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ENVIRONMENTAL TAXES AS THE INSTRUMENT OF ENVIRONMENTAL POLICY IN DEVELOPING COUNTRIES

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Abstract: *Many environmental and natural resource problems, which have been solved in developed countries with the use of appropriate instruments, are becoming increasingly common in developing countries. Due to poverty, the efficiency of conceiving environmental policies and minimizing costs, are inherent issues of these countries. The aim of this paper is to highlight the importance of environmental taxes in developing countries, as environmental taxes are an instrument of environmental policy that convenes with the level of their development. Most countries today pay great attention to environmental taxes. However, in the tax systems of developing countries, their significance is neglected. We analyzed 12 developing countries, which are members of the European Union, with the tendency to point out the benefits they could have from environmental taxes. A regression analysis was applied on the data series for the period 2001-2016. The results of the model show that the growth of tax revenues from ecological taxes implicitly increases the state allocation in the field of environmental protection.*

Keywords: *environmental policy instruments, ecological taxation, regression analysis, developing countries.*

1. INTRODUCTION

"Environmental taxes are considered as very important form of taxation" (Cornelia, Lenuţa, 2012, p. 730). Environmental taxes play a crucial role in protecting the environment today, taking into account the fact that the level of pollution is growing.

These environmental policy instruments have gained particular importance in their effectiveness in the fight against environmental problems."The experience of the last two decades has shown that ecological taxes can be efficient and effective environmental policy instruments" (Anđelković, 2012, p. 203). On the other hand, the tax system, with introduced ecological taxes, provides supply to users of public goods(Leach, 2004).

Ecological taxes expand the consciousness of producers and consumers in terms of more rational use of natural resources, on the one hand, and increase prices for environmentally harmful products on the other, ultimately reducing the demand for them. „In the case of individual countries of the European Union, revenues from ecological taxes were mainly intended for financing water supply, sewage and road construction.

However, empirical research has gradually proved that revenues from environmental taxes have been

gradually increasing and in this way have led to savings in energy and resources from one, as well as to the motivation for continuing to increase ecological taxes, on the other hand“ (Sterner, Köhlin, 2004, p. 2). The international dimension of environmental taxes is, explicitly, expressed. Most countries make great efforts on this field, pointing the capital consequences that can be caused by environmental damage.

Developed countries devote the greatest importance to ecological taxes. The main reason is their predicament in relation to other instruments in the fight against environmental problems. For this reason, most developed countries also emphasize the importance of introducing new forms of ecological taxation.

The reduction of environmental taxes is also characteristic for the developed countries of the European Union. The European Community Commission is propulsively working to introduce new forms of national taxes (Ilić Popov, 2000,pp. 219-229). Additionaly, “environmental problems such as: protection of the ozone layer, global warming, acid rain, uncontrolled destruction of the flora and fauna exceed national boundaries and can not be solved by actions of individual states” (Anđelković, 2012, p. 205).

Within the European Union, the issue of environmental protection, in order to regulate cross-border pollution, was one of the important issue related to the harmonization of the laws of the member states of the European Union. (Sterner, Köhlin, 2004). „In the new regulations on the policy of the Directorate for Environmental Protection of the countries of the European Union, the Commission emphasized the taxation of the environment „(Schlegelmilch, 1998).

The subject of this research are the developing countries that are members of the European Union and the very modest tax rates with the ecological characteristics in them. Most developing countries do not attach importance to this environmental policy instrument compared to developed countries.

The main reason for such circumstances is the level of development of these countries. Ecological taxes have a regressive character, such as value added tax. Implicitly, this major shortage of environmental taxes will have more repercussions on developing countries compared to developed countries. Analogously, there is a great uncertainty that the aim, because of which these taxes are collected, will be achieved. If there is no trust from taxpayers, in regards to any environmental quality improvements, we can not expect that sufficient funds will be collected.

The aim of this paper is to point out the importance of ecological taxes, using appropriate statistical techniques. We will analyze the 12 developing countries of the European Union: Bulgaria, the Czech Republic, Slovenia, Slovakia, Poland, Latvia, Lithuania, Romania, Greece, Hungary, Croatia and Estonia.

We will analyze the revenues from environmental taxes and environmental protection expenditures in the period 2001-2016. years.

The aim of the paper is to examine the environmental policy instruments and point out the balance of the positive effects of environmental taxes in the analyzed countries. In the paper we will give an answer to the question of whether the growth of ecological taxes affects the environmental protection expenditure in the analyzed countries.

2. Review of literature

“Based on the available data, resulting from some scientific research, there is a small concentration of states on "green tax" as an instrument for environmental protection, due to the complexity of this action“ (Cornelia, Lenuţa, 2012, p. 731). Analogically, when it comes to the relationship between environmental taxes and environmental costs, there is not a lot of empirical studies conducted on this subject (Vincent, Dore, Adriana, Rambe, Walton, 2010).

Jaffe и Palmer (1997) have investigated the cost of environmental protection in certain countries. The results of his research have shown that the omission of environmental issues causes costs that have a significant negative effect on research and development costs.

Kumbaroglu (2003) has investigated the economic effects of environmental taxation using a compatible equilibrium model that the author has applied to Turkey's economy. The results of the research indicate the possibilities for ecologically and economically sustainable development of the country.

Sterner, Köhlin (2004) have explored the importance of environmental taxes by providing a retrospective analysis of the allocation for ecological taxes of the countries of the European Union. The authors emphasized the importance of environmental taxation as one of the instruments of environmental policy. The authors answered the question, why there are variations in the levels of taxation, when it comes to the countries of the European Union.

Ecological taxes, in contrast to other forms of taxation, in modern conditions, get alongside the

fiscal function and the function of environmental protection.

Stojanović & Đorđević (2016), emphasized the importance of ecological taxes for reducing ecological problemsin Serbia.

The authors analyzed environmental taxes and expenditures of the government for environmental protection in Serbia, in the period 2006-2013.

The authors paid special attention in their research to excises, as a form of environmental taxes. They concluded that the main reason for the limited role of excise on petroleum products in Serbia, the poor differentiation of tax rates, according to environmental criteria.

Ecological taxes represent payments for specific services such as waste collection, treatment of sewage water and collective facilities for water purification (Barde, 2004, p. 2).

However, this deffinition, does not precise this fenmenon. The ecological census is a collection of populations whose tendency is to protect and improve the environment.

Cornelia and Lenuța (2012) have explored the methods of development and efficiency of ecological taxes. Their research includes environmental taxation in the European Union in the period from 2001 to 2010. The authors used a specific method, budget criteria in the aspect of satisfactory stability conditions. In their work, the authors emphasized the importance of eco taxes as instruments for obtaining the exact price on the spot. In their second survey (2012), the authors pointed to the difficulty of introducing ecological taxes in EU countries.

Đurović Todorović, Đorđević & Stojanović (2017) have explored the link between revenues from environmental taxes and government spending on environmental protection.

The authors conducted a panel analysis that included 8 countries of the European Union: Germany, Denmark, the Netherlands, Sweden, Finland, Slovenia, Estonia, Norway, in the period 2001-2013. The results of the study indicated a strong relationship. The 1% increase in revenue from environmental taxes has contributed to an increase in government spending on the environment by 0.99% point.

3. Ecological taxes as an instrument of environmental policy

In the literature we can not find a definition that involves all possible instruments of ecological policy. The main reason for this is the diverse set of policies of the state that use a whole range of instruments.

The reason for interventions, in the field of environmental protection, is found in ensuring the optimal level of pollution. Analogously, countries pretend to find an optimal tax rate. In addition to that, there is no definition of economic instruments, there is no universally accepted taxonomy of environmental policy.

There are many theoretical researchabout selection of instrument of the ecological policy (Baumol, Oates, 1988; Tietenberg, 1990; Xepapadeas, 1997; Dijkstra, 1999; Bohm, Russell, 1997; Stavins, 2002). Undoubtedly, countries, in addition to taxes and legal regulations, can incorporate in their environmental policy a whole range of instruments that will be effective in implementing environmental policy. In most countries, there is a variety of instruments, but it cannot be said that developing countries can go "side by side" with developed countries, due to the impossibility of implementing all instruments.

Namely, developing countries don't have sophisticated tools to reduce environmental protection problems.

The most commonly developed instrument in the developing countries of the EU is ecological tax. However, even this ecological instrument has not been equally developed in all countries.

The tax should be high to the level that would create an incentive for polluters to stop polluting the environment. In addition, the environmental tax should not be above the cross-border level. The population of one state is more inclined to avoid pollution than paying taxes.

The high-level rates, explicitly, will not generate sufficient tax revenue, since "polluters" will avoid paying taxes. So, in order for an ecological policy to be effectively managed, it is necessary that the rate of ecological taxes be at an appropriate level.

Table 1. Overview of Environmental Policy Instruments

Environmental Policy Instruments			
Information about pollution	**Giving the right to pollution**	**Regulation**	**Price-based instruments**
Public information	Assignment of property rights	Standard permits	Subvention
Transparent information	Licences trading	Prohibitions, zoning	Environmental fees/taxes
Voluntary agreements	Quota trading	Public goods	User charges
Tracking scheme	Systems of neutralization	Responsibility	Deposit refund systems

Source: Authors, based on: Sterner, T., Köhlin, G., Environmental Taxes in Europe, Public Finance and Management, 2003, p. 4

Conducting an environmental policy should be based on efficient instruments that, together with tax policy, will represent a good portfolio of a country. A number of instruments have crystallized, however, their application varies depending on the country.

The possibility of applying individual instrumates in economically underdeveloped countries is not possible.

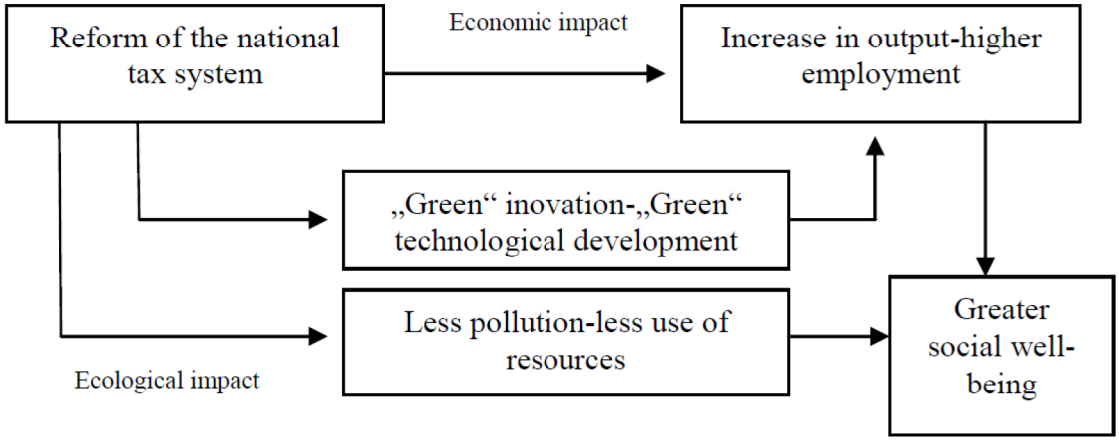
Accordingly, developing countries should rely heavily on those instruments whose application is possible and yields positive results. In addition to taxation of the environment, the cleaning of public areas is almost an instrument in all countries, since most of the country provides cleaning of public areas as a "public good".

Transparent information is also a very important part of politics. Mainly provided information has positive reflections on all citizens and can raise awareness of environmental protection, especially in developing countries.

Ecological taxes are one of the instruments that, in addition to the positive environmental impact, can provide additional tax revenues, which are necessary for all countries.

Also, ecological taxes contribute to human health.

Figure 1. Reform of the national tax system for the purpose of greater social well-being



Извор: Ekins, P., Speck, S. Enviromental Tax Reform, 2011, стр. 99.

Decentralization and transparency in the conduct of environmental policy are needed.

Figure 1 points to the necessary reforms in developing countries, but also on the benefits that developing countries can derive from environmental taxes.

The reform proposal in developing countries automatically leads to an increase in employment and stimulates "green" innovations. "This economic impact explicitly increases social well-being" (Ekins, Speck, 2011, p. 15).

3. Data Analysis and Methods of Research

„Historically, the EU's environmental policy largely had the declared goal of integrating environmental policy with other sectoral policies "(Cornelia, Lenuţa, 2012, p. 719). However, developing countries, according to their economic development, could not propulsively react on the field of environmental taxes.

Graph 1. Movement of revenues from environmental taxes in EU developing countries, 2001-2016.



***Source*:**Eurostat

Graph1 shows the tendency of ecological taxes in EU countries in the period from 2001 to 2016. An increase in environmental taxes can first be observed in Croatia, Estonia, Greece, Latvia, Lithuania and Poland.

A slight discontinuity is observed in Bulgaria, the Czech Republic, Romania and Slovakia. The largest cyclical trends are noticeable in Greece, which, after the global economic crisis, is beginning to raise a higher level of revenue on the ground of all forms of taxation. Analogously, in Hungary and Poland, there is also a sharp decline in revenues from environmental taxes, which is in line with the decline in GDP in these countries. The largest revenues from ecological taxes are realized in Slovenia, and the smallest incomes in Romania. "Romania must ensure compatibility with the European Union" (Cornelia, Lenuţa, 2012, p. 721).

In the following section, we will analyze the reflections that environmental taxes have on state expenditure on environmental protection. The basis for the creation of a database on selected variables consists of data collected from the relevant Eurostat database.

Table 2. Descriptive statistics on revenues from ecological taxes (% of GDP) of selected countries, in millions of euros.

Country					
Bulgaria	Environmental tax revenues	2.30	3.28	2.8237	.24303
Croatia	Environmental tax revenues	.00	3.58	2.9444	.84715
Czech Republic	Environmental tax revenues	2.07	2.47	2.2740	.11939
Estonia	Environmental tax revenues	1.89	3.06	2.4663	.37548
Greece	Environmental tax revenues	2.03	3.83	2.6845	.72309
Hungary	Environmental tax revenues	.27	2.81	2.5268	.60624
Latvia	Environmental tax revenues	2.05	3.66	2.7323	.59707
Lithuania	Environmental tax revenues	1.63	2.81	2.0421	.43172
Poland	Environmental tax revenues	.27	2.74	2.4333	.59418
Romania	Environmental tax revenues	1.70	2.43	2.1011	.21989
Slovakia	Environmental tax revenues	1.72	2.45	1.9927	.24889
Slovenia	Environmental tax revenues	2.95	3.94	3.4269	.36684

Source: Authors by using SPSS

The data of descriptive statistics, measured through standard deviation, show a difference in revenues from ecological taxes among the analyzed countries.

The highest amount of ecological tax revenues at the annual level was 3.94% of GDP, while the lowest amount was 0.00% of GDP. "The level of tax is determined by the revenues needed to implement ecological measures and procedures" (Määttä, 2006, p. 93).

„Data variability, measured through standard deviation, indicates the distance of data from the mean value, indicating that some countries are collecting significantly higher revenues on the basis of environmental taxes, that is, allocating considerably more funds for environmental protection in relation to the determined average" (Đurović Todorović, Đorđević, Stojanović, 2017, p. 203).

Table 3 shows the results of the regression analysis. The multiple regression model examines the impact of revenue from environmental taxes, which are independent in the model, on state expenditure on environmental protection, dependent variable.

Table 3. Estimated regression coefficients*

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	54.813	30.231		1.813	.071
	Environmental tax revenues (ETR)	.271	.009	.908	29.644	.000

*Dependent variable: state expenditure on environmental protection

Source: Authors calculation

Estimated values of regression coefficients, shown in Table 3, can expressed in the following equation:

$$State\ expenditure\ on\ environmental\ protection = 54.813 + 0.271 \cdot ETR \quad (1)$$

Based on the estimated regression model, we can notice that there are a positive effect of revenues from environmental taxes on state expenditurein the developing countries, members of the EU. Table 3 shows the estimated value of the slope coefficient (B) and it is 0.271. This value can be

interpreted as follows: the increase in environmental tax revenues by EUR 1 million causes an average increase of government expenditure for environmental protection in the amount of 271.000 euros ($p < 0.001$). This model explains 82% of the total government expenditure on environmental protection variance, and the model as a whole has a statistically significant prediction potential (Sig. 0,000).

CONCLUSION

Trends on the market show that countries do not attach importance to environmental taxes. Also, based on the analysis, we conclude that there is a decrease in these tax revenues in some countries. Apodictically, there is a great need for more research in the field of environmental taxes, on the basis of which the environmental impact assessment would be assessed.

Ecological taxes are intended to bring money to the EU budget. "Ecological taxes are taxes that have the primary goal of generating revenues, but which can have a significant positive effect on the environment" (Määttä, 2006, p. 93). Analogously, ecological taxes are one of the instruments of environmental policy. Ecological regulation can have positive effects on the performance of domestic firms in relation to their foreign competitors (Porter, 1991). The growth of environmental taxes in tax systems of analyzed developing countries provides a balance of positive effects.

Ecological taxes also allow other taxes to be diminished, while increasing benefits for human society. The aim of the paper is to point out the tendency of the movement of revenues from environmental taxes, conducting a comparative analysis of the 12 developing countries of the EU, in the temporal range from 2001-2016. In spite of the poor database, regression analysis was conducted.

The results of the regression analysis pointed the great importance of environmental revenues for increasing government expenditure in this field. The obtained results point to the necessity of increasing revenues from ecological taxes.

With an increase in environmental revenues in the amount of millions of euros, there is an increase in environmental protection spending of an average of 277000 euros in analyzed developing countries. Thus, with the growth of resources, implicitly, there will be an increase in government expenditures for environmental protection.

LITERATURE

[1] Baumol, William. J. and Wallace E. Oates. (1988). The Theory of Environmental Policy. Cambridge: Cambridge University Press.

[2] Bohm, Peter and C.S. Russell. (1997). "Comparative Analysis of Alternative Policy Instruments." In The Economics of Environmental Protection: Theory and Demand Revelation. Ed. Peter Bohm. Cheltenham: Edward Elgar, pp. 48-113.

[3] Cornelia, P.G. Lenuţa, T.C (2012). Assessing the Impact and Effectiveness of Environmental Taxes, Procedia Economics and Finance-Emerging Markets Queries in Finance and Business, 3 (2012), pp. 728-733.

[4] Cornelia, P.G. Lenuţa, T.C. (2012) Trends in the Evolution of Environmental Taxes, Procedia Economics and Finance- Emerging Markets Queries in Finance and Business, 3 (2012), pp. 716-721.

[5] Dijkstra, B.R. (1999). The Political Economy of Environmental Policy. A Public Choice Approach to Market Instruments. Cheltenham: Edward Elgar.

[6] Drenovak Ivanovic, M. (2015), The development of the right to public participation in environmental matters as a new concept of administrative decision making in Serbia, Transylvanian Review of Administrative Sciences, No. 44 E/2015, pp. 74-90.

[7] Đurović Todorović, J., Đorđević, M., Stojanović, M. (2017). Environmental taxes and expenditures in selected countries: Panel data analysis. International Scientific Conference: Contemporary Approaches in the Analysis of Economic Performances. Thematic Collection, Faculty of Economics Niš, October, pp.197-207.

[8] Ekins, P., Speck, S., (2011). Environmental Tax Reform: A Policy for Green Growth, New York: Oxford- University press.

[9] Goulder, L.H. (1994). Environmental Taxation and the "Double Dividend": a Readers Guide,NBER Working Paper National Bureau of Economic Research, Cambridgc.

[10] Ilić Popov, G. (2000). Ekološki porezi, Beograd: Pravni fakultet.

[11] Jaffe, A., Palmer, K.(1997). Environmental Regulation and Innovation: A Panel Data Study,The Review of Economics and Statistics, Vol. 79, No. 4, pp. 610-619.

[12] Kumbaroglu, S. G. (2003). Environmental taxation and economic effects: a computable general equilibrium analysis for Turkey, Journal of Policy Modeling, vol. 25, no. 8, pp. 795-810.

[13] Määttä, K. (2006). Environmental Taxes:An Introductory Analysis,Cheltenham, UK: Edward Elgar Publishing Ltd.
[14] Martin Jänicke, (2005). Trend setters in environmental policy: the character and role of pioneer countries, Environmental Policy and Governance, vol. 15, no. 2, pp. 129-142.
[15] Russell, C.S. and P.T. Powell. (1996). Choosing Environmental Policy Tools:Theoretical Cautions and Practical Considerations. Inter-American Development Bank.
[16] Schlegelmilch, Kai. (1998). Energy Taxation in the EU and some member States: Looking for Opportunities Ahead,Wuppertal Institute for Climate,Environment and Energy.
[17] Speck, S., Jilkova, J.(2012). Design of environmental Tax Reforms in Europe, LN: Carbon Energy Taxaton: Lessons from Europe, Edited by: Andersen, M.S., Ekins, P., New York: Oxford University Press.
[18] Stavins, Robert N. (2002). "Experience with Market-Based Environmental Policy Instruments." Handbook of Environmental Economics. Eds. KarlGöran Mäler and Jeffrey Vincent. Amsterdam: Elsevier Science.
[19] Sterner, T., Köhlin, G., Environmental Taxes in Europe, Public Finance and Management, 2003, Vol. 1, pp. 1-26.
[20] Stojanović, M., Đorđević, M. (2017). The role of environmental taxes in Serbian tax system, Ekonomika, vol. 62, no. 4, pp. 75-84
[21] Tietenberg, Thomas H. (1990). "Economic Instruments for Environmental Regulation." Oxford Review of Economic Policy. 6(1): pp. 17-33.
[22] Vincent, J. et al. (2002). Public environmental expenditures In Indonesia, Bulletin of Indonesioan Economic Studies, 38(1), pp. 61-74.
[23] Xepapadeas, Anastasios. (1997). Advanced Principles in Environmental Policy. Edward Elgar.
[24] Јовичић, М., и Ставрић, Б. (2011). *Основи менаџмента*. Бијељина: Факултет пословне економије Бијељина.

SUMMARY

In recent years, an increasing number of countries in the world have been devoting special attention to the protection of the environment. Improving environmental protection is particularly important for developing countries, due to the inability to apply protection instruments that are implemented in developed countries. A number of instruments have crystallized, but their application varies depending on the country. The application of some instrumates in developing countries is not possible. Accordingly, developing countries should rely heavily on instruments which are effective and yields positive results. Research shows that many instruments can have positive environmental reflections. Most economists emphasize the importance of environmental taxes in developing countries.

The paper provides an overview of instruments that have been applied in developed countries and which may be potentially applicable in the environmental policies of developing countries. Ecological taxes, as an environmental policy instrument, are the subject of our research. Ecological taxes are one of the instruments that, in addition to the positive environmental impact, can provide additional tax revenues which are necessary for all countries.

The goal of our research is to point out the importance of environmental taxes in developing countries. In this paper we have pointed out the effects which ecological taxation can have on environmental protection.Ecological taxes contribute to human health, and the reform of the tax policy in developing countries is necessary. The reform proposal in developing countries automatically leads to an increase in employment and stimulates "green" innovations. Based on statistical data, from transparent bases, we analyzed the movement of revenues from environmental taxes.

We analyzed the movement of revenues from environmental taxes in the following countries: Bulgaria, the Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Romania, Slovakia and Slovenia. The largest cyclical trends are noticeable in Greece, while the highest revenues from environmental taxes are recorded in Slovenia, and the lowest in Romania.

The highest amount of ecological tax revenues at the annual level was 3.94% of GDP, while the lowest amount was 0.00% of GDP.

The results of the estimated regression model indicate that the increase in environmental tax revenues by 1 million of euros causes an average increase of government expenditure for environmental protection in the amount of 271000 euros ($p < 0.001$). The results of the obtained model points to the necessity of turnaround in the macroeconomic policy of developing countries. Analogously, the model obtained is the basis for research in all the countries that conduct an environmental policy to increase environmental taxes.