

Problems of sustainable development of the region

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Abstract. The article considers the problems of sustainable development in the Eastern Kazakhstan region. The authors offer the economic-mathematical predicting model of the gross regional product which is a resultant estimated indicator of a sustainable development of the region. The article analyzed the ecological system of the sustainable development of the Eastern Kazakhstan region.

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Introduction

Firstly, the problem of a sustainable development was sounded in 1992 at the UN conference in Rio de Janeiro, and later it was discussed at different world forums. Since then it is always in the center of attention of government institutions and public organizations.

It is necessary to understand the sustainable development as the phenomenon which meets the requirements of the present generation as well as of the future without threatening it.

The sustainable development usually is associated with a stable state or steady growth of economy, emphasizing the necessity of ecological restrictions. Thus the center of gravity moves on a sustainable development of the regional economy because steady regional blocks develop steady national economy.

Literature review

The theoretical aspects and the organization management principles of regional systems have been investigated by such scientists, as A. Markusen (1955), Glikman N. (1980), Granberg A.G. (1983) N. S. Ziyadullayev (1983), Boeckemann D. (1984) Shniper R. I. (1991) F. Giarratani (1994), Vidner P.P. (1996) [1, 2, 3, 4, 5, 6, 7, 8].

The problems of economic growth and sustainable development are researched by R. Solow (1956), J.W. Forrester (1971), D.L. Meadows et al. (1974) G.B. Asheim (1994), R. Costanza (1996), G.M. Grossman (1994), A. Endres (2004) [9, 10, 11, 12, 13, 14, 15].

Nevertheless, the organizational and methodical aspects of a target sustainable development management in the conditions of partly

or half reliable information are not developed sufficiently.

Methodology

In order to solve problems of technical and socio-economic modernization any country can use one of two basic models of economic development.

The technologically and economically developed countries apply the model of pioneer development which is an umbrella for creation for the most advanced production technology and the most effective (in terms of growth of national wealth) economic mechanisms.

Another model is the model of “catching-up development” which is typical for countries that are in the “next” world levels of technical and economic progress. The development of these countries is based on the advancement of technology and economic mechanisms established in the leading countries.

It is considered that the country to reduce the backlog of world economic leaders should apply “catching development” strategy, according to which they undergo a series of sequential steps:

- Extraction and processing of raw materials;
- Production of material and labor-intensive products;
- Production of capital goods;
- Research and development.

We believe that Kazakhstan has passed the stages of the development, as other countries did. Despite the fact that the country produces insufficient range of competitive products (except raw materials and primary materials), Kazakhstan has all of the above steps are provided in conjunction with the

modernization of the new construction can become points of economic growth. The source of financing of the reconstruction and modernization of the national productive industry is the income from exports and foreign investment.

Results of research

Sustainable development (sustainable development) – a global socioeconomic paradigm of development, whereby the process of economic growth satisfies needs of today's generation without depriving thus future generations of opportunities to satisfy their own needs.

The conceptual problem definition of transition to a sustainable development is connected with the report "Our general future", prepared in 1987 World commission on environment and development [16]. The report noted that there are major factors which predetermined statement of a problem of a sustainable development:

- resource-positing economy;
- gradual weakening of self-restoration mechanism of environmental quality as a result of natural resources overuse;
- uncontrollable growth of insoluble waste;
- overconsumption in economically developed countries against poverty growth in the majority of the countries of "the third world";
- rapid increase of population.

The sustainable development of the region is a dynamic increase of the territory's potential, and also creation of economic agents' motivation to expanded reproduction and on this basis – to consecutive increase a standard of population living (figure 1).

The basis for realization of sustainable development strategy of the region is high growth rates of regional economy, formation of competitive sector of services in regional economy at a gain of industrial production, increase in volumes of retail trade and paid services to the population, housing input; development of innovative activity.

The main criteria of strategy realization efficiency of the region sustainable development includes rational and complex use of resource, labor and intellectual potential of the region, interregional and republican territorial division and labor co-operation, opportunities of the international economic cooperation.

We consider that in the conditions of formation of the market economy in Kazakhstan the paradigm of a sustainable development of regions is premature, which means it does not correspond to real problems of regional development, for the following reasons:

1. The concept of a sustainable development from the economical and technological point of view is based on the economical principles of the closed cycle "5R":

- reduction power and material capacities (reduction);
- replacement of non-renewable resources with renewable (replacement);
- recovery of the necessary components from the processed waste (recovery);
- recycling of waste (recycling);
- re-use production (reuse).

The economy of the closed cycle is an innovative economy. Therefore, an institutional basis of a sustainable development is the developed innovative economy at which formation strategy of the Kazakhstan regions have to be aimed.

2. The system purposes of a sustainable development include ecological integrity, economic efficiency and economic justice. The main sources of a sustainable development are the natural, material (physical), financial and intellectual capital of the region. Thus, an economic source of providing a sustainable development is growing capitalization of resources of regional economy.

3. Recognition of a sustainable development as the main strategic objective of regional development assumes creation of steady society on a global scale. In this regard the transition to the sustainable regional development implies strengthening of integration processes, an exit of the economic relations of the region not only out of limits of the geographical boundaries, but also out of borders of Kazakhstan. It is necessary not only to grow capitalization, but also system integration into the world economy to the region for providing a sustainable development and realization of the strategic interests, such as embedding in world reproduction cycles, providing economic security, expansion of opportunities of access to world resources of development.

The factors of a sustainable development are available in most developed regions in Kazakhstan. Therefore nowadays the sustainable development "for all" is the unattainable purpose. In the majority of regions of RK there are no:

- effective innovative economy which is a basis of a sustainable development;
- market capitalization of assets of the region, being a financial source of providing a sustainable development;
- prerequisites of realization of strategy of a sustainable development in the form of the integrated interregional economic relations.

In the current situation for the majority of the Kazakhstan regions an adequate strategic choice

includes either capitalization strategy, or strategy of formation of competitive regional clusters.

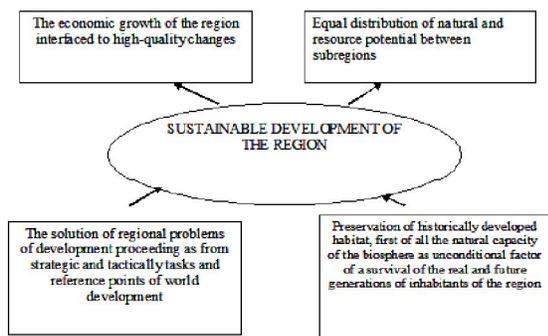


Figure 1. Essence of a sustainable development of the region

As a generalizing indicator of a sustainable development level of the region it is expedient to use the Gross Regional Product (GRP) which is the most objective macroeconomic indicator characterizing development of certain regions. Gross regional product is produced at the regional level gross added value, net of services provided by public institutions to society, financial services organizations, as well as taxes on products and imports, which are calculated for the whole country.

According to the economic meaning of GRP is a regional analog of Gross domestic product which pays off at republican level one of three methods:

- as sum of a gross value added of all sectors of economy (a production method);
- as sum of components of end use (method of end use);
- as sum of primary income (a distributive method).

It is necessary to develop the economic-mathematical model suitable for practical use by employees of state bodies in analyzing of GRP with a fine precision for increase of management efficiency by system of providing a sustainable development of the region.

The initial data of such a model should use the statistics published in reference books. It is desirable that the numbers of indicators are small, and the values were not subjected to correction or "fit" based on the subjective opinion of the analyst on the reliability of the published information.

For GRP forecasting we suggest to use the equation of regression by the following way:

$$Y = a + b_1MIP + b_2IFC + b_3NEP + b_4VIO + b_5VPA + b_6VS, \quad (1)$$

where Y – GRP, one million tenges;

MIP – monetary income of the population, tenge;

IFC – investments into fixed capital, one million tenge;

NEP – number of employed population, one thousand people;

VIO – volume of an industrial output, one million tenge;

VPA – volume of production of agriculture, one million tenge;

VS – volume of services, one million tenge.

For the East Kazakhstan region the prognoses model of GRP:

$$Y = 69065 + 0,82 MIP + 0,35 IFC_k + 0,12 NEP + 1,03 VIO + 1,12 VPA + 0,94 VS.$$

The received multiple-factor equation of regression rather fully considers the factors determining by GRP of the East Kazakhstan region has good convergence with actual data (coefficient of multiple determination of $R^2 = 0,958$) and can be recommended for the expected calculations which results are presented in table 1.

From table 2 it is visible that the actual values of GRP differ from expected for 0,66-4,11%. It also indicates the model offered by authors is suitable for practical application.

On the basis of offered model it is possible to draw a conclusion that the most significant factors of growth of GRP are volumes of production made in the industry, agriculture and a services sector. To a lesser extent GRP are influenced by change of the sum of investments into fixed capital and the population, taken in economy.

On the basis of official data on a state of environment “The Informational Bulletin 2012” [17] we will carry out the analysis of ecological making system of a sustainable development of the East Kazakhstan region.

Table 1. The forecast of major factors and volume of GRP of the East Kazakhstan region till 2015

Date	Monetary income of population (kzt)	Investments in fixed capital (mln. kzt)	The number of employed population (in thousands)	Volume of industrial production (mln. tenge)	Volume of agricultural product (mln. tenge)	Volume of service (mln. tenge)	GRP (mln. tenge)
2010	409596,0	144669,8	726,1	641267,5	153133,2	8002,5	1295192,34
2011	485808,0	241629,9	717,9	822907,4	202249,2	9363,8	1634999,87
2012	563537,3	318226,6	719,3	1064019,3	223485,4	10693,4	1998926,54
2013	653703,2	419104,4	720,8	1297039,5	246951,3	12211,9	2375889,99
2014	758292,7	551960,5	722,2	1677072,1	272881,2	13946,0	2930258,30
2015	879623,0	726932,0	723,7	2168454,2	286525,3	15926,4	3614255,88

Note - calculated by the Statistics Department of East Kazakhstan region

Table 2. Deviation of actual values from the forward GRP

Date	GRP expected (according to model), Mln tenge	GRP current, Mln tenge	Deviation of actual values from the forward GRP	
			Mln tenge	%
2010	1295192,34	1244102,60	-51089,74	-4,10655
2011	1634999,87	1624341,00	-10658,87	-0,6562

Note - calculated by the Statistics Department of East Kazakhstan region

The level of pollution of the atmosphere is estimated on the basis of a complex index of pollution of the atmosphere (IPA₅), which pays off on five substances with the greatest rated values of the

maximum acceptable concentration (MAC) taking into account their class of danger [18].

In Kazakhstan there are 10 highly polluted cities ($IPA_5 \geq 5$), including 7 cities with high level of air pollution ($IPA_5 \geq 7$): Shymkent (13,3), Temirtau (10,2), Alma-Ata (9,1), Ust Kamenogorsk (8,4), Karaganda (7,8), Taraz (7,6), Zhezkazgan (7,1).

In Ust-Kamenogorsk in 2011 there was an increase in air pollution compared to 2010. While the average for the year of nitrogen dioxide concentration was 2.2 MAC, sulfur dioxide - 1.8 MAC, formaldehyde - 1.4 MAC, phenol - 1.2 MAC. The content of suspended substances, carbon monoxide, arsenic, chlorine was within normal limits.

The maximum concentrations of single phenol was 7.6 MAC, nitrogen dioxide - 7.4 MAC, sulfur dioxide - 3.7 MAC, suspended solids - 2.8 MAC, carbon monoxide - 2.4 MAC, hydrogen chloride -1.9 MAC chlorine - 1.6 MAC.

In Ridder it is noted elevated levels of air pollution ($IPA_5 = 6.9$). The annual average concentration of nitrogen dioxide and formaldehyde was 1.5 MAC, sulfur dioxide, 1.4 MAC, MAC -1.1 phenol. Suspended solids, carbon monoxide, arsenic were within acceptable norms.

Maximum concentration of single nitrogen dioxide was 2.0 MAC, carbon monoxide - 1.6 MAC, phenol - 1.4 MAC.

After investigation of the water bodies, the surface water quality is estimated as follows:

- Water "clean" - Kara Irtysh River, Irtysh, lake Markakol;
- Water "moderately - polluted" - river Oba, Buktyrma, Emel, Ayakoz, reservoirs Buktyrma, Ust Kamenogorsk;
- Water "polluted" - river Ulba, Glubochanka;
- Water is "dirty" - Breksa River, Tichaya;
- The water was "extremely dirty" - the river Krasnoyarka.

In 2011, the extremely high pollution (EHP) of surface waters in the East Kazakhstan region was observed in 12 cases in the river Krasnoyarka. High pollution (EOI) of surface waters is recorded in the following bodies of water: river Ulba - 17 cases OT river Krasnoyarka - 12 cases OT river Breksa - 9 happened OT Quiet River - 10 happened OT river Glubochanka - 11 cases of OT.

According to the "Norms of Radiation Safety" (NRS - 99), the main value of the regulated man-made radiation - effective dose - not more than 0.57 (McSv/h mcSv/h is microsievert per hour; Sievert (symbol: Зв, Sv) – is a unit of ionizing radiation dose in the International System of Unit). In 2011, the average values of radiation gamma background atmospheric boundary layer on Human

Settlements territory of East Kazakhstan region ranged 0.09-0.16 mcSv/h and do not exceed natural background.

According to Chapter 6 of "Manual for hydrometeorological stations and posts" the allowable value daily fallout is not more than 110 Bq/m² night (Bq/m² – Becquerel per square metre – a unit which defines the activity of a quantity of radioactive material in which one nucleus decays per second). In 2011, the average density of radioactive fallout in the surface layer of the atmosphere in the region was 1.3 Bq/m² that does not exceed the maximum permissible level.

In Ust-Kamenogorsk in soil samples cadmium content was within 1.2 - 42.0 MAC, lead - 1,4-17,5 MAC, copper - 0,2-9,8 MAC, chromium - 0.01-1.6 MAC, zinc - 0,6-7,1 MAC.

In Ridder the soil samples cadmium contains from 1,7-57,0 MAC, lead - 2,1-31,7 MAC, copper 0,4-7,3 MAC, zinc 1,1-8,6 MAC, chromium - 0,003-3,1 MAC.

In Semey the lead concentration was in the range 0.2-1.5 MAC concentrations of cadmium, copper, chromium and zinc were within 0.03-0.9 MAC.

In order to dramatically improve the environmental situation the regional program "Ecology of Eastern Kazakhstan" for 2012-2020 should be developed and implemented to achieve the following objectives:

- Decreasing anthropogenic impact on the environment and public health;
- Saving and restoration of natural ecosystems;
- Formation and development of the quality management system environment.

This program should, in our view, include the following activities:

- implementation of which will lead not only to recover, but also to enrich the natural potential of the region;
- restoration of ecosystems of rivers and lakes;
- implementing a model eco-friendly, resource-saving farming systems;
- go to waste technologies using natural raw materials;
- widespread transition to closed water systems in industry and public utilities [18].

Conclusion

The economic mechanism of the sustainable development should encourage enterprises to carry out environmental protection activities. The enterprises should be delivered in an environment in which economic results of their activities are directly

dependent on the degree of ecological production. The enterprises should seek to minimize their total environmental costs (consisting of costs of pollution prevention, pollution charges and licensing fees) while maximizing the net profit. The prerequisite for this is to minimize damage to the environment and companies reducing anthropogenic impact on the environment to the standard level.

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