

Estimation of the Level of Sustainable Development in Kazakhstan Regions and Recommendation for its Increase

Gulzada S. Baimukhamedova*, Nailya K. Nurlanova**, Sharzada Akhmetova***

Abstract

The purpose of this study is to investigate existing world economic science theories and concepts of sustainable development as well as create original system of criteria and indicators to assess potential and conditions for sustainable development from a regional perspective and based on the above justify proposals for public authorities to improve methods of economic regulation for regional development.

To achieve the goal evolution process of existing theories and concepts of sustainable development and "green growth" have been studied in terms of its adaptation to the spatial development of Kazakhstan, comparative dynamics of natural resources consumption in the Asia-Pacific region and Kazakhstan were investigated as well.

Methodology. World best theory and practice methods for assessment of the level of sustainable development of the country and some of its territories were also studied. We selected the best system of criteria and indicators for assessment of economic, social and environmental sustainability of regional systems. Methods offered in this article are based on traditional and new factors of economic development and conditions for operation of regional systems. Indicators are chosen with a glance to basic goals for future development of regions in Kazakhstan. It is recommended to use two levels of methodology offered by author, namely national and regional, and at the local level later (districts, municipalities, cities).

The results. Method offered by the author has been tested based on materials and statistics of regions in Kazakhstan. Suitability and usability of the proposed system of criteria and indicators for measuring of economic, social and environmental sustainability of regional systems was proved. Based on this analysis it was found out that

there are regions in Kazakhstan that differ from each other by most of key indicators of sustainable regional development and this tendency is increasing.

Conclusions and recommendations. As a result of this analysis, the authors have substantiated a number of proposals on methods of analysis to be used, improvement of methods of regional development, implementation of institutional reforms, as well as improvement of regional statistics.

This article provides recommendations that can be successfully used in the management practices by public authorities to implement a new regional strategy focused on sustainable development in future.

Keywords : Sustainable Development, Region, Economic Regulation Methods, Regional Strategies, Factors of Economy

JEL Classifications : O13, O31, O53, R11, R58

I. Introduction

The purpose of this study is to investigate the existing world economic science theories and concepts of sustainable development, create the original system of criteria and indicators for assessment of potential and conditions for sustainable development of the country from a regional perspective and finally based on the above justify proposals for public authorities to improve methods of economic regulation for regional development.

This research work includes criteria and indicators to assess sustainability of regional economic systems based on research of methodological approaches existing in the world practice and its analysis through the example of Kazakhstan, provide recommendations for government authorities for better management of this process.

This study is required due to the fact that the object of attention of the world economics in the late 20th century was the concept of sustainable development, which implies the equality interests of present and future generations. However, this concept was initially a global dimension, and in meanwhile it was decided to include the sustainable development into the subject of regional economy. The above task has been realized in this article.

This work can be considered as *novel and original* because the problem of sustainable development is studied more carefully from territorial and local aspects, as opposed to the generally accepted global aspect. In compare with other similar publications it offers the

* Corresponding Author, Professor, Faculty of Economics, Kazakhstan Academy of Transport and Communications. 97 Shevchenko Avenue, Almaty, 050010, Republic of Kazakhstan. Tel: +7-727-292-2800 Fax. +7-727-292-0986, E-mail: seigul@mail.ru

** Professor, The Institute of Economics, Ministry of Education and Science of the Republic of Kazakhstan. 29 Kurmangazy Street, Almaty, 050010, Republic of Kazakhstan. Tel: +7-727-261-0262, Fax. +7-727-272-7829, E-mail: naziatta@mail.ru; n.k.nurlanova@gmail.com

*** Deputy Director, Open Enrollment and Certificate Program, KIMEP University. 4 Abay Avenue, Almaty, 050010, Republic of Kazakhstan. Tel: +7-727-237-4782, Fax +7-727-237-4785. E-mail: sharzada@kimep.kz or sharzada25@yahoo.com

author's system of criteria and indicators to assess economic, social and environmental sustainability of regional systems adapted to Kazakhstan.

In addition the article provides recommendations to improve regional policies for sustainable development for the purpose to ensure better living conditions for people and better environmental conditions, as well as recommendations to use methods of economic management for sustainable and economic development of natural resources. This fact is very important for Kazakhstan.

The author's method described in this article provides assessment system of the level of sustainable development in regions based on 25 indicators (including 13 economic indicators, 7 social, and 5 social and ecological).

This article is of a methodological significance, as it offers to choose the system of indicators and it is the most suitable for stability assessment at the local level.

The practical significance of this study lies in the fact that it has been revealed by amplification of the uneven economic, social and environmental development of regional systems. Recommendations to improve situation proposed in this article are also of great importance for the sustainable development of the regions in Kazakhstan and presuppose improvement of regional policy of sustainable development, introduction of new methods of economic regulation and proposals for institutional reforms in the field of economic development of natural resources.

The article consists of the following parts: Introduction, Material and methods, Results, Discussion, Conclusions, List of sources used.

II. Material and Methods

1. Material

Until recently the model of accelerated build-up of productive forces dominated in many countries of the world resulting to extensive involvement of the natural resources rotation and global ecological crisis threat. For example, in the Asia-Pacific Region (APR) in the last decade the rapid growth of national economies and population was registered, namely growing demand of scarce natural resources (including energy and water) and increasing suppression on environment caused by human activity (Figure A.1 - Dynamics of consumption of key natural resources in Asia Pacific countries) (GESY, 2011). As the graph shows, consumption of natural resource has increased by more than 2 times over the 20-year period. In the Asia-Pacific countries against the background of high levels of poverty, socio-economic problems (including food) there are pro-environmental concerns associated with rapid industrialization and urbanization.

The development model on the basis of nature management increase is particularly typical in post-Soviet countries, including Kazakhstan. Since 2000 up to 2008 it is characterized by beginning of global economic crisis and economic growth including the following features: First, it was made against the regressive structure of the economy, its weak diversification, mainly due to the fuel and energy

complex (more than 70%); moreover, the major factors of the growth were external and independent on the government's economic policy of price increase and oil demand; Secondly, the value of Gross Domestic Product growth was higher compared to the increase of physical volumes of production; Thirdly, the industrial and infrastructural base of economic growth requires a qualitative technological modernization process; Fourth, along with manufacturing process increase there was natural resources reduction and environmental degradation; Fifth, improvement of material well-being, the rise of population's living standards and development of human potential was significantly behind the growth of the economy; Sixth, in the states with a larger territory more profound differentiation of regional socio-economic position was observed, including Kazakhstan.

Thus, on the merits, the implemented model of gradual increase of production rate ensures "growth without development." For a long time the economy was growing and its resources were expanded as well.

This fact can be proved by the high energy consumption, which is so typical of Kazakhstan. The increasing dynamics of primary energy resources consumption concerning to the key countries and Kazakhstan is shown on the graph (Figure A.2 - Dynamics of energy consumption in key Asia Pacific countries and Kazakhstan) (GESY, 2011).

As the graph shows, over a period of 20 years, the energy consumption has increased dramatically in China, India, Indonesia and other key Asia Pacific countries. If the above countries do not reduce the energy intensity of Gross Domestic Product (GDP), further growth of their economies will lead to a stronger greenhouse effect on the planet and finally to disastrous effects. Significant increase of natural resources consumption characterizes particularity of economic growth in all key Asia Pacific countries, such as Australia, China and India and others, as it is seen on Figure A.3. - Dynamics of Energy use in key Asia Pacific countries and in Kazakhstan (OECD/IEA, 2010).

Kazakhstan has a huge territory and such things as nature and climatic conditions, level of economic development, life quality of population, availability of natural resources are very different in its regions.

Therefore, it is very important for Kazakhstan to establish an effective regional policy aimed at sustainable development. Strategy of territorial development of Kazakhstan till 2015 is developed currently for that purpose, but now it is not coordinated enough with the principles of the Concept of Kazakhstan transition to sustainable development till 2024.

General threats to sustainable development of all regions are as follows:

- structural instability of economy in the majority of regions expressed in complication of industrial structure, raw-material orientation increase and absence of diversification;
- inefficient structure of export and as the result the dipper differentiation between regions;
- Irrational use of natural resources causing its depletion and restriction of opportunities for future growth on the one hand, and environmental pollution and on the other hand.
- unemployment and high level of poverty that results in irrational

settling and shortage of the qualified workers required for sustainable development;

- industrial and social infrastructure lagging.

The main advantages are: large land area, natural resources reserves, scientific and technical potentials, and others. However, the threats and the advantages considerably differ in the regions of the country. Therefore, it is important to choose the correct development indicators for evaluation of factors and threats of sustainable development of Kazakhstan regions. The basic aims of future development of Kazakhstan regions were taken into account as selection of such indicators.

2. Methods

International community started the research works to develop indicators of sustainable development and “green growth” over the last 20 years (WB, 2009; UN ESCAP, 2008; UN ESCAP, 2009 and others). Almost all major international organizations such as United Nations (UN), Organization for Economic Cooperation and Development (OECD), European Community, and other proposed the new system of indicators for measuring sustainability.

There are several approaches in world practice to select indicators of sustainable development including creation of an integral indicator or indicator system in the selected areas of sustainable development. Indicator systems are used in some countries such as USA, Great Britain, Denmark, Portugal, etc. In 1996 Commission on Sustainable Development, United Nations Organization (UN CSD) developed the system, which includes the most indicators for measuring of sustainable development.

Of course, Universal indicators applicable at any level could become the best option to be used by decision makers to evaluate the stability degree of the territory. Nonetheless, the existing statistical base does not allow making it; moreover, all specified levels have its individual features. However, scientists of the world have not yet agreed on this issue.

Great number of indicator of sustainable development appeared as the result of attempt to account as much factors as possible. But it has become more complicated to evaluate the stability degree of economic systems. As the result all indicators have been ranked by level of priority from a regional perspective. Ranking of indicators is used by almost all international organizations and many countries, and by the Commission on Sustainable Development in particular (it reduced the number of proposed indicators from 134 to 60), the Great Britain’s Sustainable Development Strategy “Better quality of life” used 15 key / base indicators, etc.

Indicators of sustainable development at regional level are available in Russia. In particular, Russian experts have distinguished the “potential” indicator (141 indicators) and the possible “key” indicators (25 indicators) (Bobylev, 1997; Bobylev, Soloviev, 2003). In respect of Kazakhstan 60 indicators are proposed, including 25 environmental indicators, by 15 and 20 for economic and social indicators, respectively (Esekina, 2004; Almaty, 2002).

Indicators of sustainable development in the region shall reflect economic, social and environmental aspects of development to ensure

economic growth without harming the environment.

So, using the accumulated international experience and Russian particular, as well as our own, we have identified the following three groups of indicators: economic, social and environmental.

Besides, it is vitally important to consider the opportunity to use the selected indicators of sustainable development at two levels (state and regional), and further at local level (areas, municipalities, cities). State level may give the better pattern compared to regional level.

Indicators of sustainable development at all the levels of management in Kazakhstan were based on the following data:

- statistical information,
- information provided by akimats, ministries and other departments,
- regional information:
- sociological interrogations of the population and other ways,
- different methodical attitudes to evaluate ecological parameters,
- scientific publications and works related to the considered problem.

We can distinguish the following 25 key indicators, namely 13 economic, 7 social and 5 ecological based on statistical regional data-base, human development reports of UNDP and taking into account the importance to cover the different spheres of activity defining the stability in the regions (See Table 1).

<Table 1> Key indicators of sustainable development of Kazakhstan regions by spheres of activity

№	Indicators
1	2
	Economic
1	Gross regional product(GRP) per capita, thousand tenge
2	Money income in account per capita, thousand tenge
3	Watercapacity of the Gross regional products (GRP), ni/thousand tenge
4	Raw capacity of the Gross regional product(GRP), \$/ thousand tenge
5	Volume of production (goods and services per capita), thousand tenge/population
6	Volume of agricultural production per capita, thousand tenge/population
7	Volume of services rendered by the enterprises and organizations of sector of services per capita, thousand tenge/population
8	The weight of the small business in the total production output (works and services)
9	Number of labor force engaged on the enterprises of small business as a percent to the total labor force
10	Fixed assets per head, thousand tenge/population
11	Fixed assets renewal coefficient, as % to the end of the year
12	Fixed assets liquidation coefficient, as % to the beginning of the year
13	Total amount of the investments in % to Gross regional product(GRP)

	Social
1	Dynamic of a natural increase (decrease) of the population, general of the increase of population per 1000 population
2	Share of the economically active population, %
3	The unemployment rate, %
4	Intensity on the regional labor market, the rate of the unemployed registered on 1 vacancy, man
5	Human development index
6	Share of population with income below the value of subsistence level, %
7	Coefficient of funds, times
	Ecological
1	The air pollutions per capita, kg
2	The weight of air pollutions in the total level of pollutions, %
3	Share of utilized toxic (dangerous) wastes at regional enterprises, %
4	Access to clean water: <ul style="list-style-type: none"> • Degree of population access to clean water from decentralized sources of water supply, % • Ecological condition of water sources, weight of water from pipes and from decentralization sources which does not satisfy normative, as % to average republican level by: microbiological indexes; chemical indexes
5	Volume of investments in environment protection and rational use of natural resources per capita, thousand tenge

The note: elaborated by the authors.

III. Results

The analysis of the regional sustainable development based on the aforementioned indicators has revealed positive, and the most urgent problem areas. Gross Regional Product (GRP) per capita is one of the most important key indicators describing the economic component of regional systems. Usage of this indicator for comparison of regions provides opportunity to estimate the degree of heterogeneity of the economy in the country, and finally, determines efficiency and sustainability of the economy in region.

It shall be mentioned that regions are essentially differ by the contribution to GNP of the country. The results of analysis are as follows:

- In the last 7 years, the economic development in all Kazakhstan regions has been characterized by the increase in physical volumes of the Gross Regional Product (GRP) and GRP per capita.
- The rates of this increase essentially diverge by the regions. The stable high rates of growth are observed in oil and gas mining regions (Aktyubinsk, Atyrau, West-Kazakhstan, Kysylorda and Mangistau regions) and in Astana, the capital of the country. Industrially developed regions of Kazakhstan (East Kazakhstan,

Karaganda and Pavlodar regions) have shown relatively low rates of Gross Regional Product (GRP) growth per capita.

- In 2005 difference between maximal Gross Regional Product (GRP) per capita in Atyrau region (5401.0 thousand tenge) and minimal in Zhambyl (429.0 thousand tenge) was 12.6 times against 6.6 times in 1999 (for comparison: the difference between the most advanced and the poorest countries of the European union is no more than four times).

Economic, social and ecological indicators of sustainable territorial development were calculated in the same way. Deep regional distinctions were observed in the volumes of industrial production per capita, agriculture, services rendered by enterprises and organizations, and other analysed economic indicators. The inequality of economic development has caused a significant difference between social and ecological indicators in Kazakhstan regions. To compare, let's have a look at the data showing the difference between the regions by the most important indicators of sustainable territorial development (See Table 2).

It is obvious from the given data that differentiation of regions by the key indicators of stable development has strengthened including such indicators as the volume of industry production (goods and services), volume of agricultural production per capita, index of poverty. Other indicators (investment as % to Gross Regional Product (GRP), fixed assets renewal coefficient, rate of unemployment, coefficient of funds) have shown some reduction in difference during the analysed period, but in general all indicators have shown the tendency of keeping disproportions in the territorial development.

However, despite the observed positive changes on the levels of ecological indicators of sustainable development, the analysis of the dynamic by all regions show the presence of ecological problems and in some cases there is a tendency of problem increase requiring decision. The analysis does not include the emissions of seedbed gases. Therefore, it is possible to conclude that ecological conditions of regions negatively affected on level of sustainable development.

IV. Discussion

Trend to changing of such factors as depletion of non-renewable natural resources, industrial and agricultural production growth, population increase as well as scale of environmental pollution was investigated in the report prepared by the research team of D. Meadows (Meadows, 1978, Meadows, 1994) "Boundaries of growth" (1972), which was a part of "Rome Club Reports".

The authors built a computer "model of world" and on this basis it was concluded that in the period between 1900-2100 the growth in the number of food, industrial output, population and pollution of the environment as long as the rapid depletion of mineral resources would impede this process. As a measure to halt this trend it was proposed to use the zero growth implying an artificial slowdown of economic growth rate. In accordance with the concept of zero growth, humanity has to stabilize the population rate, stop industrial growth, offsetting only the funds' wear, invest and develop only agriculture in order to increase food production and service industries.

<Table 2> Differentiation of regions by the indicators of sustainable development in 1999 and 2010

	Indicator	1999		2005		2010	
		Region	Index	Region	Index	Region	Index
1.	Gross regional product(GRP) per capita, thousand tenge						
	Maximal	Atyrau	289,7	Atyrau	1797,2	Atyrau	5401,0
	Minimal	Zhambyl	43,8	South-Kazakhstan	143,1	Zhambyl	429,0
	Gap		6,6		12,6		12,6
2.	Total amount of investments to the Gross regional product(GRP)						
	Maximal	West-Kazakhstan	87,6	Atyrau	79,6	Atyrau	38,9
	Minimal	Akmola	5,9	Zhambyl	12,7	South-Kazakhstan	8,7
	Gap		14,8		6,3		4,5
3.	Volume of industrial production(goods and services) per capita, thousand tenge						
	Maximal	Atyrau	466,8	Atyrau	2243,2	Atyrau	5863,6
	Minimal	Zhambyl	23,6	North-Kazakhstan	55,9	North-Kazakhstan	144,4
	Gap		19,8		40,1		40,6
4.	Agricultural production per capita, thousand tenge						
	Maximal	North-Kazakhstan	62,6	North-Kazakhstan	141,8	North-Kazakhstan	282,9
	Minimal	Mangistau	2,3	Mangistau	6,4	Mangistau	8,4
	Gap		27,0		22,2		33,7
5.	Fixed assets renewal coefficient, %						
	Maximal	Astana city	15,8	Astana city	22,5	Astana city	20,5
	Minimal	Zhambyl	3,2	Zhambyl	6,4	West-Kazakhstan	9,7
	Gap		4,9		3,5		2,1
6.	Material intensity of the Gross regional products (GRP)						
	Maximal	Astana	0,920	Astana	0,664	Astana	0,598
	Minimal	West-Kazakhstan	0,185	West-Kazakhstan	0,098	West-Kazakhstan	0,108
	Gap		5,0		6,8		5,5
7.	Ratio of economically active population to the whole population						
	Maximal	Almaty city	72,6	Kostanay	61,7	Kostanay	75,3
	Minimal	Almaty	60,1	South-Kazakhstan	45,4	Almaty	65,2
	Gap		1,2		1,36		1,15
8.	Index of poverty						
	Maximal	Kyzylorda	36,6	Mangistau	29,5	Mangistau	11,6
	Minimal	Almaty city	18,8	Astana city	16,6	Almaty city	2,6
	Gap		1,9		1,8		4,5
9.	Unemployment rate, %						
	Maximal	Kyzylorda	16,1	Zhambyl	9,8	Mangistau	6,4
	Minimal	West-Kazakhstan	7,8	Karaganda	7,0	Almaty	5,3
	Gap		2,1		1,4		1,2
10.	Coefficient of funds 1						
	Maximal	Mangistau	13,4	Atyrau	7,7	Akmola	9,43
	Minimal	Kyzylorda	6,1	South-Kazakhstan	4,2	South-Kazakhstan	4,65
	Gap		2,2		1,8		2,02
11.	Weight of air pollutions without cleaning in the total amount of pollutions, %						
	Maximal	Mangistau	99,7	Mangistau	99,7	Atyrau	99,2
	Minimal	Pavlodar	1,0	Pavlodar	1,4	Pavlodar	1,3
	Gap		99,7		71,4		76,3

The notes:

A.2.1 Coefficient of funds is the ratio between the average income of 10 % poorest and 10 % richest groups of population.

A.2.2 It has been made and is designed on the database of Agency Republic of Kazakhstan on statistics.

These are issues of main concept on transition to environmentally friendly development. The world community has realized that its main task is to find new ways of economic growth that do not increase suppression on natural systems, and transition to a new model of sustainable development or implementation of the concept of "Green Growth." Sustainable development is a model of socio-economic life of the society, which if implemented meets the vital needs of the pres-

ent generation and will give the same opportunity to future generations. The most definitions of sustainable development worldwide, which were more than 60 by 1999 (Wozniak, 1995), reduce to this statement. This system has been implemented in the most developed countries in the last decades of the 20th century. Transition to a postindustrial society is accompanied by such a major trend as a radical change in the nature of economic growth and the onset of its

new quality. The main source of this growth is not natural resources, but human factors.

In 2006, the international auditing agency Price water house Coopers (PWC) presented a strategy "Green Growth Plus" by constructing a global model. It is based on establishment of national quotas on greenhouse gas emissions without compromising economic interests of developing countries and allows them to predict based on the use of certain industrial processes.

This approach is currently being implemented in Asia Pacific countries through the National Green Growth plans. For instance in China, there are objectives of eco-efficient economic development up to 2020 relative to 2000 levels in the 11th Five-Year Plan (2005). According to the plan, the following goals of improving eco-efficiency are outlined:

- Decrease the energy consumption by 50 -60%;
- Reduce water-intensive GDP by 80%;
- Decrease specific emissions of sulfur dioxide (SO₂) per unit of GDP by 75%;
- Reduce carbon intensity of GDP by 60% (GGAP, 2008).

Russia's Energy Strategy (2002) stipulates reduction of the energy intensity of GDP:

- 25-27% by 2010,
- 35-40% by 2015 and
- 42-46% by 2020 in relation to 2000 levels according to the baseline scenario (values in the underlying optimistic scenarios are increased by 2-5%) (ECOR / MEA, 2009).

As world practice shows, the use of the concept of "Green growth" at the level of enterprises and organizations does not provide an appreciable transition of national economies to the nature conservation development. In developed countries the reason for that is unsustainable consumption, while low market prices on natural resources and weak environmental laws are responsible for the same process in developing countries. At the UN Summit of Sustainable Development "Rio +20" passed at 20-22 June of 2012 in Rio de Janeiro, which was attended by representatives of 190 countries an agreement was adopted, which contains requirements for the development of "green economy", providing for the responsible use of natural resources. However, there is no certainty, that this Agreement will be implemented by all countries (16).

It is essential that the indicators of environmental performance should be related to the most significant global, regional, and national ecological issues and reflect the degree of the "contribution" made by company / country to these problems.

We believe that implementation of this model requires an economic approach, including scientific and technological development, optimal increase of manufacturing factors, resource assessment in accordance with their relative limitations (scarcity), the change in the structure of production and consumption in maintaining stocks of scarce resources. It is important to understand that a separate state or territory cannot have a sustainable development without consideration of a single global vision. What is beneficial for a particular area or region may not be acceptable in a wider scale, and vice versa. A good example is the large-scale development of irrigation in the Aral Sea,

when the region obtained a high GDP growth and achieved cotton independence. Currently, however, dust and salt brought from the bottom of dried-up Aral Sea, are spread throughout considerable distances, which affects not only this region but also more distant areas.

Nevertheless, Kazakhstan set up a framework for implementation the policy, corresponding to the principles of sustainable development, announced in 1992 in Rio de Janeiro (DRJED, 1997). Thus, Kazakhstan has ratified a number of "green" conventions (18 to date), developed the National Action Plan on environmental conservation for sustainable development of Kazakhstan, become a member of the Commission on Sustainable Development of the United Nations (since 1998), and it created the National Commission on Sustainable Development.

According to the purposes of industrial-innovative development in the Republic of Kazakhstan the energy intensity of GDP in 2015 should decrease no less than 10% compared to 2010 (SPFIIDK, 2009). In November 2009, the Kazakhstan Government made a decision to reduce greenhouse gas emissions to 15% by 2020 and to 25% by 2050 in relation to the baseline level in 1992, as it was officially announced at the Copenhagen conference in December 2009. Thus, initially the concept of sustainable development and "Green Growth" appeared at the global level, and now it has become an important topic for the various territories and countries, their regions and individual settlements. It is precisely that at the local level the problems and contradictions in the interaction of economy, society and environment, and the threats to sustainable development become apparent. A specific regional problem of the modern reality, is that in the long-term outlook of identifying allowable differences on the levels of regions' socio-economic development, in connection with creation of equal opportunities of access to international markets (labor, capital, information), happen sat the expense of the new information networks and technologies.

V. Conclusions

So far, in Kazakhstan there was no method to determine the sustainability of regional development, making it difficult to monitor the socio-economic processes and the environment in the country. Using the proposed methodology it would be possible to promptly identify problems and bottlenecks in the development of the territories of Kazakhstan and will allow taking the required measures on time. Testing of the proposed method on Kazakhstan has identified that the ways of improving the sustainability of regional development are still poorly used, and increasing the economic activity units' competitiveness in the regions has not been achieved. Currently primary sector exhibits the main influence on the results of the economic regions.

Differentiation in the regions more and more intensified, affecting key indicators such as gross regional product per capita, industrial output per capita, poverty index, consumption of materials. With some indicators showing the positive trend, for example, as a reduced differentiation in regions by poverty and unemployment.

In order to ensure sustainable development throughout the country,

improvement in living conditions and environment in the regions, and reducing their differentiation, it is proposed to develop and implement a new regional policy for sustainable development. The policy should include:

- First, the restriction of activities of enterprises and facilities that have a negative impact on the environment of the region;
- Second, reconstruction work in the environment by land reclamation, reforestation, rivers cleaning, elimination of waste disposal sites, restoration of fish population, environmental sanitation in the field of treatment, rest and recreation;
- Third, compensation for the harm caused to the citizens health, by issuing of environmental benefits packages and establishment of various benefits for population.

To strengthen the state regulation of regional development, it is proposed, to take the following economic impact measures:

- develop the policy of subsidies for companies that are in difficult socio-economic and environmental conditions;
- ensure compensation for additional costs incurred by entities in locating their businesses in areas with difficult natural conditions;
- establish the high prices for environmentally friendly products;
- give sanctions to companies that pollute the environment, especially in the most disadvantaged areas.

In order to overcome the backwardness of some regions not only economic policies are required but also institutional changes in the economic development of natural resources. They should include:

- Improvement of the environmental management system, implementation of sound separation of powers between central and local governments;
- Development of the institution of state ownership of natural resources and enhancing the role of regions in the use of natural resource rents;
- Development of accounting and economic valuation of natural resources, environmental licensing;
- Gradual reformation of the tax system, aimed at increasing the share of resource revenue payments to the budget;
- Improvement of the economic and financial mechanisms of natural resources reproduction (fee for use of natural resources, assess and recover damages, environmental insurance, etc.), market development services in the field of nature;
- Development of systems to monitor condition of natural resources and execute control over the use and protection of natural resources;
- Encourage introduction of resource-saving technologies, increasing the share of secondary resources, increased recycling.

In order to monitor efficiently the development of the regions, with the proposed method, it is necessary to improve statistics in regions by introducing measurements such as energy consumption, volume of unprocessed waste and emission of greenhouse gases into the atmosphere.

Research work is required (pilot projects) on the materials of one or two regions to develop a mechanism for monitoring of the socio-economic development of regional systems. Based on it, the decision can be made to choose priorities and achieve equilibrium state of the environmental, social and economic activities.

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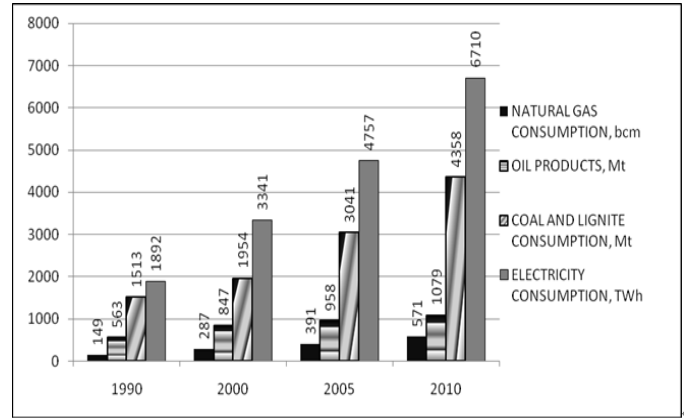
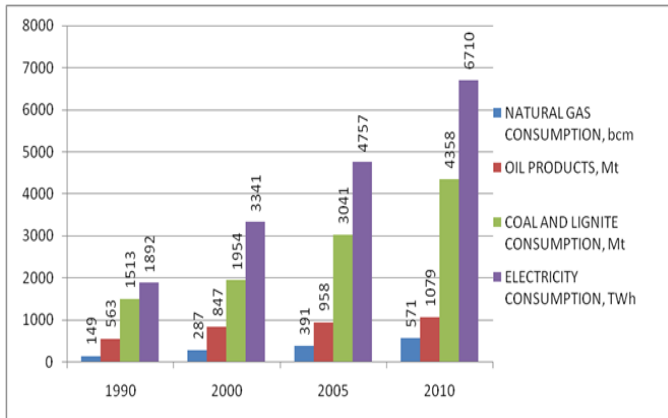
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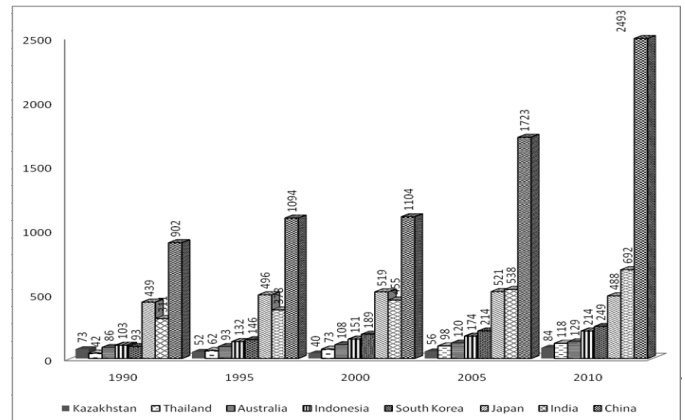
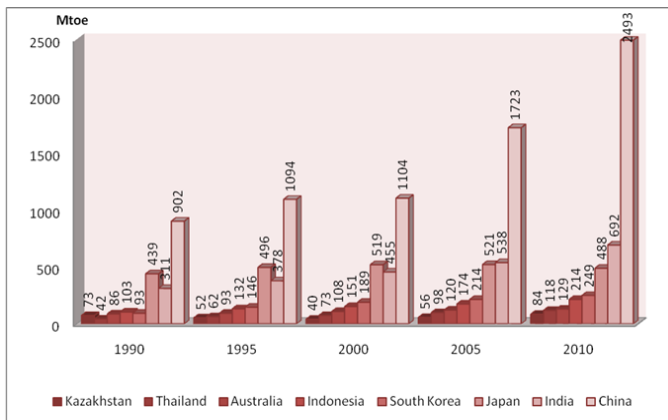
Appendix



Source: Global Energy Statistical Yearbook 2011 from <http://yearbook.enerdata.net/#/electricity-domestic-consumption-data-by-region-in-2010.html>
<http://yearbook.enerdata.net/images/enerdata.jpg>

	Asia			
	1990	2000	2005	2010
Natural gas consumption, bcm	149	287	391	571
Oil products, mt	563	847	958	1079
Coal and lignite consumption, mt	1513	1954	3041	4358
Electricity consumption, twh	1892	3341	4757	6710
	China			
	1990	2000	2005	2010
Natural gas consumption, bcm	15	22	48	112
Oil products, mt	102	201	296	406
Coal and lignite consumption, mt	1051	1231	2159	3236
Electricity consumption, twh	535	1143	2126	3624
	India			
	1990	2000	2005	2010
Natural gas consumption, bcm	13	28	38	65
Oil products, mt	57	108	117	152
Coal and lignite consumption, mt	227	366	463	647
Electricity consumption, twh	212	367	471	669

<Figure A.1> Dynamics of consumption of key natural resources in Asia Pacific countries.

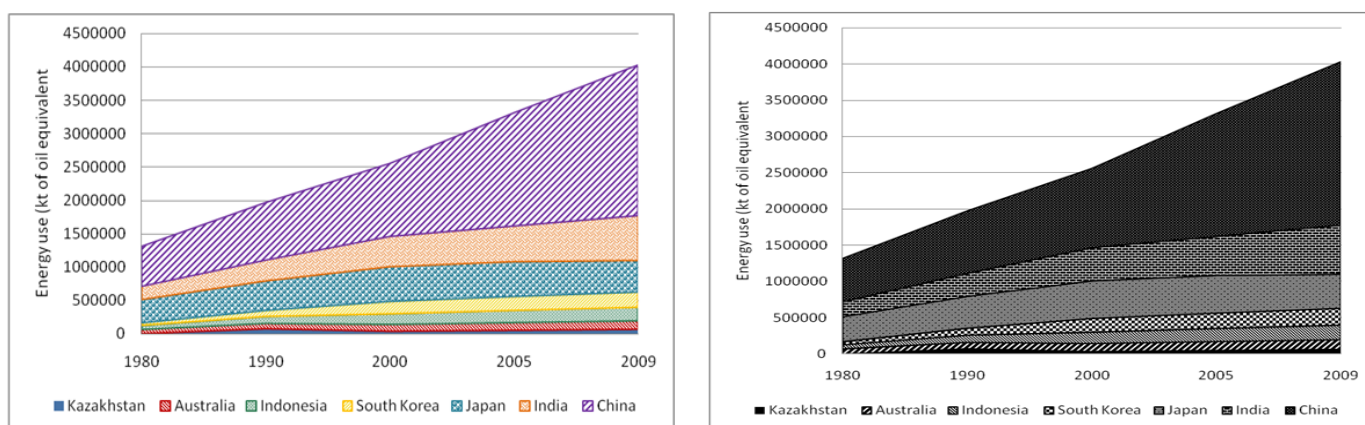


Source: Global Energy Statistical Yearbook 2011 from <http://yearbook.enerdata.net/#/2010-energy-consumption-data.html> Source: Global Energy Statistical Yearbook 2011 from <http://yearbook.enerdata.net/#/electricity-domestic-consumption-data-by-region-in-2010.html>, <http://yearbook.enerdata.net/images/enerdata.jpg>

	1990	1995	2000	2005	2010
Kazakhstan	73	52	40	56	84
Thailand	42	62	73	98	118
Australia	86	93	108	120	129
Indonesia	103	132	151	174	214
South Korea	93	146	189	214	249
Japan	439	496	519	521	488
India	311	378	455	538	692
China	902	1094	1104	1723	2493

Source: Global Energy Statistical Yearbook 2011/<http://yearbook.enerdata.net/#/2010-energy-consumption-data.html>

<Figure A.2> Dynamics of energy consumption in key Asia Pacific countries and Kazakhstan



Source: Catalog Sources World Development Indicators. International Energy Agency (IEA Statistics © OECD/IEA. from <http://www.iea.org/stats/index.asp>).

	1980	1990	2000	2005	2009
Kazakhstan		72746,0	35581,8	50739,4	65835,0
Australia	69603,1	86226,2	108111,2	119592,4	131070,7
Indonesia	56251,2	101327,8	155691,6	181381,1	201998,6
South Korea	41211,2	93087,0	188075,2	210102,0	229178,0
Japan	344522,7	439315,4	518946,1	520514,7	471992,4
India	205154,6	316743,2	457214,2	537908,6	675829,8
China	598487,7	862955,7	1094871,4	1696389,5	2257100,9

<Figure A.3> Dynamics of Energy use in key Asia Pacific countries and Kazakhstan (kt of oil equivalent)