THE PROBLEMS OF DEVELOPING THE ECOLOGICAL MARKET OF THE REGION

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The definition of the ecological market is given. The regularities of the ecological market development abroad are shown. The ecological and economic indicators of the ecological market of the region are suggested. The basic problems of the ecological market and its infrastructure in the Kemerovo Region are determined.

The increasing scale of environmental pollution together with resource deterioration set brand problems in front of the economies of industrially developed regions. Enhancing of the economic development of the region as well as that of a single company must include not only efficient utilization of limited resource bit also in mitigation of the negative impact upon the environment.

In Russia there is no integrated, programming approach to nature use management; the system of ecological situation monitoring is not developed; there are problems with controlling the environmental reporting of contaminating plants; there is no integrated system of economic instruments to encourage the companies make their activities more ecologically friendly.

To solve the given problems we need to determine the trend of the ecological market which, in our opinion, expresses the system of economic intercourse developing in the process of circulation of ecological assets, rights for emissions and financial instruments which derivate from them.

The foreign works define the ecological market as a system of regulatory and self-sustaining markets where the ecological assets circulate including multiple transactions of emission rights [1].

Our analysis of the last twenty years of foreign ecological markets development (the USA, countries of European Community, Japan) revealed the following regularities: 1) developed ecological markets are observed in eco-economic systems where the ecological problems are urgent as the economic growth is the source of economic problems; 2) these countries have a developed infrastructure including legal and regulatory institutions and organizations advancing the circulation of ecological assets; material base of the infrastructure; social infrastructure [2].

Systematization of experience of the countries with the developed ecological market allows singling out a number of the most important elements of the infrastructure indispensible for the ecological markets development. They include emission limits, implementation of the mechanism of natural resources use on the paying basis and high quality of ecological monitoring systems. The first mentioning of market mechanisms introduction into the nature use processes is found in the works of T.D. Crocker (USA, 1966) and J.H. Dales (Canada, 1968) [3].

To estimate the eco-economic indicators of the region characterizing the conditions of the ecological market development it is suggested to use three groups of parameters which, with consideration to the nature of the solved problems, will allow measuring the maturity of the eco-economic system for developing such an institution.

The authors suggest the point-rating method for estimating the given indicators which allows evaluating the conditions of ecological market development in the regional eco-economic system in terms of their quality. The method is based upon the look back (from 1991 to 2010) analysis of the eco-economic system parameters of the countries where the ecological market existed and exists now (USA, Germany, France, Italy, Great Britain, Netherlands, Poland, Japan). The rating agency Financial Times developed a number of indices characterizing the conditions of the ecological market (FTSE Environmental Markets Index Series). The players in the ecological market are described as "the companies producing goods and services contributing to solution of the ecological problems including ecological technologies, also called "clean technologies" [4].

It is statistically valid to distinguish 5 groups of intervals within out method which were given the following points: rating A – 5; rating B – 4; rating C – 3; rating D – 2; rating E – 1.

The calculations are presented in Table 1.

The points scored this way were calculated for all parameters of all countries for all the years under analysis. The minimum allowed total points were determined for every group of parameters (with consideration to confidence interval with the probability 99.7%). They made:
- for the group of economic indicators – not less than 2.28;
- for the group of ecological indicators – not less than 2.12;
- for the group of the market formation conditions indicators – not less than 2.42.

Table 1. – **The developed rating of parameters characterizing the conditions of the ecological market development**

Indicators	Rating groups				
	A	B	C	D	E
1	2	3	4	5	6
1. Economic indicators					
1.1 Per capita GDP (GRP), USA doll. according to PPP / person	over 48710.1	36611.3-48710.1	18316.1-36611.3	8501.2-18316.1	less than 8501.2
1.2 Industrial segment in GDP (GRP), %	over 31.6	25.7-31.6	16.7-25.7	11.5-16.7	less than 11.5
1.3 GDP (GRP) growth rate	over 10.6	6.85-10.6	(-0.7)-6.85	(-0.7)- (-5.8)	over -5.8
2. Ecological indicators					
2.1 Population carrying capacity of the territory, segments [5]	less than 0.64	0.64- 0.73	0.73- 0.88	0.88- 0.97	over 0.97
2.2 Amount of emissions for 1 km^2, tons/km^2	over 80.049	52.501-80.049	20.047-52.501	8.757- 0.047	less than 8.757
2.3 Atmosphere emissions per capita, tons/person	over 0.917	0.538-0.917	0.126- 0.538	0.126-0.06	less than 0.06
2.4 Wastes per capita, tons/person	over 6.7	4-6.7	3.4-4	2.1-3.4	less than 2.1
2.5 Energy consumption, kg of reference fuel/1000 USA doll. according to PPP	over 393	267-393	115-267	53.5-115	less than 53.5
3. Indicators characterizing maturity of the ecological market and its infrastructure					
3.1 Environmental costs, % of GDP (GRP)	over 3.261	1.95-3.261	0.53- 1.95	0.179-0.53	less than 0.179
3.2 Environmental costs of the companies, % of GDP (GRP)	over 1.156	0.828-1.156	0.353-0.828	0.094-0.353	less than 0.094
3.3 Environmental capitalizable costs, %of GDP (GRP)	over 0.324	0.218-0.324	0.074-0.218	0.036-0.074	less than 0.036
3.4 Amount of imposed ecological payments, % of GDP (GRP)	over 4.356	3.254-4.356	1.411-3.254	0.252-.4116	less than 0.252
3.5 The monitoring systems allow controlling the state of environment:	on real-time basis	twenty-four-hour, a number of measurements	at regular interval within 24 hours	at regular intervals during the day	there are none
3.6 Economic preferences for the companies of the ecological sector:	direct support	significant preferences	insignificant preferences for a wide range of companies	insignificant preferences for a narrow group of companies	are not applied
3.7 Introduction of eco-management systems, their certification in the companies-users of natural resources:	everywhere	relatively wide-scale	are seldom introduced	isolated instances	are not introduced
3.8 Availability and application of registers of the best accessible technologies:	available, mandatory application	available, optional application	available for some industries	unavailable, but there are framework laws	there are none
3.9 Quality of environmental information access systems, information is updated:	on real-time basis, high detalization	on real-time basis, poor detalization	at regular intervals, poor detalization	seldom, poor detalization	is not carried out
3.10 Self-regulating organizations, unions, associations in the sphere of ecological assets circulation:	large number of SRO, unions	considerable number of unions and SRO	a limited number of unions and SRO	a limited number	there are none

The resulting rating of the region is calculated after summing up the points. The points were ranged into the rating values of the region on the base of analysis of the points obtained by the studied countries from year to year. The resulting rating of the territories is presented in Table 2.

Table 2. – **Determining the resulting rating of the territory**

in terms of the quality of ecological market development conditions

Rating	Points	Qualitative characteristics

A	over 10.261	The conditions are better than those in the eco-economic systems with the developed ecological market
B	9.43-10.261	The quality of conditions is above the average in comparison to the eco-economic systems with the developed ecological market
C	8.36-9.43	The conditions are characterized as average in comparison to the eco-economic systems with the developed ecological market
D	7.914-8.36	The quality of conditions is below the average in comparison to the eco-economic systems with the developed ecological market
E	less than 7.914	The conditions are worse in comparison to the eco-economic systems with the developed ecological market

The suggested method is based upon extension of the foreign experience into the Russian Federation and its constituent territories. We have to admit the impossibility of absolutely correct foreign experience extension into the eco-economic reality of the Russian Federation due to the large number of peculiarities in the national mechanisms of economy greening. At the same time the method suggested by the authors is to solve only the problem of countable indicators estimation which is impossible without comparing them to some "standard" represented by the countries with the developed ecological market.

As a result of the application of the method for estimating the ecological market development conditions to the regions of Siberian Federal District the authors rated the SFD regions according to the criterion of the quality of conditions for ecological markets development:

1. the Kemerovo Region – 9.433 points, rating B;
2. the Krasnoyarsk Territory – 9.4 points, rating C;
3. the Irkutsk Region – 8.633 points, rating C;
4. the Omsk Region – 8.133 points, rating D;
5. the Zabaikalye Territory – 8.1 points, rating D;
6. the Republic of Khakassia – 7.933 points, rating D – E;
7. the Republic of Buryatia – 7.767 points, rating E;
8. the Tomsk Region – 7.633 points, rating E;
9. the Republic of Tyva – 7.167 points, rating E;
10. the Novosibirsk Region – 7.167 points, rating E;
11. the Altai Territory – 5.9 points, rating E;
12. the Republic of Altai – 5.767 points, rating E.

The key element of the ecological market infrastructure is correct realization of the mechanism of natural resource use on the paying basis. The regional government faces the problem of determining the interdependence between the amount of pollution and the amount of ecological payments as well as the reaction at the growth of the natural resource user payments in the form of environmental expenditures. Thus, for the purposes of forecasting, ecological payments elasticity of emissions and ecological payments elasticity of corporate sector expenditures are of paramount importance. When we know the elasticity indicators we can estimate the efficiency of the managerial decisions.

To solve the given problem the authors suggest applying linear regression models developed on the base of the time series of the mentioned indicators observed in the eco-economical systems with the developed ecological market and correct mechanism of natural resources use on the paying basis. Average meanings of the studied indicators for the countries during the period of 1991-2010 were used for the calculations. The model specification is based upon the application of the graph methods. The graph method implies analyzing the diagram of the explanatory variable which in the given case is characterized by relatively low scatter of the data cloud from the linear trend line.

The authors started with developing the linear regression model describing the dependence of pollution amount upon the taken ecological payments. With the principle of natural resource use on the paying basis realized correctly the increase of the ecological payments paid by the natural resource users must promote pollution reduction.

After considering the results of development we obtain model (1):
$$y_1 = -0{,}00512x_1 + 0{,}5174, \qquad (1)$$
where y_1 – the amount of emissions per capita, tons/person;

x_1 – the amount of the ecological payments, bill. USA doll. according to PPP.

Correct realization of the principle of natural resources use on the paying basis supposes that increase of the ecological payments amount must encourage the environmental activities of economic entities and, as a result, increase the demand in the ecological market. Let us build the model describing the interdependence of the ecological payments amount and the total amount of environmental expenditures of the corporate sector. Total current expenditures and investments represent the amount of the satisfied effective demand in the ecological market, so the given indicator is of special interest for us. After considering the results of calculations we obtain model (2):
$$y_2 = 0{,}3488x_2 - 3{,}516, \qquad (2)$$
where y_2 – the amount of effective demand for the ecological assets, bill. USA doll. according to PPP;

x_2 – the amount of ecological payments, bill. USA doll. according to PPP.

Test of statistical significance of coefficients x_1 и x_2 with application of **t** – criterion showed that the explanatory variable is statistically significant in both cases. Testing the models with F-criterion also proves that the obtained one-factor linear regression equations are statistically significant and provide an adequate description of phenomenon under study.

For the purposes of forecasting the opportunity of estimating the elasticity of the analyzed indicators is of special interest. Calculation of emissions elasticity of ecological payments allows illustrating the effect of the principle of natural resources use on the paying basis and calculation of ecological payments elasticity of corporate sector environmental expenditures illustrate its motivating function in the ecological market. From models 1 and 2 we obtain ecological payments elasticity of air emissions $Эy_1x_1 = -1,81\%$: ecological payments elasticity of demand in the ecological market $Эy_2x_3 = -1,199\%$.

The results of detailed analysis made for the Kemerovo Region allow making the following conclusions. First, in spite of the fact that the ecological situation in the region is estimated as unfavorable, the region has the background for ecological market developing. The level of economic development is high enough and the industry specialization promotes formation of demand for ecological assets.

Second, the following problems of the regional ecological market development were revealed: absence of ecological monitoring system in the region, which is able to control the environmental quality on the real-time basis (or at regular enough intervals); the amount of payments for negative environmental impact (the only component in the ecological payments structure which depends upon the negative impact produced by the natural resource user) in the general system of ecological payments is small, thus, the given instrument, as it is, cannot have any significant influence upon the natural resource users; the region does not have instruments for economic encouragement of the companies in the ecological sector (for the exception of waste processing plants), which results in demand for the ecological assets, though demonstrated by the natural resource users, being satisfied by other regions or from abroad; absence of the systems providing immediate information about environmental quality in the region.

We suggest a number of measures to improve the ecological market infrastructure in Kemerovo Region. We recommend introducing an automated system of air quality monitoring with integration into GIS-system. Atmospheric air was chosen as priority area because this type of pollution is the hardest to control. Thus, it is the area where disturbances often occur. Besides, atmospheric air pollution has the greatest effect upon morbidity and mortality of population causing losses in the form of underproduced GRP. Implementation of the given measure will allow more efficient control of the natural resource users activities as well as that of correct calculation of payments for the negative environmental impact due to the actual amounts of pollution. The expenditures associated with introduction of this measure were evaluated, and the positive economic effect in the form of payment increase for the negative environmental impact according to formula 2-TP (air) by 86% (according to the worse-case assessment scenario) was revealed.

To support the companies – sources of pollution – in the ecological market of the region it is recommended to give tax breaks for property and income taxes for the given group of companies (according to Russian National Classifier of Economic Activities), which is one of the elements of the legal and regulating framework of the ecological market. Efficiency of the given measure was revealed as a result of application of tax break efficiency estimation method used in the Kemerovo Region.

Thus, the suggested method and the given measures will encourage ecological market development in the region. After practical approval the increase of ecological payments amount in the Kemerovo Region will make 3.9% due to implementation of recommendations, the demand for the ecological assets in the region will grow by 4.7%. Ecological payments elasticity of emissions known we arrive at possible reduction of emissions into the atmosphere by 7.06%.

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