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Environmental tax as a factor of effective impact on rate of waste produced by enterprises

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The article discusses the trends in the environmental tax in Ukraine and the impact of changes in the size of the above noted tax on the economic activity of industrial enterprises. The interconnection between the size of the tax and the economic activity of enterprises was explored. For this aim, the correlation and regression analysis of such indicators was used: the sales of products, the income to the budget through environmental tax and the amount of waste. In addition, comparative description with the experience of foreign countries in the field of environmental taxation was established. Suggestions for improving the current condition of the economic and environmental situation at industrial enterprises of Ukraine were provided.

Keywords: environmental tax, industry, waste, correlation and regression analysis, EU.

Громадська А.В., Хмилевська А.О., Лазоренко Т.В. ЕКОЛОГІЧНИЙ ПОДАТОК ЯК ФАКТОР ЕФЕКТИВНОГО ВПЛИВУ НА ОБСЯГ ВІДХОДІВ ПІДПРИЄМСТВ

У статті розглянуто тенденції зміни екологічного податку в Україні та вплив зміни розміру зазначеного податку на економічну активність підприємств промисловості. Досліджено взаємозв'язок між розміром податку та економічною активністю підприємств. Для чого було використано кореляційно-регресійний аналіз показників обсягу реалізованої продукції, обсягу надходжень до бюджету через екологічний податок та обсягу відходів. Також проведено порівняльну характеристику з досвідом зарубіжних країн в сфері екологічного оподаткування. Наведено пропозиції для покращення сучасного стану економічної та екологічної ситуації на промислових підприємствах України.

Ключові слова: екологічний податок, промисловість, відходи, кореляційно-регресійний аналіз, ЄС.

Громадская А.В., Хмилевская А.О., Лазоренко Т.В. ЭКОЛОГИЧЕСКИЙ НАЛОГ КАК ФАКТОР ЭФЕКТИВНОГО ВЛИЯНИЯ НА ОБЪЕМ ОТХОДОВ ПРЕДПРИЯТИЙ

В статье рассмотрены тенденции изменения экологического налога в Украине и влияние изменения размера указанного налога на экономическую активность предприятий промышленности. Исследована взаимосвязь между размером налога и экономической активностью предприятий. Для чего было использовано корреляционно-регрессионный анализ показателей объема реализованной продукции, объема поступлений в бюджет через экологический налог и объема отходов. Также проведена сравнительная характеристика с опытом зарубежных стран в сфере экологического налогообложения. Приведены предложения по улучшению современного состояния экономической и экологической ситуации на промышленных предприятиях Украины.

Ключевые слова: экологический налог, промышленность, отходы, корреляционно-регрессионный анализ.

Formulation of the problem. Ukraine is producing far more garbage than can utilize nowadays. A significant proportion of waste is produced by enterprises, and therefore the next question appears: "How to use resources effi-

ciently and don't contaminate existing ones?" It is difficult to answer this question because Ukrainian producers usually have a number of more pressing problems that are directly related to their economic activity. This was the main

reason for the creation of an environmental tax for enterprises. In this way, the state assumed responsibility for eliminating the negative consequences of economic activity for the environment and, in the long run, forcing enterprises to become technologically advanced.

Analysis of recent research and publications. The question of problems and analysis of the environmental tax in Ukraine were carried out by such scholars as: Naydenko O.Ye. [1, s. 9], Nikitishyn A.O., Yakovenko K.A. [2, s. 9], Suchek S. [3, s. 10].

Setting objectives. The purpose of the study is to provide a detailed analysis of the impact of environmental tax on the volume of waste of the companies, and to characterize the current conditions of environmental taxation in Ukraine and abroad.

Presentation of the main research material. The studies of the World Bank have evidenced the fact that the volume of garbage is growing up every year with an incredible pace. Thus, by 2050 humanity will produce 70% more garbage. Such a trend would have to make the producers of the world think about changes in their activities in favor of environmentally friendly production.

But, unfortunately, not all producers, and especially ones from developing countries, can be highly responsible and to think about the impact on the environment firstly. That is why the activity of such enterprises should be interfered by the state, providing effective influence both on the economic and ecological component of their activity. Such levers of influence in Ukraine include the environmental tax, the size of which is proportional to the amount of pollutant emissions into the environment (the full list can be found in the 8th section of the Tax Code of Ukraine). Every year, the size of the environmental tax increases, which provokes a negative reaction from the part of the industrialists. The dynamics of the share of environmental tax in the budget revenues and GDP in 2004-2015 shows that during the analyzed period, the share of environmental tax in the budget revenues ranged from 0.2% to 5.3%, in GDP – from 0.06% to 1.6% (Fig. 1) [5, p. 10]. These numbers are significantly lower than those of the EU countries.

So, it can be difficult to answer the question: "Is it expedient to increase the size of environmental tax in Ukrainian realities?". For better understanding of this question, the intercon-

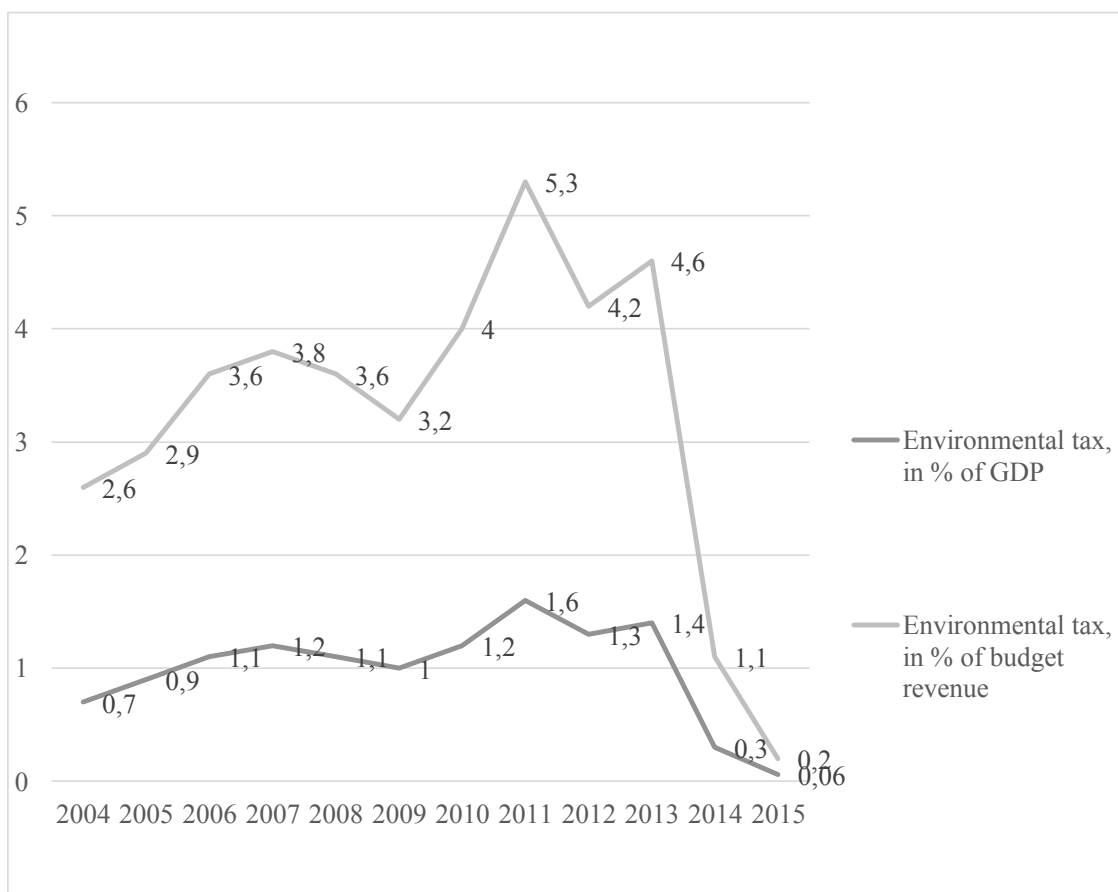


Fig. 1. Dynamics of the share of environmental tax in budget revenues and GDP in 2004-2015

nection between the three indicators shown in Table 1 must be analyzed.

It is advisable to explore the relationship between these data using the following factors:

1) correlation coefficient:

$$r = \frac{\sum_{i=1}^n ((x_i - \bar{x})(y_i - \bar{y}))}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 \sum_{i=1}^n (y_i - \bar{y})^2}};$$

2) determination coefficient:

$$R^2 = r^2;$$

Using these formulas the following indicators were received:

1) correlation coefficient: $r = -0,506$;

2) determination coefficient: $R^2 = 0,257$.

The correlation coefficient shows that the connection is not very tight and that it is inverse, meaning that the increase of the environmental tax reduces the amount of waste, and this is the main task of the state. But it is worth noting that, despite increasing expenses of the enterprise, the State Statistics Service provides data about annual increase in the volume of sales of industry products. In turn, the determination coefficient shows how the variation in the amount of environmental tax is determined by the variation in the amount of waste. The obtained results showed that the input indicators have a low correlation with the resulting data. But this is also due to the lack of data for analysis, since the amount of generated waste determines in the future the amount of the paid environmental tax.

Consequently, the fact that the environmental tax grew did not negatively affect the economic welfare of enterprises and allowed them to further develop, but at the same time, this policy of the state forces companies to look for ways to improve the technological process, which would be expedient in terms of not only economic benefits, but also the impact on the environment.

One of the best methods for improving the efficiency of the technological process is the

recycling and reuse of raw materials. Common solutions for obtaining the desired effect are: regeneration of heat, water recirculation, condensation, reuse of waste from production. For example, enterprises can engage in the production of related products. Thus, pulp as a fuel for a biogas plant is used at a sugar plant in the Vinnytsia region. The additional accompanying product in the process of manufacturing biogas is fertilizers that are sold to local farmers [6, p. 10].

Consequently, the fact that environmental tax has increased did not negatively affect the economic well-being of enterprises and allowed them further developing, but at the same time, such a policy of the state forces companies to look for ways to improve the technological process, which would be expedient in terms of not only economic benefits, but the impact on the environment.

One of the best methods for improving the efficiency of the technological process is the recycling and reuse of raw materials. Common solutions for obtaining the desired effect are: regeneration of heat, water recirculation, condensation, reuse of waste products. For example, companies can be engaged into the manufacture of related products. Thus, pulp as a fuel for a biogas plant is used at the sugar plant in the Vinnytsia region. An additional concomitant product in the production of biogas is fertilizers that are sold by local farmers [6, p. 10].

Other, but equally important, methods for obtaining energy and resource efficient production can be called technological changes and modifications of production, that are partial changes in the products made to improve the characteristics of the product and increase its environmental and economic attractiveness. The modification may consist of changes in appearance and other characteristics to extend its lifecycle, improve the way of disposal and reduce the impact on the environment. This method is used by the enterprise for the manufacture of products and semi-finished products (dumplings and

Table 1

Indicators for analysis

Year	Volume of products sold by industry, UAH million	Waste generation by enterprises, thousand tons	Ecological tax, thousand UAH
2011	1 305 308,00	442464,4	2 275 886,10
2012	1 367 925,50	442757,4	2 816 008,30
2013	1 322 408,40	439091,4	3 899 487,00
2014	1 428 839,10	348686,1	4 830 908,70
2015	1 776 603,70	306214,3	2 691 040,10
2016	2 158 030,00	289523,6	4 987 435,20

Source: created by authors, based on [4, p. 10; 5, p. 10]

vareniks) in the Odessa region. This has already helped to achieve significant results: increasing of the number of billets on 25%, reduction of waste volumes, as well as a decrease of electricity consumption on 56% [6, p. 10].

Thus, using the indicated ways of improving production, the enterprise can achieve such results as: increase of production efficiency, reduction of energy costs and use of raw materials, reduction of environmental impact of production, approximation to international standards of quality of production processes and products, and in turn to increase competitiveness on the world market. These must be the results of the state's

interference in the business sector by increasing the environmental tax. For example, the components of environmental taxation in the EU countries are presented (Table 1) [1, p. 9], the main distinguishing feature of which in comparison with the similar tax in Ukraine is a significant amount of failure to meet the conditions of clean production.

From the above data it can be concluded that the environmental tax in the EU countries has a much wider range of fines than in Ukraine. This confirms the idea that we can look for ways to have a more severe impact on the company, which will help to reduce annual emissions to the environment. Today it is also worth noting that a

Table 2

Environmental taxes in EU countries

Category of payment	Brief description of payment	Country
1	2	3
Fee for pollution of water objects	The size of the charge depends on the volumes and type of pollutants discharged into water objects	Germany, France, Austria, Finland, Ireland, Poland, Estonia, Latvia, Czech Republic
	The amount of charge, besides the type and volume of pollutants, is also influenced by the possibility of diffusion of pollutants with oxygen	The Netherlands
Tax on products	Installed in the form of a mark-up to the price of goods, which either at the stage of its production, or in the process of consumption pollutes the environment	Germany, Lithuania, Sweden
Tax on products	The tax on waste electrical and electronic equipment is included in the price of the goods	Sweden, Czech Republic, France, Belgium, Austria
	Fee for the disposal of TVs, computers, etc. equipment, the size of which depends on the weight of the object to be disposed of	Germany, Slovakia, Lithuania
	Payment for products that do not meet certain environmental standards	Poland
	Fee for products containing chlorofluorocarbons	Czech Republic
	Tax on waste placement at landfills	EU countries
Taxes paid by airports	Airfare tax, the size of which depends on the number of passengers on an airplane per flight and the flight distance	Germany, UK
	Noise pollution tax	Czech Republic
Tax on fertilizers and pesticides	The tax on fertilizers, acts in the form of a mark-up to the price of the goods	Austria, Finland, the Netherlands, Sweden
	Fee for sulfur fertilizers and grazing of unused fertilizers	Belgium
	Pesticide tax (margin to product price)	Denmark
	Tax on fertilizers and pesticides	Norway
The tax on emissions of air pollutants in the atmospheric air of the SRV	Carbon tax	Finland, Sweden, Norway, the Netherlands
	The tax that is set as a result of the emission of pollutants into the atmosphere. Its size depends on the volumes and type of such pollutant	Other EU countries

Source: created by authors, based on [7, p. 10]

new market is opening up for Ukrainian producers, but at the same time it is necessary to meet a whole range of requirements, including environmentally friendly production, to export products to the EU countries. Therefore, Ukrainian producers should feel the motivation to change for the better, not only because of the influence of the tax policy of the state. However, in Ukrainian realities, control and fines have the most significant impact on the environmental safety of production, which in the long run should change and become more self-conscious.

Conclusions from the research. The analysis allows stating the following conclusions:

1) Ukrainian producers have a quite loyal system of taxation; therefore, it is expedient to gradually increase the size of the environmental tax;

2) the increase of the environmental tax does not lead to a decrease in the sales products, as is usually considered, instead it has a positive effect – reducing the amount of waste;

3) there is an incredible number of improvements of the technological process, which will be more environmentally friendly and at the same time cost-effective;

Summing up, it should be noted that the transition to environmentally friendly production technology has many positive effects. For example: access to new markets and, as a result, to the international market, increase in sales volume, growth of net profit, reduction volume of environmental tax, and, most importantly, to improve the conditions of the environment and the welfare of the population in Ukraine.

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