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IMPLEMENTATION OF STATE ENVIRONMENTAL POLICY: FOREIGN EXPERIENCE FOR UKRAINE

Abstract. The academic paper has analysed the environmental policy stringency index in various countries and the dynamics of tax revenues in the field of ecology for 1990 – 2019. The features of the environmental policy of Germany, Poland and Lithuania have been investigated, which have different social-economic indicators of the development and growth of green business, economic opportunities and approaches to overcoming environmental problems. It has been established that the government of Lithuania is pursuing a policy aimed at stimulating the introduction of eco-technologies in the field of renewable energy. Germany provides a higher level of financing compared to Lithuania and Poland, the lowest level of tax revenue related to the environment, however, a higher level of tax revenue related to road transportation. It has been determined that Poland's environmental policy is connected with a high level of environmental taxes, the highest prices for gasoline, diesel fuel, the lack of a green tariff as an incentive for the development of renewable energy sources. Based on the analysis conducted, the author of the academic paper has identified the successful practical cases for Ukraine as follows: the introduction of a green tariff; strategic environmental assessment and monitoring of environmental risks as effective tools that have proven their effectiveness in practice; management of environmental consequences and, on the basis outlined, more stringent requirements and sanctions for ecologically unsafe enterprises operating in the country; development of renewable energy sources and eco-technologies; financing of investigations and developments in the sphere of ecology from the state and local budgets; a systematic approach to solving environmental problems with the involvement of key stakeholders; responsibility of authorities working in the sphere of ecology.

Keywords: environmental policy, sustainable development, environmental policy instruments, environmental taxes, environmental protection.

Problem Statement. Environmental issues actualize the necessity to implement the state policy of environmental protection, determine the emergence of the concepts of socially responsible business, sustainable development, green business, which have

been discussed in the scientific literature since the late 1980s [11]. Modern business corporations are increasing investments in progressive and goal-oriented sustainable activities taking into account the interests of all stakeholders while gaining competitive advantages from the introduction of energy efficient production technologies [10].

The concept of sustainable development has been evolving and environmental policy has been expanding due to the emergence of new tools and methods of environmental protection. Government regulations and legislation, especially in advanced countries, point out that companies are obliged to make the most of environmentally friendly technologies in production. The company's "green" strategy is a way to prevent pressure from the environmental community, local and international organizations [8; 15; 9]. Along with this, in the face of environmental degradation, the government demands from business to change traditional approaches in favour of environmentally responsible production, the introduction of environmental technologies, environmental management and marketing systems, environmental auditing, and a focus on eco-products.

Analysis of Recent Studies and Publications. In the scientific literature, the issue of environmental policy is studied in the works of Bobrovska N. [1], Zharova L. [2], Nikitishyn A. [3], Perga T. [4], Trush O., Andriienko M., Lomovskykh H. [5], Khlobystova Ye., Ilina M. [6], Yakusheva D. [7]. The authors of the publications consider approaches to the environmental policy formation, as well as tools, including taxation, and methods of environmental protection.

At the same time, foreign experience in implementing environmental policy, in particular, modern methods and tools for stimulating the introduction of environmentally friendly technologies in production that can be applied in Ukraine are little covered in scientific publications. All the issues outlined above actualize the study of foreign experience in the implementation of state environmental policy for Ukraine.

The purpose of the academic paper lies in studying the features of foreign experience in the state environmental policy implementation in order to identify modern practices that can be introduced in Ukraine. In order achieve the purpose outlined the following tasks have been set, namely:

1. To conduct an analysis of the environmental policy stringency index in various countries for 1990 - 2019 and an analysis of the dynamics of tax revenues in the sphere of ecology for 1994 - 2019.
2. To reveal the features of environmental policy on the example of Germany, Poland and Lithuania and highlight the positive developments for Ukraine.

Presentation of the Basic Material. In recent years, environmental policy has become increasingly stringent; one can trace the convergence at the level of stringency of environmental protection policy (Figure 1). In the EU, the environmental policy stringency index increased significantly in 2005-2015 (from 2,37 to 2,85). On a world-wide scale, policy tightening has been increasing since the early 2000s.

The OECD environmental policy stringency index is a country-specific indicator of environmental policy rigidity. Strictness is defined as the degree to which environmental policy sets an explicit or implicit price for polluting or environmentally harmful behavior.

The index ranges from 0 (not stringent) to 6 (the highest degree of rigidity). The index covers 28 OECD countries and 6 BRIICS countries for the period 1990-2015. The index is calculated on the basis of the rigidity of 14 environmental policy instruments, primarily related to climate and air pollution.

Figure 1. Dynamics of the environmental policy stringency index in different countries in 1990-2015

Source: it has been compiled based on the information provided in [12].

Environmental taxes are one of the priority instruments of environmental policy, which differ significantly in various countries (Figure 2). Estonia, the Netherlands, Slovenia, Denmark, Latvia and Italy have the highest levels of environmental taxes of GDP (more than 3%, in particular within 3,27 – 3,69%). In Finland, Portugal, the

Czech Republic, Poland, Austria, France, Hungary, Great Britain, Turkey, Belgium, Slovakia and Sweden, the level of taxation is within 1-2%. In other countries, the level of environmental taxes is below 1% of GDP.

Let us analyse the features of environmental policy using the example of Germany, Poland and Lithuania, which have different social-economic indicators of the development and growth of green business, approaches to overcoming environmental problems. For instance, in Lithuania and Poland, the GDP index significantly exceeds the German GDP index, which means that economic growth has a negative impact on the environment in Lithuania and Poland due to the growth of industrial production. In all countries, the value added of industry on average in 2010 - 2019 was approximately at the same level: in Germany – 30,15%, in Lithuania – 29,58%, in Poland – 32,88%. In Germany, the value added of the agricultural sector is much lower than in Lithuania and Poland: over ten years, the average value was 0,89% compared to Lithuania (3,73%) and Poland (3,09%). The value added of services is also approximately the same in all countries (Germany - 69%, Lithuania - 67% and Poland - 64%).

Figure 2. Dynamics of tax revenues (environmental taxes) in 1994 - 2019,% of GDP
Source: it has been compiled based on the information provided in [13].

It should be noted that GDP per capita in Germany is 47 439 US dollars per capita; in Lithuania – 28 355 US dollars per capita; in Poland – 26 856 US dollars per capita. Herewith, the structure of the country's economy and the impact on the

environmental policy of states regarding the promotion of green technologies, innovations and green business do not differ significantly.

Figure 3. Production capacity of CO₂, GDP per unit of CO₂ energy emissions of Germany, Lithuania and Poland in 2010 - 2019, US dollars per kilogram according to prices as of 2015

Source: it has been compiled based on the information provided in [14].

It can be assumed that in Lithuania, in comparison with Poland and Germany, there is less harm from production and a lower level of environmental impact, which may indicate a more environmentally friendly business or higher GDP growth, leading to an increase in CO₂ production productivity. For instance, in Poland, with a higher GDP growth rate than in Germany, the value of CO₂ production productivity is lower (Figure 3).

Energy productivity shows the level of energy efficiency in the countries, namely: the higher the indicator is, the higher the efficiency is revealed; it is possible to increase GDP in monetary terms for 1 unit of primary energy. Consequently, in Germany, it is possible to provide 13 812 US dollars of production in monetary terms with the help of single facilities of the total volume of primary energy, in Poland - 11 734 US dollars, in Lithuania - 12 671,39 US dollars, respectively. This means that in Germany the level of energy efficiency is much higher (Figure 4).

Figure 4. Energy productivity, GDP per unit of TPES (total primary energy supply), US dollars according to prices as of 2015

Source: it has been compiled based on the information provided in [14].

Higher level of energy productivity in Germany and higher level of CO₂ production productivity of Lithuania and Poland may be related to the level of renewable energy supply [14]. In the period 2010 - 2019, the share of deliveries increased significantly in all countries; the largest was observed in Germany – 20,51. That is, the figure has doubled in terms of green business development and the introduction of new technologies for production.

The share of renewable electricity in 2010 in Germany was 20,43% of total electricity production, in 2019 – 39,9%, in Poland – 8,05% and 15,27%, respectively, and in Lithuania – 26,19% and 73, 29% (Figure 5).

Figure 5. Renewable electricity in Germany, Lithuania and Poland
in 1990 - 2019,% of total electricity production

Source: it has been compiled based on the information provided in [14].

Although Lithuania's share of renewable energy supplies and the share of renewable electricity in total electricity production significantly exceed these indicators in Germany and Poland, in Germany, on the other hand, the level of CO₂ production is higher. Poland has the lowest level of all indicators of green business development, including CO₂ production productivity, energy productivity, and renewable energy supply.

In Germany, the structure of energy consumption differs from the structure of Poland and Lithuania. In Germany, less energy is consumed by the transport sector (which also includes goods logistics); more energy is consumed by industry (26%) and the service sector (13%). In Lithuania, most of the energy is consumed by the transport sector (31,7%); industry uses 16,9%, services – 9,94%.. In Poland, the transport sector consumes 29,49% of energy, industry – 21,52%, services – 10,54%, respectively. A large share of energy consumption by industry and transport may lead to a greater necessity for the introduction of environmentally friendly production technologies, forasmuch as the burden on the environment is higher, for instance, in Germany.

The green business development in the countries can be assessed based on the

indicators of technology and innovation (patents, research and development), the level of international assistance for the development of technologies, innovations, developments in the green business direction. In general, these indicators provide an understanding of the economic opportunities of business in this area and government policies towards stimulating green business.

In Poland, the development of environmentally related technologies accounted for 9% of all technologies implemented in 2005. During the period 2010 - 2019, the average share of eco-technologies was 12,4% with a decrease by 1,9% from 2010 to 2019. For comparison, the share of eco-technologies in Lithuania in 2005 was 15,4%. For the period 2010 - 2019, the average value of the share of eco-technologies was 15,1% with a decrease by 18,8% from 2010 to 2019.

In Germany, the share of eco-technologies in 2005 was 9,4%. During the period 2010 - 2019, the average share of eco-technologies was 12,5% with a decrease of 3,6% from 2010 to 2019.

Lithuania has the highest level of implementation of eco-technologies – 15,1%, followed by Germany with 12,5% and Poland with 12,4%, respectively. The relative advantage of technologies, environmental innovations related to the environment has different dynamics. Compared to other countries, Lithuania has a relative technological advantage (RTA) or specialization in environmental technologies. The average value of the index for 2010 - 2019 period was 1,5 in Lithuania, 1,2 - in Poland, and 1,2 - in Germany.

For the period of 2010 – 2019, the share of environmental technologies of Lithuania in the eco-technologies of the world averaged 0,02%, in Germany – 11,3%, in Poland – 0,3%. This indicator means that more expensive eco-technologies are produced in Germany than in Lithuania and Poland. In Lithuania, the indicator of the development of environmental technologies averaged 2 units per capita, in Poland – 2,3, and in Germany – 48,1.

The development of green business to a great extent depends on the government's response to environmental problems and the impact of business on the environment. Therefore, it is advisable to conduct a factor analysis of the development of indicators characterizing the environmental policy of states to stimulate business and the introduction of eco-technologies. Despite the development indicators of eco-technologies, which are the lowest in Poland, this country has the highest share of the government's environmental budget for R&D – 6,9% for 2010-2019, while in Lithuania – 0,6% and in Germany – 2,8%, respectively (Figure 6).

Figure 6. The environmental budget of the government for research and development, % of the total volume of state R&D, the average indicator for 2010 - 2019

Source: it has been compiled based on the information provided in [14].

In 2010 – 2019, national expenditures on environmental protection issues averaged 1,9% of GDP in Poland, 1,7% of GDP in Lithuania and 2,1% in Germany. In 2010 – 2019, net official assistance for the development of eco-technologies averaged 0,1% of GDP in Poland, 0,1% of GDP in Lithuania and 0,5% in Germany. While the development of green business and eco-technologies of Lithuania depends more on the amount of technology implementation and a high share of renewable electricity supplies, than the development of green business of Germany depends more on public funding for research and development in the direction of ecology.

In Poland, the level of environmental taxes amounted to 2,4% of GDP on average for 2010 - 2019, while in Lithuania – 1,9%, and in Germany – 1,9%. Environmental taxes as a share in total tax revenues accounted for 7,4% of total taxes in Poland, 6,7% - in Lithuania, and 5,2% - in Germany.

Taxes related to energy consumption accounted for 88,9% of the total amount of environmental taxes in Poland, 87,7% of the total amount of environmental taxes in Lithuania, and 83,2% of the total amount of environmental taxes in Germany. Tax revenues related to road transportation accounted for 6,7% of the total amount of environmental taxes in Poland, 3,9% of the total amount of environmental taxes in Lithuania, and 16,8% of the total amount of environmental taxes in Germany.

The green economy development also depends on taxes and prices for gasoline, diesel fuel, and electricity for various economic entities. For instance, Germany has the lowest taxes on 1 liter of gasoline and diesel for 2010 - 2019 (0,85 and 0,61 US dollars per 1 liter), and the lowest prices for gasoline and diesel for the consumer (1,94 and

1,69 US dollars per 1 liter). This means that economic entities have more opportunities to use these types of resources and pollute the environment.

In Lithuania and Poland, these figures are much higher; they are at about the same level. The electricity price in Germany was 0,37 US dollars per kWh in 2010 - 2019, while in Lithuania – 0,30 US dollars per kWh, in Poland – 0,24 US dollars per kWh.

This could have influenced the development of renewable energy sources in Lithuania, where the highest share of renewable energy from total energy supply and renewable electricity from total electricity production is observed.

The development of renewable energy sources in Lithuania and Germany (compared to Poland) is stimulated by the introduction of green tariffs by states (a special tariff, according to which the state, represented by a state-owned enterprise, buys from enterprises and individuals electricity produced using renewable energy sources - solar, wind, biomass, as well as water, small hydropower plants). The lowest average tariff for the production of solar photovoltaic electricity is observed in Lithuania – 0,06 US dollars and 0,03 US dollars - for the production of wind power. In Germany, prices were 0,17 and 0,11 US dollars, respectively; and in Poland, the state does not provide a green tariff [14].

Support for producers in providing general services in the field of fossil fuel extraction was about 30% in Poland (the highest indicator), support for oil consumers was 66,36% in Lithuania (the highest indicator) [14]. It is evident that fossil fuel subsidies are harmful to the environment and undercut efforts towards combating climate change. Thus, support in the form of consumers' subsidies has a negative impact on the climate and green business, reducing the level of its development in the case of a high level of support.

Conclusions. In general, the analysis of the features of the environmental policy development in foreign countries is a reflection of the fact that the environmental policies of Lithuania, Poland and Germany are conceptually similar. At the same time, Germany has the lowest level of environmental tax revenues, a higher level of tax revenue related to road transportation and significant financing of green development course, compared to Lithuania and Poland. The lowest taxes per liter of gasoline and diesel for 2010 – 2019 are also observed in Germany. In Lithuania and Poland, these figures are much higher; they are at about the same level.

In Lithuania and Germany, the market of renewable energy sources and eco-technologies is stimulated by the introduction of a green tariff by states. Poland pursues the most aggressive policy of environmental protection, which is connected with a high

level of environmental taxes (2,4% of GDP on average in 2010 - 2019), the highest prices for gasoline, diesel fuel, electricity for various economic entities, the lack of green tariff as a stimulus for the development of renewable energy sources. Herewith, the highest share of the government's environmental budget for R&D – 6,9% is observed in Poland for the period of 2010 - 2019.

In the context outlined, there are several positive aspects for Ukraine that can be considered as successful practical cases, namely: the introduction of a green tariff; strategic environmental assessment and monitoring of environmental risks as effective tools that have proven their effectiveness in practice; management of environmental consequences and, on this basis, more stringent requirements and sanctions for ecologically unsafe enterprises operating in the country; creation of favorable conditions for the development of renewable energy sources and eco-technologies at the national level; financing of scientific investigations and developments in the direction of ecology by the state and from local budgets; a systematic approach to solving environmental problems with the involvement of key stakeholders; responsibility of authorities working in the field of ecology.

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