

Methodological Approaches to Estimation of Economic Growth and Sustainable Development: Kazakhstan's Experience

Nailya K. NURLANOVA*, Akedil K. OMAROV**, Zaira T. SATPAYEVA***

Received: February 14, 2020 Revised: February 24, 2020 Accepted: March 1, 2020.

Abstract

The study aims to analyze the theoretical background of the economic growth and sustainable development; systematization of scientists view on monitoring and economic and innovative evaluation, analysis and diagnosis of factors affecting these processes. Rating characteristics of the level of innovative resources development obtained based on the comparative analysis of Kazakhstan regions. Calculations were done based on official statistics during 2010 and 2015-2017. Based on obtained data there has been grading of the country regions and their ratings were determined by the level of development of innovative resources. This research identifies areas and mechanisms to ensure balanced sustainable development of the national economy. The findings suggest that sustainable development of the state is affected by the innovative activity of the regions, the sustainable development of which is ensured by innovative enterprises. Transition to the model of sustainable territorial development involves the formation of such conditions and the use of mechanisms under which the natural base of this development is not destroyed, the environment suitable for human existence is preserved and reproduced. The findings of this research support for pursuing a national policy of reducing regional imbalances, and promoting a more balanced and sustainable development of the whole country.

Keywords: Region, Region Policy, Disparities, Economic Growth, Sustainable Development, Innovation, Kazakhstan

JEL Classification Code: O40, Q01, Q30

1. Introduction

Strengthening of global technical revolution processes brought into focus the search problem of new models, resources and factors of economic growth. In view of this

Kazakhstan has set a course for the formation of a knowledge-based economy and usage of green ICT. The goal is to become an industrial country, capable to join the ranks of 30 most developed countries in the world due to the diversification and improving competitiveness of national economy, integrated increase of labor efficiency. For instance, embedded energy-efficient manufactured digital platforms and highly efficient industrial servers can be used in order to reduce energy consumption and increase non-stop operating hours.

These issues solution required fulfillment of comprehensive technological modernization of national economy and applying of new methods of innovative processes organizing. Such policy first must be built based on new trends, current incentives and models, aimed at economic growth, sustainable development and rational use of energy. Many developed countries like the USA and Europe allocate large financial resources for the implementation of sustainable development concept. They regard the concept mainly in the context of productivity

*First Author. Chief Researcher, Institute of Economics of the Ministry of Education and Science of the Republic of Kazakhstan; Professor, al-Farabi Kazakh National University, Kazakhstan. E-mail: n.k.nurlanova@gmail.com

**PhD student, Al-Farabi Kazakh National University/ Institute of Economics of the Ministry of Education and Science of the Republic of Kazakhstan, Kazakhstan. E-mail: akedil1981@mail.ru

***Corresponding Author. Senior Researcher, Institute of Economics of the Ministry of Education and Science of the Republic of Kazakhstan, Kazakhstan [Postal Address: 29 Kurmangazy Street, Almaty, 050010, Kazakhstan] Tel: +7 7079057330, E-mail: szt_kz@mail.ru

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improvement and usage of energy efficient technology. This will lead to creation of new competitive environment and radical alterations in traditional economic sectors.

The imperative of economic growth and sustainable development policy must become technological modernization and digitalization of basic industries enterprises, implementation of investment projects focused on resource-efficient usage of raw materials potentials, creation of new knowledge-intensive industries, fields of activities, and increase of labor efficiency. This calls for assessment of capabilities of capacity for innovation and scientific justification of regional policy priorities, directed at development of scientific increase “point”.

In this context, it is necessary to formulate a new sustainable development policy in accordance with priorities of the concept “Transition of the Republic of Kazakhstan to “Green Economy””. This part includes the usage of the concept of data-processing network of material things “Internet of Things”, as well as cloud technology and green ICT.

For Kazakhstan, with its extensive territory and a significant variety of socio-economic and geographical conditions the course towards industrial development depends largely on geography level. Therefore, the problem of creating science-based economy can be solved only based on regional strategies, which should be focused on the formation of “points” of economic growth.

The aim of the article is to study the theoretical and methodological framework to estimate the economic growth and sustainable development in Kazakhstan, assess the level and possibilities of identifying new “growth points”.

The initial theoretical and methodological basis of this research have formed the scientific and practical developments of foreign and domestic scientists in the field of economic growth and sustainable development.

Thus, the study of territorial development problems through differentiated approach have been observed in the works of researchers Parr (1999), Barry (2007), Broekel (2011), Pilyasov (2012) and Rodríguez-Pose (2013). The study of economic growth and sustainable development problems have been considered in works of following researchers: Turner (1988), Krugman (1991), Dutton (1999) and Kenny (2002). Studies on the development of energy-efficient technologies have been studied in the works of the following scientists Pearce (1992), Zhau (2016), Kim (2017), Hojjat (2014), Nguyen and Ngoc (2020).

The study is divided into the following sections. The Section 2 proposes to consider the theoretical aspects of the economic growth and sustainable development. Section 3 sets the methods of this research. Section 4 contains the results of this research. Section 5 is a concluding part.

2. Theoretical Background

The initial theoretical and methodological basis of this scientific research was the development of scientists in the field of economic growth and determination of sustainable development trends. The in-depth study of these researches gave the opportunity to develop the context of theoretical and methodological support of this research. Herewith, it should be pointed out that current research on identifying methodological approaches taking into account national specifics has no analogues in Kazakhstan and will be studied for the first time.

New trends towards formation of sustainable development policy more often have one scientific or production base, furthermore, successful development of energy-efficient sectors of economy can be guaranteed if the scientific base allows to build regional policy not according specialized type but differentiated one. Accordingly, the study of territorial development management issue by differentiated approach can be seen in the works Barry (2007), Broekel (2011), Pilyasov (2012) and Rodríguez-Pose (2013).

Generally, systematic approach understands sustainable development as a complex of subsystems of social and natural type, union of ecological, social and economic sustainability as its basic components. In addition, a differentiated approach refers to a combination of various components of the entire economic system (Parr, 1999; UNEP, 2011; Nurlanova, Satybaldin, Bekturganova, & Kireyeva, 2018). Some of the scientists made a great contribution in development of scientific knowledge of improving the competitiveness of regional economic systems through technological modernization (Moseley, 1974; Romer, 1986; Zubarevich & Safronov, 2011; Kireyeva, Mussabalina, & Tolysbaev, 2018; Lee & Xuan, 2019).

In our view, to develop the interpretation of “sustainable development” concept, it is reasonable from the perspective of a systematic approach to understand the essence of such concepts as “sustainability”, “development”, “sustainable development”, “cyclicity”, “economic growth”. In the scientific community there is a great debate regarding the concept “sustainable development”, that it is a complex concept, which includes social, economic and ecological aspects of human development. Uskova (2009) defined that sustainable development as a special type of economy dynamics, tailored for current needs, but not threatening future generations in meeting their needs.

In accordance with the model of sustainable development achievement of economic growth, the preservation of natural complexes and the elimination of social injustice are mutually complementary for society. Environmental management is impossible without

socioeconomic management. Important factor of sustainable development is economic growth, associated with it are indicators of production, its effectiveness, the possibility of improving the material level and quality of life of people.

It has been identified that economic growth is an increase in either real output (GNP) or real output per capita. While many developing countries have witnessed rapid economic growth in the recent decades, relatively few of these countries have been able to ensure that the economic growth process has been inclusive of the poor (Haughton & Counsell, 2004). Other scientists regard growth as an increase in the production capabilities of society (Turner, 1988). Nevertheless, inequality within countries has tended to increase, with incomes rising for the already affluent while living standards stagnate for much of the population. The essence of economic growth to the rate of economic welfare or national income per capita (McConnel, Brue, & Flynn, 2017).

Transition to sustainable development of any country is possible only when there is sustainable development of all regions. Formation of sustainable development strategy and economic growth of regions is a difficult and time-consuming task. In order to determine sustainable development there is required a systematic work on monitoring and estimation of economic, innovative and environmental situation, analysis and diagnosis affecting these processes (Pearce, 1992).

Most of the economist have a theory that economic growth problems must be exclusively considered from the perspective of economic activity as a part of social development (Fujita & Mori, 1997; Granberg, 2000; Kireyeva, Lakhonin, & Kalymbekova, 2019). Accordingly, they contend that more important is not only the problem of reducing inequality of income distribution, but also efficient use of natural resources pay more attention to environmental issues.

The importance of dominant directions of sustainable economic development have reflected in the works of many scientists, who evaluated sustainable development of economic system by specific economic indicators. Selection of indicators characterizing sustainable development is provided by information, on the system state. The following requirements are imposed upon them:

- indicators of sustainable development are needed for a target-oriented choice of political course and economic decisions for the whole society;
- all indicators are targeted at the most important interests of various layers and groups of society;
- the number of indicators is determined by the minimum of needs, adequately reflecting immediate developmental aspects;

- the indicators must be clearly stated and defined on the basis of the consensus of opinions of the population of the region for which they are developed;

- the indicators must be clear and well-designed and adequately reflect development course.

All these indicators form the basis of region sustainable development. In general, formation of sustainable development indicators is a sophisticated scientific problem. Many scientist of our country and abroad are working on its solution. To characterize sustainable development and economic growth there is a set of indicators, which can be considered at different hierarchical levels: global, national, regional, sectoral, even for individual settlements

Based on the information presented above region sustainable development in this paper can be defined as a form of development whereby totality of economic, social and innovative systems is characterized by a high level of balance, which allows to maintain achieved equilibrium by the system in the running period and in the long term.

3. Research Methods and Materials

The important drawback of all estimation methods for developing assessment indicators of sustainable development and economic growth is the lack of priorities. Many methods act as equal, having the same weight. Meanwhile the analysis of indicators scheme shows, that when they are created, any particular group of indicators is somehow given more weight than other groups. Assessment of the stability (instability) of the regions and identification of the main problems of socio-economic development should be carried out in stages. The following approach is proposed for identifying indicators of sustainability of regional development, which includes following stages:

1. The preparatory phase, which defines the goals of sustainable development assessment, the scope and time frame of the study, and the use of assessment results

2. The stage of developing the concept of sustainable development of the regions, which serves to concretize the concept of sustainable development and ensure its applicability in the region, which will have a direct impact on the subsequent stages.

Rating method was chosen as the methodological approach to an objective assessment of the level of development of innovative activity in the regions of the country This methodological approach allows us to quantify the analyzed processes in an aggregated form to present their qualitative state and dynamics. Despite the obvious advantages of this methodology, one can note its disadvantages, which are expressed in a limited set of studied processes due to the lack of reliable statistical data. Thus, to build the ratings, a method was chosen that uses a

set of indicators to determine the level of development of innovative resources in the regions of Kazakhstan (including regions and cities), tracked by state statistics (Rittel & Webber, 1972; Ritchey, 1991; Nurlanova et al., 2018).

In particular, taking into account the availability of official statistics from Kazakhstan, the following indicators of the level of development of innovative resources of the region were selected for the rating assessment:

- the costs of scientific research and development work (R&D);
- costs of technological innovation;
- level of innovative activity of enterprises, in %;
- level of activity on product and process innovations, in %;
- release of innovative products;
- the share of people engaged in research and development in the total number of employees in the region, in %.

The transition from a set of values of initial indicators to aggregated estimates is made according to the following algorithm. For each of the indicators of the level of development of innovative resources introduced into the analysis, a leader region, that has the maximum value of the indicator is defined, which is taken as 100%. Further, to determine the rating score for the i -th indicator (Rb_i), the parameters of the corresponding indicators of the studied population of regions are recalculated as a percentage of the maximum value relative to the leading region according to the following formula (1):

$$Rb = X_n / X_{\max} \times 100\% \quad (1)$$

Where X_n – parameter value for the n -th region
 X_{\max} – maximum parameter value;
 Rb_i - rating score for the i -th indicator.

As a result of using formula (1), one can obtain series of rating score data for indicators selected for analysis characterizing the degree of proximity of parameter values for each region to the leader region.

The final rating of the region according to the level of development of innovative resources was estimated by calculating the aggregated rating score (Rb_a), combining private ratings for all analyzed indicators in one common indicator, using formula (2)

$$Rb_a = (Rb_1 + Rb_2 + Rb_3 + Rb_4 + Rb_5 + Rb_6) / 6 \quad (2)$$

Where Rb_a - aggregated rating score;
 Rb_1 - rating score for R&D expenses per 1 employed;
 Rb_2 - rating score for the level of costs of technological innovation per 1 employed;
 Rb_3 - rating score on the level of innovative activity of

enterprises;

Rb_4 - rating score for activity level by product and process innovations (or share of innovative products);

Rb_5 - rating score for the volume of produced innovative products per 1 employed;

Rb_6 - rating score for the share of research workers in the total number of employees in the region.

The rating assessment of the level of development of innovative resources in the regions will be in the range from 0 to 100%. Accordingly, the larger the value of this assessment, the higher the region's place is in the ranking.

The objective of creation of this methodology is determination of directions and mechanisms for providing balanced sustainable development of national economy based on the analysis of regions according to the level of innovative resources. The sustainable development of the state is affected by the innovative activity of the regions, the sustainable development of which is ensured by innovative enterprises. Sustainable development of enterprises, in turn, depends on their innovative activity. One of the most important tasks was the territorial concentration of human capital and innovation at priority growth points, and the intensive development of urbanized zones.

4. Results and Discussion

Rating characteristics of the level of innovative resources development obtained based on the comparative analysis of Kazakhstan regions. Calculations were done based on official statistics during 2010 and 2015-2017. Based on obtained data there has been grading of the country regions and their ratings were determined by the level of development of innovative resources in accordance with formulas (1, 2). The results of the calculations are shown on the example of data for 2017 (see Table 1).

The assessment showed that in 2017 - Atyrau region was the leader in terms of technological innovation costs per 1 employee (471,8 thousand KZT), and the capital, Nur-Sultan city was the leader in terms of specific research and development costs per 1 employee. The highest level of innovative activity was observed at enterprises of East Kazakhstan region (15,1%), majority of all innovative products per 1 employee were produced in Pavlodar region and Nur-Sultan city.

According to the level of activity in product and process innovations, the first places were taken by North-Kazakhstan (9,2%) and East-Kazakhstan (8,3%) regions. In fact, the share of North-Kazakhstan region in the GRP structure is very small, however, the region has technological capabilities for production of innovative high-tech products. At the same time, the costs of research,

development and technological innovations in this area are quite low.

number of employees is Almaty city, which has the highest scientific and technical potential.

The leader in the share of research workers in the total

Table 1: Ranking of the indicators of the level of development of innovative resources of the regions in Kazakhstan in 2017

Region of Kazakhstan	Expenses on R&D	Expenses on technological innovations	The level of innovation activity	Product and process innovation activity level	Volume of innovative products	Share of research workers in total	Aggregated Rating Score (Rb _a)
Akmolinsk region	6,7	19,3	49,7	59,8	8,6	16,7	26,8
Aktobe region	6,3	28,5	66,9	82,6	21,5	8,9	35,78
Almaty region	2,7	1,9	53,6	54,3	2,8	9,9	20,87
Atyrauregion	37,0	100,0	53,0	53,3	4,3	15,9	43,92
West-Kazakhstan region	2,8	4,3	35,1	16,3	12,6	10,2	13,55
Zhambyl region	6,2	5,3	74,8	76,1	22,4	7,5	32,05
Karaganda region	16,3	9,3	73,5	69,6	10,9	21,0	33,43
Kostanay region	7,3	15,5	74,8	79,3	41,4	11,7	38,33
Kyzylorda region	4,7	3,9	75,5	64,1	3,7	7,0	26,48
Mangistau region	88,4	4,3	23,2	27,2	0,2	25,3	28,1
South-Kazakhstan region	2,5	35,0	43,0	65,2	24,6	9,7	30,02
Pavlodar region	2,6	59,0	57,6	66,3	100,0	16,6	50,35
North Kazakhstan region	1,9	15,5	74,2	100,0	10,4	3,2	34,2
East Kazakhstan region	22,2	31,2	100,0	90,2	26,1	34,1	50,63
Nur-Sultan city	100,0	38,3	95,4	67,4	66,9	62,1	71,68
Almaty city	87,0	12,2	49,7	48,9	6,6	100,0	50,95

To identify opportunities for the development of high-tech sectors of the economy, the level of development of innovative resources of the country's regions for 2010 and 2015-2017 assessed in the similar way.

Based on the values and literal values of the aggregate rating points, the country's regions ranked and their next typology compiled according to the level of development of innovative resources (see Table 2).

Table 2: Category of regions of the Republic of Kazakhstan based on the level of innovative resources

Rating point, %	Definition	2010	2015	2016	2017
From 80 to 100	Very high level of innovative resources development	-	-	-	-
From 60 to 80	High level of innovative resources development	-	Nur-Sultan city	Nur-Sultan city	Nur-Sultan city
From 40 to 60	Medium level of innovative resources development	Pavlodar region, East-Kazakhstan region, Almaty city	Atyrau region Almaty city	Atyrau region, East-Kazakhstan region	Atyrau region, East-Kazakhstan region, Pavlodar region, Almaty city

From 20 to 40	Low level of innovative resources development	Aktobe region, Zhambyl region, Karaganda region, Nur-Sultan city	Akmolinsk region, Aktobe region, Almaty region, Zhambyl region, Karaganda region, Kostanay region, Kyzylorda region, Mangystau region, North-Kazakhstan region, South-Kazakhstan region, East-Kazakhstan region	Aktobe region, Almaty region, Zhambyl region, Karaganda region, Kostanay region, Kyzylorda region, Mangystau region, Pavlodar region, North Kazakhstan region, Almaty city	Aktobe region, Almaty region, Zhambyl region, Karaganda region, Kostanay region, Kyzylorda region, Mangystau region, North Kazakhstan region
From 0 to 20	Very low and unsatisfactory level of innovative resources development	Akmolinsk region, Almaty region, Atyrau region, West-Kazakhstan region, Kostanay region, Kyzylorda region, Mangystau region, North-Kazakhstan region, South-Kazakhstan region	West-Kazakhstan region, Pavlodar region	Akmolinsk region, West-Kazakhstan region, South-Kazakhstan region	West-Kazakhstan region

The obtained data show that in 2017 high-level of innovative resources development for all analyzed indicators observed only in Nur-Sultan city. The majority of regions in Kazakhstan had low-level of innovative resources development, moreover current rating included such economically developed regions as industrial Karaganda region, as also raw-mining regions – Aktobe region, Kyzyl-Orda region, Mangystau region. Over recent years, these three regions had a steadily low-level of development of innovative resources. Unsatisfactory level of development of innovative resources in 2017 was common with West-Kazakhstan region.

Summarizing of rating collective results highlighted the features of determining sustainable development of the region based on the differentiation of Kazakhstan development and draw the following conclusions.

Firstly, only on region – Nur Sultan city which is characterized by high level of economic growth. The middle position is occupied by other four regions: Atyrau region, Pavlodar region, East-Kazakhstan region and in Almaty city. Low level is typical for 10 regions of the country, while West-Kazakhstan region identified as the region with unsatisfactory development level of innovative resources.

Secondly, Nur-Sultan city is clearly defined as the main “growth point” of Kazakhstan. The largest volume of produced innovative products per worker is here. In many respects, this is accounted for providing of large-scale works in the framework of International specialized exhibition of development of green and energy-efficient technology “EXPO-2017”, as well as creation of and functioning of new scientific-research centers in Nazarbayev University.

Thirdly, in Atyrau region, which lays claims to being a leader and is included in the middle level zone, at high

share of spending on technological innovations, the volume of produced innovative products per worker is unreasonably low. Therewithal, the level of products innovativeness produced within the conditions of low-tech manufacturing is questioned.

Consequently, conducted analysis let’s take the position that the degree of economy readiness to the development of local industries is different in regions of Kazakhstan, otherwise stated the territorial differentiation of the country by the level of economic development is preserved.

5. Conclusions

This work marks a starting point for further research in the field of economic growth and sustainable development. It provides some suggestions for improvement of future studies dealing with this subject. In general, it may be concluded that transition to sustainable development of the country is possible when sustainable development is supported in all regions. Transition to the model of sustainable territorial development involves the development of such conditions and application of such mechanisms whereby the natural base of the development is not destroyed, and environment suitable for human existence is preserved and reproduced

Based on these research findings of this paper, the practical implications are listed below:

The need for sustainable development of the region is due to the planetary threat of environmental degradation, unstable situation in the global economy, low socio-economic indicators of the country, poor innovation activity in the Republic of Kazakhstan, therefore, the development of the regions of Kazakhstan today is one of the priority tasks since dynamically developing and competitive regions

are the source of growth for the whole country, the pillar of pursuing a national policy of reducing regional imbalances, promoting more balanced development and contributing to the country's sustainable development

Firstly, in order for the raw material regions (Atyrau, Aktobe, West Kazakhstan, Mangystau and partly Kyzylorda regions) to be able to maintain their leadership positions in the face of an adverse change in the environment, it is necessary to improve the sectoral structure of the economy. In particular, large-scale technological modernization of traditional sectors of economy based on modern technologies and green technologies is recommended; creation of new industries, that process raw materials without polluting the environment. At this stage, there is needed, government support for new manufacturing industries focused on deep processing of raw materials and production of high value-added products by providing tax and customs benefits, stimulating investment, providing state subsidies and guarantees, etc.

Secondly, the "growth points" of the economy are Nur-Sultan and Almaty cities, where projects for the development of green and energy-efficient technologies are being implemented. For example, the formation of Smart city in Almaty includes the implementation of system digital projects in the areas of security, monitoring of mudflow activity, public transport, housing and communal services, education and healthcare. It is planned to create on the right bank of Nur-Sultan city is a "smart" district with digitalization of housing and communal services, the well-being of the city, and social infrastructure is planned.

Thirdly, special state support needed in depressed regions (Zhambyl, North Kazakhstan regions, some regions of East Kazakhstan, South Kazakhstan, Almaty and Kyzylorda regions). The main direction that can ensure the economic recovery of these regions is the development of transport, logistics and communication infrastructure, which makes it possible to level the factor of remoteness of territories from centers; ubiquity of the Internet; revival of national crafts and cottage industries. It is important to motivate the development of social infrastructure and the environment, ensuring inclusive development, through the development of special programs and non-standard schemes for attracting external financing, and the wide use of public-private partnership mechanisms. A meaningful part in the development of current type of regions can be done with the help of self-government system spread.

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