacity.
2. Critical state area ($0 < i \leq 1$). Indicates on insufficient level of capacity for the formation of an innovative economy in the region and the need for finding ways to improve the use of its resource components and activation of the final results of innovation.
3. Satisfactory condition Zone ($i > 1$). It is characterized by breaking the trajectory of the critical development path of innovative processes, and it requires the development of actions aimed at maintaining the positive dynamics.

The results of presented zoning can serve as a basis for determining directions for the implementation of innovational transformations.

Conclusion

Techniques of "Genuine saving" ("Net adjusted savings") index and "The system performance indicators" developed by the World bank and Commission on Sustainable Development of United Nations Organization (UN CEB), are effective in assessing the pace of globalization and the impact of external threats to the development of the regional economy. However these methods cannot provide useful information on the level of content and satisfaction of citizens from economic development, the inter-state disparities in income and living conditions, which can possess hidden threat for development of healthy society.

For the purpose of determining the socio-economic capacity of regions for stable development, and in order to learn complex assessment methods of regional capacities as well as their analysis,

it is useful to develop the system of computing indicators on the base of following economic areas:

- Human resources (number of population, the share of the economic active population, the share of people with higher education);
- Manufacturing (production volumes, the residual cost of the existing fixed assets of enterprises);
- Finance (taxes, non-tax revenues, budget expenditures, investments in fixed capital)
- Natural (agricultural land, goods and services produced in agriculture, mineral ores)
- Transport (the length of roads, the length of railway tracks, the volume of transported cargo)
- Infrastructure (the level of supply of the population settlements with sewage, electric power, gas)

Assessment of the economic capacity of regions by these indicators, along with creation of the convenience in elaborating regional development programs for local authorities for operational decision-making and ensure an integrated development of the regions.

Therefore it is important to solve following methodological problems:

- To consider the socio-economic capacity and its components as an economic category and the object of statistical observation;
- To develop a system for determining capacities of the region on the base of characteristics of existing volumes, their structure, quality and other indicators of resources;
- To develop a methodology for assessment of various elements of capacities;
- To develop a methodology for evaluating the loss (reduction) of social and economic capacity of the region;
- To develop a methodology reflecting the illegal or “shadow” use of the regional capacity;
- To develop methodologies for the effective use of social and economic capacity of the region;
- To develop a methodology for determining factors of development and the degree of their impact on socio-economic capacity of the region under market economy.

One of the most urgent issues while assessing the innovative development of territories is the analysis of the state of human capital, the existing technical and technological developments, the number of patents and their quantity per capita.

Therefore, one of the main task of researchers who study advanced scientific and methodical practice on assessment of the level of the regional development is to adapt them to the conditions of Uzbekistan and to develop practical recommendations for their application.

One of the prerequisites in the assessment of the socio-economic capacity of the region has to be accounting of factors such as the availability of resources, technical and technological possibilities of their use, the intellectual capacity of the region and its actual use, as well as the development of various regional programs based on the volume of resources, etc. ..

Therefore, the study of elaborations which are generally recognized and justified themselves in practice, as well as understanding their nature should serve for development of efficient programs and concepts aimed at complex development of regions.

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