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ECONOMETRIC MODELS FOR ASSESSING ENVIRONMENTAL FACTORS AFFECTING THE COMPETITIVENESS OF THE REGION

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Annotatsiya. Maqolada ekologik omillarni hisobga olgan holda mintaqaning raqobatbardoshligini oshirish uchun ekonometrik modellarni yaratish masalalari muhokama qilinadi. Xorazm viloyati misolida ekonometrik tahlil o'tkaziladi.

Kalit so'zlar: Mintaqa, strategiya, raqobatbardoshlikning ekologik omili, ekologik-iqtisodiy jihati, yalpi hududiy mahsulot, ekonometrik model.

Аннотация. В статье рассматриваются вопросы построения эконометрических моделей повышения конкурентоспособности региона с учетом факторов окружающей среды. На примере Хорезмской области проведен эконометрический анализ.

Ключевые слова: регион, стратегия, экологический фактор конкурентоспособности, эколого-экономический аспект, валовой региональный продукт, эконометрическая модель.

Abstract. The article discusses the issues of building econometric models for increasing the competitiveness of the region, taking into account environmental factors. On the example of the Khorezm region, an econometric analysis is carried out.

Key words: Region, strategy, competitiveness ecological factor, ecological-economic aspect, gross regional product, econometric model.

Introduction. The process of globalization, the formation of new regional centers in the form of large agglomerations, growth points and special economic zones leads to increased competition for attracting investments, highly skilled labor and promising infrastructure projects. Major regional centers account for 75% of world GDP, 58% of exports and 76% of investments [1]. This, in turn, encourages other regions and countries to pursue regional policies aimed at increasing their competitiveness and maintaining competitive advantages.

Therefore, the study of environmental factors affecting the state of regional competitiveness is emerging as a new and complex research subject of the regional economy. However, the theoretical and methodological basis for the study of regional competitiveness is not yet sufficiently systematized and it is mainly based on the concepts of regional production complexes, economic zoning, development and location of productive forces.

In the process of building a new Uzbekistan, special attention is paid to the development of the regions of our country. The strategy of actions for the further development of the Republic of Uzbekistan sets the task of "accelerating the development of comparative regions and cities by reducing the gap in the level of socio-economic development of regions through the modernization and diversification of the regional economy, primarily by increasing industrial and export potential" [2].

Research methodology. Along with economic growth in the regions, a number of problems arise, among which the negative impact on the environment plays an important role. In this regard, the main direction is the timely assessment and forecasting of the environmental consequences of increasing the competitiveness of the region, not only at the national but also at the local level. The environmental situation and public health are very important issues in the sustainable development of the region. Despite the emphasis on maintaining eco-intensive indicators in the sector, the levels of certain types of pollution are increasing from year to year. This situation not only has a negative impact on improving the living standards of the population, but also leads to a decrease in the competitiveness of the region. To assess the relationship between economic growth and the level of environmental pollution in the sustainable development of the region, models are used that present the results of the analysis of the decoupling factor and the analysis of the environmental Kuznets curve. The concept of "Decoupling", which is an interaction in the economic and environmental direction of sustainable development of the economic system of the region, is understood as a combination of economic growth and harmful effects on the environment and the consumption of natural resources [3]. To apply the decoupling effect, the growth rate of the environmental load should tend to decrease compared to the rate of economic growth during this period. Based on a number of studies by foreign authors, the decoupling factor is assessed as the ratio of the level of environmental load to GRP at the beginning and end of the study period [4]. The results obtained are evaluated in units: if the value of the coefficient is less than one for the studied period, this means the presence of decoupling, if the value is more than one, this means that there is a correlation between the indicators, respectively. Decoupling factor (Dt) is determined by the method of the Organization for Economic Cooperation and Development as described above, but the specified ratio is lost from one unit [5]:

$$D_t = 1 - \frac{AE_t}{Q_t} \Big/ \frac{AE_{t-1}}{Q_{t-1}} \qquad (2.2.6)$$

where, AE- an indicator that reflects the harmful effects on the environment (adverse effect), Q – indicator reflecting the development of the economic system (quantity) (GDP, GRP, production volume, etc.).

In the above case, if the value of D_t is zero or negative, the decapling effect is unlikely to occur. Accordingly, a positive D_t value indicates decoupling. In this case, it is known that the closer the value of the determined coefficient is to one unit, the less pressure the economy has on the environment. The decoupling factor, which is based on simple calculations and has sufficient logic in the assessment of economic and environmental policy, is widely recognized and used both individually and in combination with other methods.

This study also uses environmental Kuznets curve (EKC) analysis to econometrically model the relationships between regional economic growth and environmental damage, which are elements of this system, to analyze the sustainable development of a regional economic system. In this regard, three different types of (EKC) models, namely the linear equation, the second and third order polynomial equations, were considered:

$$P = b_0 + b_1 Q + b_2 Q^2 + b_3 Q^3 \qquad (1)$$

where: P – environmental indicator (pollution), Q – an indicator (quantity) that reflects the development of the region's economy (GRP, production volume, etc.), b_0, b_1, b_2, b_3 - parameters of the regression equation.

It is also recommended to use the following modification model to test the (EKC) hypothesis:

$$\ln(E/P) = \beta_i + \varphi_t + b_1 \ln(Q/P)_{it} + b_2 \ln(Q/P)^2_{it} + \varepsilon_{it} \qquad (2)$$

where: E – emission of harmful substances, P – population, i,t – indices representing object and time, b_0, b_1 - parameters of the regression equation, β_i, φ_t - individual and time effects, ε_{it} - residual component.

The analyzes considered the release of harmful substances into the environment from stationary and mobile sources as a general indicator of environmental pollution (Table 1).

Table 1

The amount of harmful substances emitted from stationary and mobile sources in Khorezm region in 2005-2019

Years	Stationary sources and greenhouse gas emissions from transport (thousand tons)	The value of GRP in current prices (billion soums)	The value of GRP in current prices (billion soums)
2005	29.746	595.2	1453.9
2006	38.859	803.0	1477.8
2007	52.983	1 040.1	1504.2
2008	56.294	1 255.3	1530.8
2009	43.12	1 534.0	1561.6
2010	58.048	2 058.0	1601.1
2011	49.033	2 624.6	1629.1
2012	50.408	3 326.8	1653.8
2013	54.196	4 129.6	1684.1
2014	52.688	5 061.0	1715.6
2015	48.317	6 167.7	1746.9
2016	50.262	6 778.8	1776.7
2017	55.454	11 457.2	1804.7
2018	59.396	15 154.2	1835.5
2019	61.228	19212.2	1861.2

Based on these data, the decoupling effect was calculated (Figure 1).

Figure 1

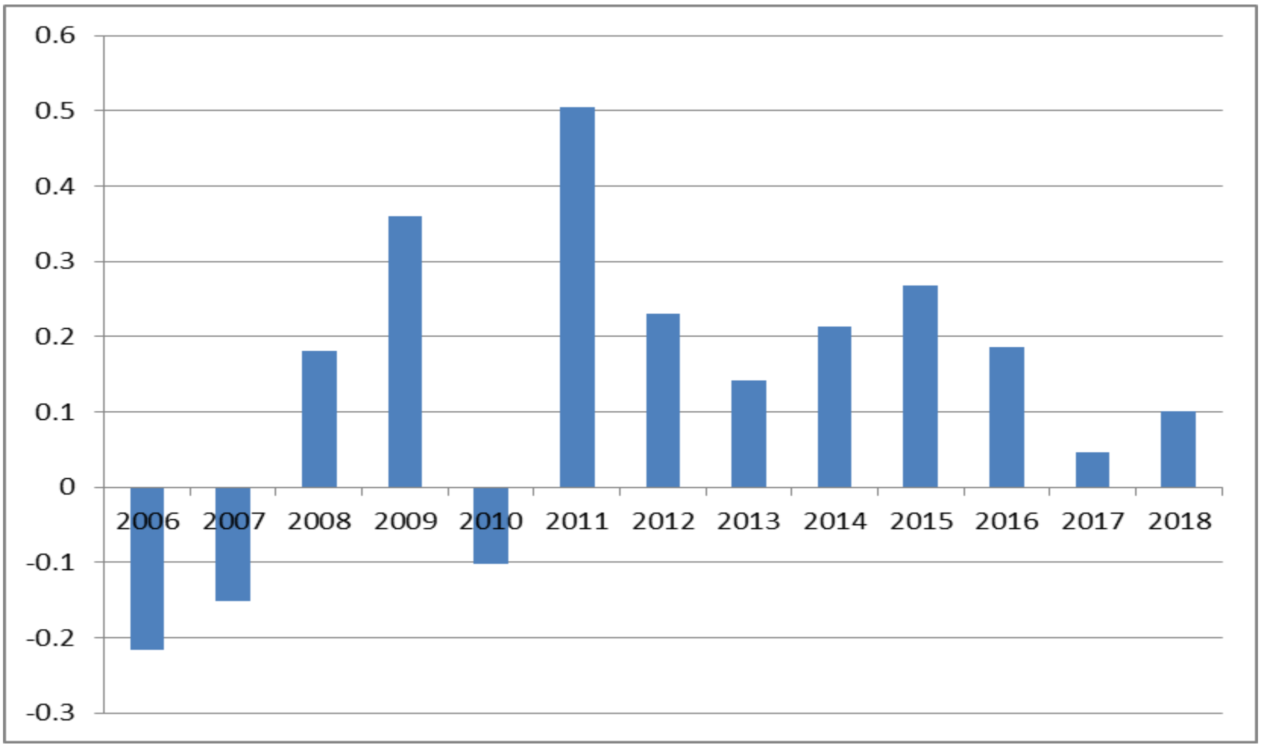

Figure 1. Dynamics of economic growth and decoupling coefficient of harmful substances emitted into the atmosphere from stationary and mobile sources in Khorezm region in 2006-2019.

Analysis and results. In 2006, 2007, and 2010, when the value of the decoupling coefficient was negative, it can be seen that the harmful effects on the environment decreased compared to the previous year. In addition, the analysis revealed that the environmental load was high in 2008 and from 2012 to 2019. Compared to other years, 2017 saw the highest level of environmental pollution. It can be seen from the calculations in Figure 1 that the value of the decoupling efficiency coefficient in 2009 and 2011 is positive compared to the analyzed years.

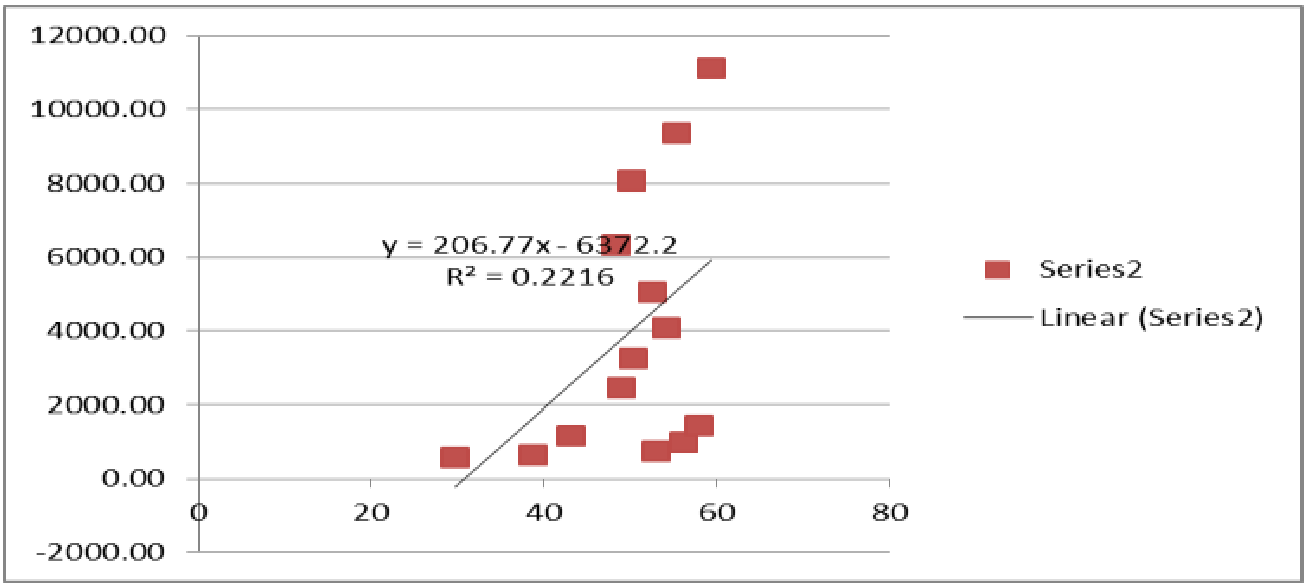

Figure 2. The change in the relationship between GMP and environmental pollution of the environmental Kuznets curve in terms of linear function.

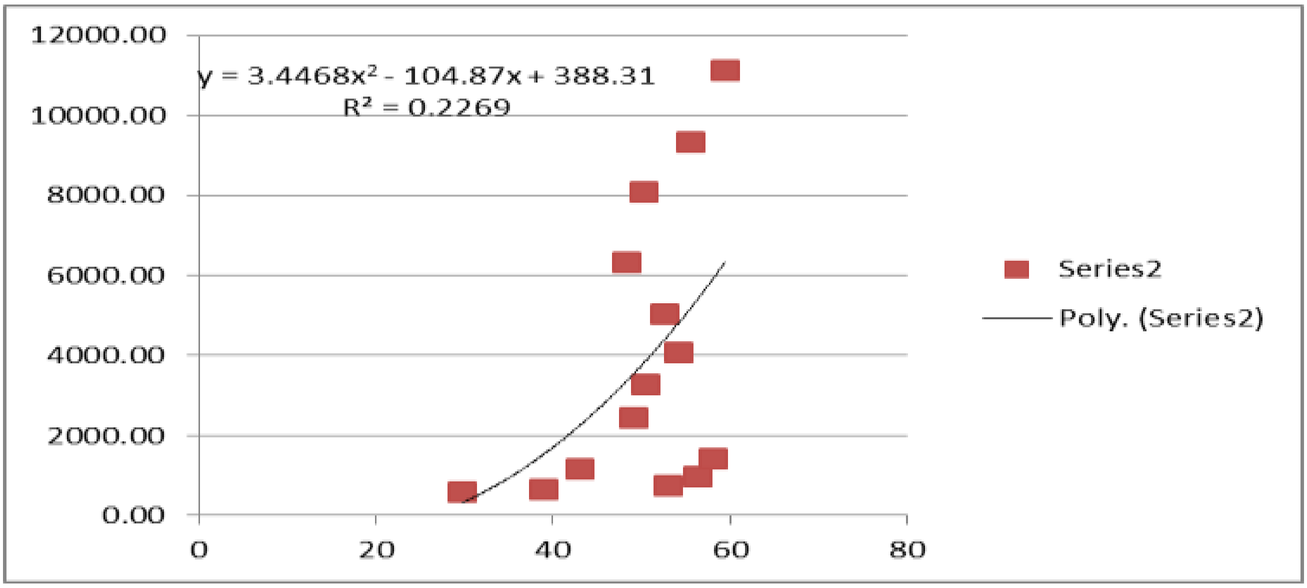

Figure 3. The change in the relationship between the GRP and environmental pollution of the EKC on the second-order polynomial function.

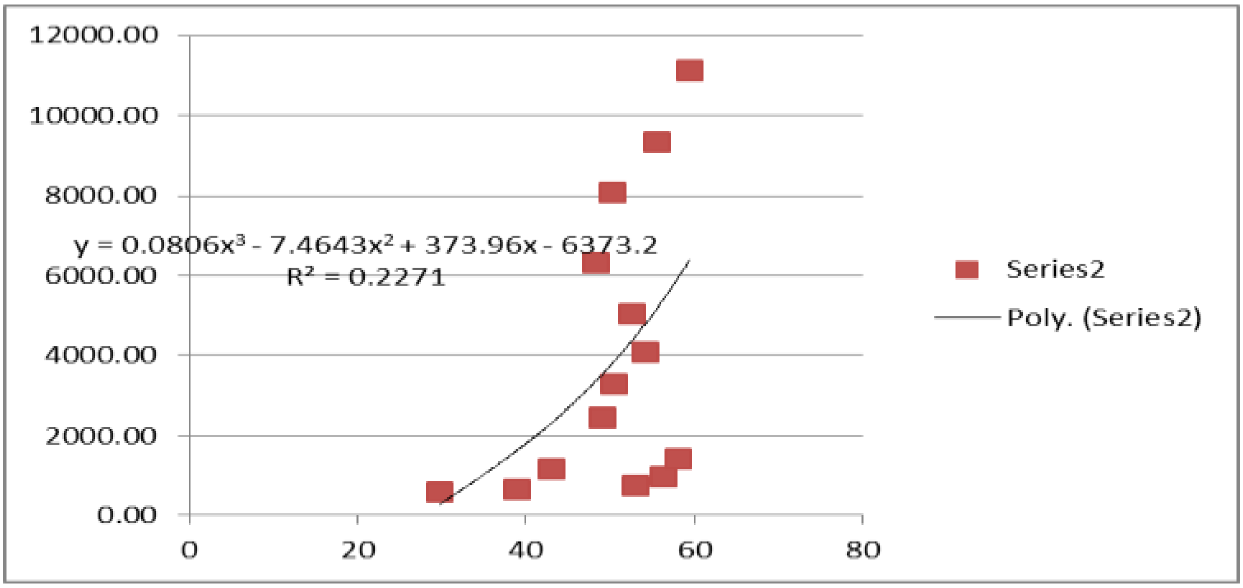

Figure 4. The change in the relationship between GRP and environmental pollution of the EKC on the third-order polynomial function.

The analyzes shown in Figures 2, 3, and 4 were performed according to formula (1). Based on these analyzes, the following conclusions can be drawn:

- Figure 2 shows the regression equation based on the linear function, and the share of GRP in the follow-up of the environmental indicator is 22.16%, and the share of other factors is 77.84%.

- Figure 3 shows the regression equation based on the second-order polynomial function, and the share of GRP in the follow-up of the environmental indicator is 22.69%, and the share of other factors is 77.31%.

- Figure 4 shows the regression equation based on the second-order polynomial function, and the share of GRP in the follow-up of the environmental indicator is 22.71%, and the share of other factors is 77.29%.

The results of the analysis of the regional economy based on the Kuznets ecological curve show that the relationship between the level of environmental pollution and GRP growth in Khorezm region is very low, and the share of other factors not included in the model is very high.

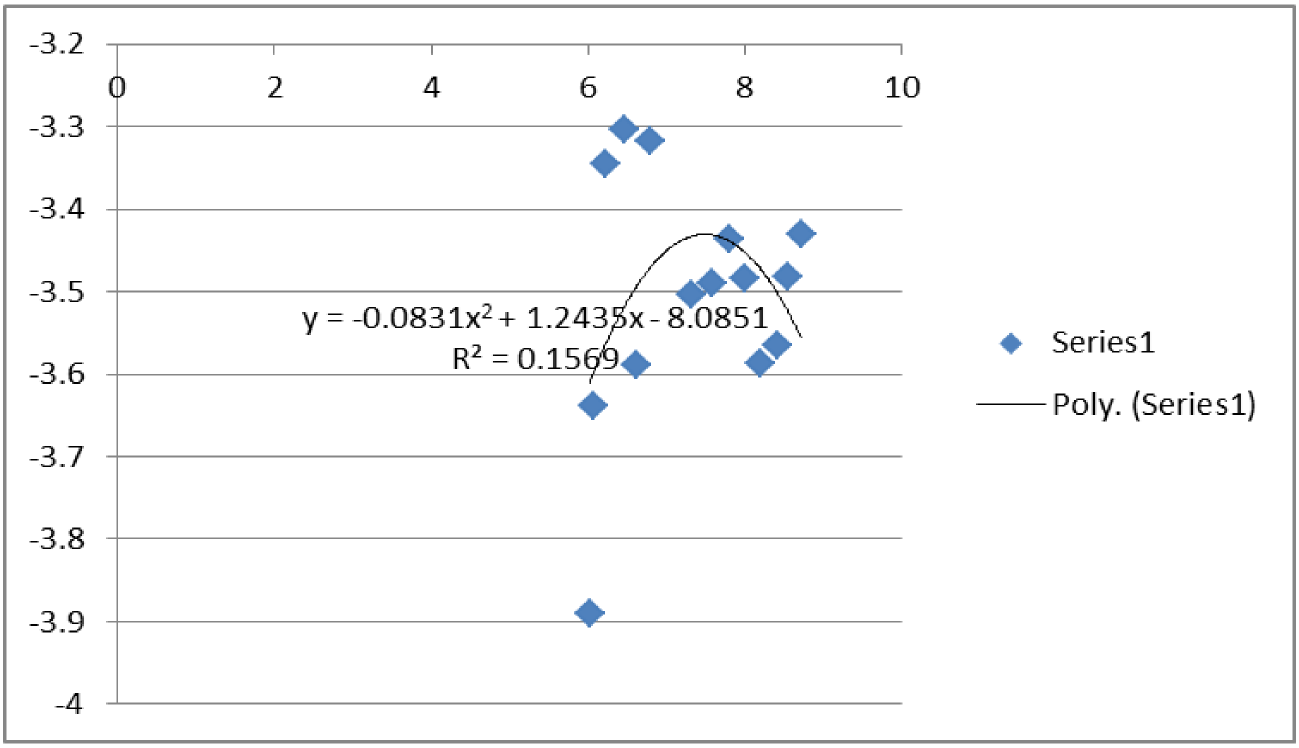

Figure 5.
The second-order polynomial function of the relationship between environmental pollution (Ln(E/P)) and GRP (Ln(E/P)) relative to population.

According to formula (2), the situation in Figure 5 occurred when the Environmental Kuznets curve relative to the population was expressed by a quadratic function. Based on this, it can be seen that in the Khorezm region the dependence of hazardous substances from stationary and mobile sources on GRP, that is, the coefficient of determination of the population, is 15.7%, and the share of factors not included in the model is 84.3%. This, in turn, means that an increase in GRP should be achieved by replacing the production of environmentally friendly goods and services with environmentally friendly technologies. In addition, in environmental studies, it is advisable to analyze the proportion of factors not included in the model, except for GRP, and also to reduce the influence of these factors.

Conclusions. The formation of an innovative economy in the region, the organization of production processes in the value chain, the establishment of the production of environmentally friendly agricultural products, and the maintenance of a minimum level of environmental load on the environment will serve as a key factor in increasing the competitiveness of the region.

References

[1]. Appendix 1 to the Decree of the President of the Republic of Uzbekistan No. 4947 of February 7, 2017 "Strategy of actions on five priority areas of development of the Republic of Uzbekistan for 2017-2021". www.lex.uz.

[2]. European Union. Proportion of regions included in NAFTA and ATES. Source: World Bank data for 2014. Electronic source: http: // databank.worldbank.org (date of use of the source: 15.01.2016).
[3]. Bobylev S.N., Zakharov V.M. Green economy and modernization. Ecological and economic foundations of sustainable development // On the way to sustainable development of Russia. - 2012. No. 60. - 89 p.
[4]. L.C. de Freitas, Kaneko S. Decomposing the decoupling of CO2 emissions and economic growth in Brasil //Ecological Economics, 2011. Vol. 70, pp. 1459-1469; Luo Juan The research of Hubei province (China) economy growth influence on environment quality // Modern High Technologies. Regional Application,2013. № 1, pp. 37-42.
[5]. Organization for Economic Cooperation and Development (OECD). Indicators to Measure Decoupling of Environmental Pressure and Economic Growth. OECD, Paris. 2002.