Global Trend of Regional Policy Greening as a Factor of Social and Economic Growth of Regions in the Russian Federation

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Abstract.

Research background: Sustainable development, social and economic growth not damaging the natural environment are one of the most acute problems in the modern world. The issues of the regional sustainable development in the Russian Federation as the purpose of regional policy and aspects of correlation between socio-economic development and state of regional environment were discussed in scientific papers of D.V. Novachenko, D.V. Malova, O.K. Tsapieva, L.V. Shchukina, E.A. Khrabrova, O.V. Vilchinskoy, Yu.G. Neudakhina, A.V., Okuneva, Boronnikov, D.V., E.A. Guseva, D.A., N.N. Yashalova, N.L. Yatsukova, A. Yu. Davankova, L.K., Kazantseva, T.O. Tagaeva, M.F. Zamyatina, P.V. Druzhinin, G.T. Shkiperova, O.V. Potasheva, A.A. Bashirova and others.
Purpose of the article: The purpose of this article is to develop measures to improve socio-economic growth in regions on the base of theoretical and methodological substantiation of greening regional policy.
Methods: Systematic approach, methods of analysis and synthesis, logical and econometric modelling were used in this research.
Findings & Value added: The necessity of including the environmental component in the regional policy structure was approved; the process of regional policy greening was determined; the author's methodical approach to evaluate the performance of regional policy greening was elaborated; positive changes in social and economic growth were identified with the intensification of regional policy greening; by the example of Perm Krai measures to promote the regional policy greening performance were developed.

Keywords: *sustainable development; regional environment; regional policy; social and economic growth*

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1 Introduction

Sustainable development, social and economic growth not damaging natural environment are one of the most acute problems in modern world. The problem of the relationship between economic and social development and the state of the environment is widely covered in the international scientific literature [1-10]. The issues of the regional sustainable development in the Russian Federation as the purpose of regional policy and aspects of correlation between socio-economic development and state of regional environment were discussed in scientific papers of D.V. Novachenko, D.V. Malova [11], O.K. Tsapieva [12], L.V. Shchukina [13], O.V. Vilchinskaya, E.A. Khrabrova, E.A. Guseva [14], Yu. G. Neudakhina [15], A.V., Okuneva, D.A. Boronnikov [16], N.N. Yashalova [17], A. Yu. Davankov, N.L. Yatsukova [18], L.K., Kazantseva, T.O. Tagaeva [19], M.F. Zamyatina [20], P.V. Druzhinin, G.T. Shkiperova, O.V. Potasheva [21], A.A. Bashirova [22] and others.

Nevertheless, the current regional policy in Russia gives the priorities to only socio-economic development. The analysis of 63 Russian regional strategies reveals that 12% of strategies miss the importance of environmental development and around 70% of them lck any environmental indicators [23]. Thereby, it is nessesary to aprove the content of regional policy as a complex of measures for the socio-economic and environmental growth of regions. The purpose of this research is to develop measures to improve socio-economic growth in regions on the base of theoretical and methodological substantiation of greening regional policy.

2 Methodology

The theoretical and methodological base of this study consisted of modern regional policy and sustainable development researches. Systematic approach, methods of analysis and synthesis, logical and econometric modelling were used in this research. The evaluationg of the performance of regional policy greening was carried out for the regions of the Volga Federal District (hereinafter - VFD): Nizhny Novgorod Region, Orenburg Region, Perm Krai, Republic of Bashkortostan, Republic of Tatarstan, Samara Region. All calculations were based on data for 2010–2015.

3 Results and Discussion

The researh aproved the nessesity to supplement the content of regional policy with an all-sufficient environmental component including aim, tasks, measures and instruments. Further, each regional polisy component should be additionally oriented on improving environmental processes:

1) an economic componen, increasing gross regional product (hereinafter – GRP) while preserving environment and social capital;

2) a social component, increasing the life level and quality and enabling favorable environment;

3) an environmental component, aiming on iproving the self-healing abilities of the natural systems.

The environmental component being part of the regional policy affects the social and economic regional growth in several directions. Thus, it is possible to clarify the content of the “regional policy greening” process:

1) adding environmental objectives to the regional policy priorities;

2) implementation of the economic policy based on environmental constraints on the anthropogenic load on the environment, high-tech and environmentally friendly productions in the GRP structure, greening the investments structure;

3) amplification of the regional social policy on the base of improving living conditions.

Specific regional features, including natural and climatic conditions, economic characteristics and regions' specialization, allocation of industrial productions and residets resettlement, sociocultural features, etc. define:

1) the maximum possible socio-economic effect of the potential environmental positive impact ("benchmark" parameters);

2) and the minimum allowable impact level, below which destructive changes in social and economic growth are possible ("threshold" parameters).

Evaluation of regional policy performance in Russian economic literature does not usually take into account the environmental component [24, 25]. Difficulties and sometimes impossibility of evaluating regional policy effectiveness with regard to its environmental component are caused by failure of measures and target indicators oriented on the solution of environmental problems in regional development programs. Significance of assesing the greening regional policy (as the unity of the three components) performance determines the necessity to focus on the performance as a compliance degree of factual environmental and socio-economic indicators with "benchmark" indicators. In this connection, autors' methodology for evaluating regional policy performance was introduced (hereinafter – evaluationg of the performance of regional policy greening). The presented methodology takes into account the environmental component of the regional policy and its impact on the social and economic development. It also considers specifics of the environmental development evaluation. The sequance of carring out the evaluayion is described below.

Step 1. Selection of regions for evaluation in conformity with the criteria: 1) consimilar climatic conditions, which determines relatively similar "benchmark" and "threshold" parameters of the regional policy greening performance (region of one federal district); 2) high level of economic development (GRP per capita is above the average in the federal district); 3) consimilar economic specialization (the share of mining and processing industries in the structure of GRP is not less then 30%).

Step 2. Determination of evaluation indicators. In this research only one natural sphere was used to test the methodology: atmospheric air. Nevertheless, methodology concept makes it possible to include into the research any number of natural spehers. The following units of indicators were formed:

Table 1. Units of indicators for evaluating regional policy greening performance.

Unit A: environmental development indicators	**Unit B: economic development greening indicators**	**Unit C: social development greening indicators**
Investments in fixed assets for the atmospheric air protection (% of GRP)	High-tech industries in the GRP structure (%)	Disease incidence rates of the population due to the air pollution: respiratory disease (cases per 1000 population)
Pollutant air emissions productivity (bln. rub. of GRP per thous. tons of emissions)	Main polluting industries in the GRP structure (%)	Disease incidence rates of the population due to the air pollution: cancer (cases per 1000 population)
Share of the population living in low air pollution cities (%)	Depreciation of fixed assets (%)	Disease incidence rates of the population due to the air pollution) anomalies and malformations (cases per 1000 population)

Step 3. Relative indicators (KPI_i) calculation. KPI_i = 100% corresponds to the "benchmark" parameter, KPI_i = 0% corresponds to "threshold" parameter. Thus, indicators of A, B, C units were normalized using KPI_i-s:

$$KPI_i = \frac{|X_{fact} - X_{thr}|}{|X_{bench} - X_{thr}|} * 100\% \quad (1)$$

where KPI_i - KPI index of the *i*-th evaluating indicator in the reporting period; X_{fact} - factual value of the *i*-th evaluating indicator in the reporting period; X_{bench} - "benchmark" parameter of the *i*-th evaluating indicator (in this research the best value for the evaluating regions in the reporting period was used); X_{thr} - "threshold" value of the *i*-th evaluating indicator (in this research the worst value for the evaluating regions in the reporting period was used).

Step 4. Relative indicators for each regional policy components (KPI_{jcomp}) and integral indicator of the regional policy greening performance (KPIregpol) calculation:

$$KPI_{j\ comp} = \sum_{i=1}^{n} w_i * KPI_i \quad (2)$$

where KPI_{jcomp} - KPI index for the *j*-th regional policy component in the reporting period; KPI_i - KPI index of the *i*-th evaluating indicator in the reporting period; w_i - weight of the KPI_i in the KPI_j ($0<w_i<1$; $\sum w_i=1$; the weights of KPI_i indexes in the KPI_{jcomp} index were taken equal).

$$KPI_{reg\ pol} = \sum_{j=1}^{n} w_j * KPI_{j\ comp} \quad (3)$$

where KPI_{regpol} - is the integral KPI index of the regional policy greening performance in the reporting period; KPI_{jcomp} - KPI index for the *j*-th regional policy component in the reporting period; w*j* - weight of the KPI_{jcomp} index in the integral KPI index of the regional policy greening performance ($0<w_j<1$; $\sum\_ w_j=1$; the weights of KPI_{jcomp} indexes were taken equal).

The closer the KPI_{regpol} value is to "100%", the higher the level of regional policy greening performance.

Step 5. Region classification and ranking by the level of regional policy greening performance:

Table 2. Units of indicators for evaluating regional policy greening performance.

Group I: Low regional policy greening performance	**Group II: Medium regional policy greening performance**	**Group III: High regional policy greening performance**
KPI_{regpol} = [0; 33%]	KPI_{regpol} = [34; 66%]	KPI_{regpol} = [67; 100%]

Step 6. Calculation of the unevenness degree of regional policy greening performance:

$$\sigma_{KPI_n} = \sqrt{\frac{1}{l}\sum_{m=1}^{l}(KPI_{n_m} - \overline{KPI}_n)^2} \quad (4)$$

where σ_{KPIn} - unevenness degree of the *n*-th KPI index (*n*-th KPI index may be: 1) *i*-th evaluatingt indicator (KPI_i), 2) KPI index for the *j*-th of regional policy component (KPI_{jcomp}), 3) the integral KPI index of the regional policy greening performance (KPI_{regpol})); KPI_{nm} - *n*-th KPI index for the *m*-th region; $\overline{KPI}_n$ - arithmetic average value of the n-th KPI index for the evaluating regions in the reporting period.

Step 7. Decomposition of indicators for evaluating environmental component performance (industry and municipal levels).

Step 8. Forecasting of social, economic and environmental indicators in two scenarios 1) maintaining current trends 2) amplification of regional policy greening.

Results of the regional policy greening performance evaluation are represented in the Tables 3-5.

Table 3. Regional policy greening performance ($KPI_{reg\ pol}$) of VFD regions, %, 2010–2015.

Region	2010	2011	2012	2013	2014	2015	Performance in 2015
Rep. of Tatarstan	76.0	65.7	70.7	61.1	69.5	80.4	high
Rep. of Bashkortostan	50.1	64.0	62.0	75.0	57.3	68.5	high
Nizhny Novgorod Region	59.3	58.7	55.5	53.8	55.3	67.3	high
Orenburg Region	35.7	37.8	35.2	39,.0	35.3	47.9	medium
Samara Region	33.7	34.4	34.9	33.2	40.9	31.2	low
Perm Krai	23.0	32.4	33.1	33.2	24.8	26.6	low

The growth of regional policy greenenig performance in almost all the evaluating regions is obvious. This could be explained by the amplification of environmental development processes and strengthening of its impact on the regional socio-economic development. However, there are still reserves for the growth of regional policy greening performance remaining, as the "benchmark" parameters are not achieved. The worst values are shown by such economic indicators as are: depreciation of fixed assets and share of main polluting industries in the GRP structure (especially in Orenburg Region and Perm Krai); The worst values of social indicators are shown by the incidence of diseases of the respiratory organs, the presence of anomalies and malformations (especially in Nizhny Novgorod Region, Perm Krai, Samara Region,).

Results of calculation of the unevenness degree of regional policy greening performance are shown in Table 4.

Table 4. Unevenness degree of the performance indicators (σ_{KPI_n}) for VFD regions, %, 2010–2015.

Unevenness degree of the performance indicators (σ_{KPI_n})	2010	2011	2012	2013	2014	2015	$\Delta\sigma_{KPI_n}$
Regional policy greening, including:	5.1	5.5	3.8	5.6	5.3	7.8	↑
economic development greening	12.8	10.2	10.4	10.3	10.9	10.5	↓
social development greening	7.6	10.5	6.1	12.0	9.3	9.3	↑
environmental component, including:	2.9	4.3	4.4	6.8	6.5	11.1	↑
investments in fixed assets for the atmospheric air protection	12.9	13.9	13.4	14.8	14.5	17.0	↑

pollutant air emissions productivity	14.0	13.8	13.4	13.7	13.6	13.5	↓
share of the population living in low air pollution cities	13.1	13.3	13.1	13.1	14.3	16.0	↑

Relaying on data presented in the Table 4 an increase in the gap in the levels of regional policy greening performance among regions was revealed. The gap is caused by the increase in the unevenness of the volume of investments in fixed assets for the atmospheric air protection and levels of air pollution in cities. Positive changes in solving air quality problems and greening the equipment used in main industries are obvious in the Republics of Bashkortostan and Tatarstan, Nizhny Novgorod and Orenburg regions. At the same time, lack of regional policy greening is presented in regions of Perm Krai and Samara Region. Revealed shifts indirectly affect the growth of the social development greening uneveness (increasing gaps in the values of morbidity indicators).

By an example of Perm Krai, which had taken the last pplace in the rating of regional policy greening performance (Table 3), the values of environmental development indicators were decomposed on industry and municipal levels. As a result, the limitations of greening processes were revealed: environmentally unfriendly development of the transport and communications industry, industry of production and distribution of electricity, gas and water and mining industry. The major limitative factors of these productions are: depreciation of fixed assets and outdated technologies (especially, associated petroleum gas (hereinafter - APG) flaring). As the most problematic cities were identified: Perm, Berezniki, Solikamsk, Krasnokamsk and Lysva. The major limitative factors of these territories are high concentration of industrial enterprises (especially, chemical and petrochemical businneses, metallurgy and power generation production) and growth of air pollutant emissions from road transport.

Using the example of Perm Krai forecasting of social, economic and environmental indicators was carried out in two scenarios 1) maintaining current trends 2) amplification of regional policy greening. In each econometric model describing one of the evaluating indicators one of the explanatory factors was changed while maintaining the fixed values of the others: for the first scenario the value of the environmental indicator was changed in accordance with the identified 2010-2015 trend; for the second scenario the value of the environmental indicator was improved in accordance with the best shown regional performance. The values of the best performance results were obtained by analysis of evaluating VDF regions indicators for the period 2010–2015.

Relying on forecast data it can be concluded that:

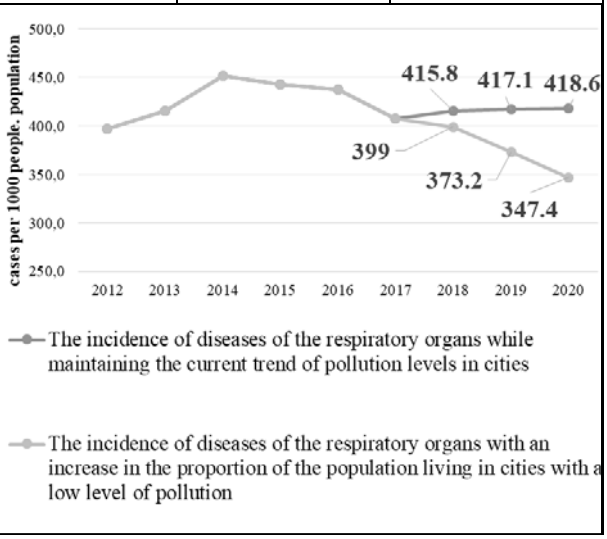
1) growth of the proportion of the population living in low air pollution cities by 5% per year provides an annual decline in the incidence of respiratory diseases by 25.8 cases per 1000 population on average;

2) growth of investments in fixed assets for the atmospheric air protection by 0.01% of GRP per year provides an annual decline in the growth rate of the incidence of respiratory diseases in the population by of 0.28 on average %.

3) use of environmentally friendly equipment and technologies meaning the decline of depreciation of fixed assets by 5% per year provides an annual growth of pollutant air emissions productivity by 1.42 billion rubles. GRP per thous. tons of emissions on average.

Thereby, positive changes in social and economic growth are becoming more rapid with the intensification of regional policy greening.

Table 5. Fragment of the socio-economic and environmental indicators forecast for Perm Krai, 2018–2020: incidence of respiratory diseases

Model	2018	2019	2020
$\hat{Y}$=-515.59$\hat{X}$+656.78 where $\hat{Y}$ - the incidence of respiratory diseases in Perm Krai, cases per 1000 population; $\hat{X}$ - the share of the Perm Krai population living in low air pollution cities,%. Adjusted (normalized) coefficient of determination: 0.812	$\hat{Y}$ provided maintaining current trends		
	415.8	417.1	418.6
	$\hat{Y}$ provided growth in the proportion of the population living in low air pollution cities (5% per year)		
	399.0	373.2	347.4
			

Analysis of the regional policy greening processes was conducting. According to it, tools of an environmental development in VDF regions were systematized as: 1) “environmental” tax benefits; 2) inclusion of environmental goals and objectives into regional development strategies and specialized programs; 3) institutional tools, including development of public institutions that provide greening processes publicity. The analysis also revealed a lack of application of transport tax benefits in regional management practice as well as insufficient elaboration of specialized programs on atmospheric air protection and the creation of favorable living environment. Particullaly, during the period of 2006–2012 in Perm Krai there was no specialised program on environmental development. The current program for the environment protection does not include measures to reduce air pollutant emissions and stimulating greener production law instruments.

Based on the analysis major directions for improving regional policy greening performance in Perm Krai were introduced:

1) To establish “environmental” profit tax benefits for businesses, which modernize production, introduce environmentally friendly technologies, reduce the share of flaring APG, etc: establish “environmental” transportation tax benefits for owners of high ecological class vehicles.

2) To introduce a mechanism of investment tax credits for projects of equipment and technologies environmental modernization.

3) To amend the current regional program on environmental protection, including goals, target indicators and list of investment projects oriented on air protection.

4) To establish a specialised program on cities infrastructure modernisation: transfer industrial productions from the populated areas to special industrial parks; design sanitary protection zones of enterprises (hereinafter - SPZ); resettle the population living in the SPZs; "green" the landscape of settlements; rationalize cities transport infrastructure.

5) To introduce a mechanism of regular regional policy greening performance evaluation.

To summarize the study, it can be concluded that the necessity of including the environmental component in the regional policy structure was approved; the process of regional policy greening was determined; the author's methodical approach to evaluate the performance of regional policy greening was elaborated; positive changes in social and economic growth were identified with the intensification of regional policy greening; by the example of Perm Krai measures to promote the regional policy greening performance were developed.

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