

Countries ecology and transport infrastructure sustainable development based on partnership between the state and business

Oksana Pirogova^{1*}, *Irina Androsova*², and *Alexander Anisimov*³

¹ Peter the Great St. Petersburg Polytechnic University, 29 Polytechnicheskaya str., St. Petersburg, Russia, 195251

² Southwest State University, 50th anniversary of October street, 94, Kursk, Russia

³ The Synergy University, Meshchanskaya str., 9/14 p. 1, Moscow, Russia

Abstract. Recently, companies operating in the global space have been applying the ESG principles in their practice, which are the basis for the sustainable development of the country. The purpose of this article is to develop recommendations on the use in domestic practice of various tools for the development of ecology and transport infrastructure on the basis of partnership between the state and business. The development of these recommendations is based on the results of studying the ESG concept and the specifics of public-business partnership in domestic and foreign practice. The objectives of the study are: to study the stages of development of the ESG concept in the global space; to conduct a comparative analysis of the development of public-business partnerships in the world and in Russia; to assess the current state of the European public-business partnership market for the implementation of projects in the field of transport and ecology; to analyze the ranking of countries according to the ESG index. The article examines the historical stages of the development of the ESG concept at the global level; presents digital data characterizing the state of the European market for the implementation of projects based on the principles of ESG; The ranking of countries according to the ESG index for 2022-2023 is analyzed. Recommendations for the sustainable development of transport infrastructure with minimal negative impact on the environment, based on methods and practices used in foreign countries, are presented.

1 Introduction

In modern conditions, considerable attention in all countries is paid to the ecological problems of society, consisting of environmental pollution, waste processing and disposal, the greenhouse effect, and the destruction of the ozone layer. The country's transport infrastructure, which includes the construction and operation of highways, railways, urban transport, and the maintenance of traffic monitoring and control systems, has a significant impact on the environment. The negative impact of transport infrastructure on the

* Corresponding author: kafedra17@rambler.ru

environment occurs due to the significant consumption of energy and a significant portion of the world's oil reserves by transport, which leads to the depletion of the ozone layer, air pollution and, as a consequence, to global warming. According to the Inland Transport Committee of the Economic Commission for Europe [1]: in 2022, global CO₂ emissions from transport reached 7.9 gigatonnes, which is 5% higher than in 2021. If we consider the problem in a regional context, Asia has the highest level (>30%) of transport-related CO₂ emissions by the end of 2022; North American countries account for 28% of CO₂ emissions, and the share of European CO₂ emissions from the transport sector was 22% of the economy, which corresponds to the third value of the indicator after Asia and North America. The remaining share (<20%) of CO₂ emissions is distributed among the countries of Africa, Latin America and the Caribbean, and Oceania. It has been established that the problem of the negative impact of transport is present to one degree or another in all regions of the world. However, in addition to the negative impact on the environment, it is also necessary to note the positive effects of the contribution of transport infrastructure to the economic development of any state, which is manifested in such aspects as: foreign economic relations and relationships; defence; servicing various categories of the population; stable functioning of industry, agriculture, trade; development of new economic regions [2].

It should be understood that the renewal of transport infrastructure is a capital-intensive project, so their implementation is carried out mainly with the involvement of public and private investment. According to the authors, in order to implement projects to renew transport infrastructure taking into account the principles of ESG (E-environment, S-social, G-governance), it is necessary to build more effective partnerships between the state and business (in this context, most often used as a public-private partnership (PPP)). In a partnership between the state and business, it is important to simultaneously maintain a balance of interests of the state and business while strengthening control over the expenditure of funds and the fulfillment of contractual obligations [3].

If we consider the mechanism of public-private partnership in the transport and environmental sphere in Russian practice, the following will be the distinctive features: a significant excess of budget financing over private financing due to the high capital intensity of projects; the use of competencies and experience on the part of business; the presence of responsibility on the part of private investors not only for the construction of the facility, but also for its further operation; concession is a priority form of PPP in the implementation of transport and environmental projects. At the same time, it is noted that for the further development of partnership between the state and business in Russian practice it is necessary to take into account foreign experience, which will allow creating the most advanced model of interaction between the state and business in modern conditions.

2 Materials and Methods

When writing the article, the authors used a set of general scientific methods of cognition: historical, statistical, observation, description, analysis and generalization, tabular and graphical methods of data visualization. The historical method was used when considering the features of the development of public-private partnership in Russia and in the world at different stages of time. Using the statistical method of research, quantitative patterns were established in the analyzed data. The use of methodological techniques of observation, description, analysis and generalization allowed the authors to gain a deeper understanding of the subject of the study. Tabular and graphical methods of presenting and visualizing data will allow potential readers to enhance the perception of the information presented.

The information and empirical basis of the study are regulatory documents governing public-private partnership issues; policy documents of government bodies; data from open Internet sources. In the process of writing the article, the authors analyzed the works of the following authors: Fang Guand Chul-soo Kim [4], WeiGuo Ma [5], C. Wang [6], Fokina O. [7], Pirogova, O. [8], Berezin. A. [9] on the subject of assessing the impact of transport infrastructure on the state of the environment of countries. When considering the issues of formation and development of partnership between the state and business, the studies of such authors as: K. Othman [10], C. Cui [11], Vertakova, Yu [12], Podgorny, B. [13] and others were used. The study and consideration of various author positions allowed us to improve the quality of the study

3 Results and Discussion

In many economically developed countries, adherence to ESG principles is acquiring the status of a generally accepted public norm. The understanding that the Earth's resources are limited, while the needs of society and production, on the contrary, are constantly increasing, predetermined the formation and development of ESG - a concept that has gone through a number of stages in its historical retrospective [14]:

- 1970s - the doctrine of economist M. Friedman was formulated, which states that the social responsibility of business is to increase its profits. This doctrine caused a public outcry, as controversial positions arose on the subject of companies should strive not only to maximize profits, but also to take into account the interests of society. This period can be considered the birth of the ESG concept;

- the 1980s were marked by several environmental disasters (such as the major Prudhoe Bay oil spill), which led to the creation in 1989 of the Coalition for Environmentally Responsible Economies (CERES), a non-profit organization promoting ethical and sustainable business practices;

- in 1990, the MSCI KLD 400 Social Index (formerly known as the Domini 400) was introduced to provide information on stocks with positive environmental and social characteristics;

- in 1992 (Rio de Janeiro) the Earth Summit was held, where the Declaration on Environment and Development was adopted and an international environmental agreement was signed between 154 countries;

- in 1997, the international organization Global Reporting Initiative (GRI) was founded, providing advisory support to companies on the use of sustainability reporting rules;

- in 2000, the United Nations Global Compact was launched, aimed at engaging businesses in partnership with government to ensure compliance with the principles of sustainable development;

- 2004: the emergence of the term ESG (Environmental, Social, Governance);

- in 2011, the Sustainability Accounting Standards Board (SASB) was established to standardize the disclosure process on financially significant environmental, social and governance issues;

- 2015 was a significant year for the development of the ESG concept, as 17 sustainable development goals for the period up to 2030 were formulated within the framework of the United Nations Convention. It was noted that the latest sustainable development goal "Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development" is aimed at further stimulating partnerships with the participation of many stakeholders (government, business, scientific community, other stakeholders), exchanging resources and competencies to achieve the set goals;

- 2020-2021: During the COVID-19 pandemic, the implementation of many environmental projects was suspended, as the priority was to combat the consequences of

the virus. Despite these circumstances, it was during this period that the interest of the state and business in the ESG concept increased in the world;

- from 2022 to the present: the changing geopolitical situation has made its own adjustments to international initiatives related to ESG transformations, but at the same time, the trend of strengthening partnerships between business, government, and the scientific community aimed at developing green technologies to combat climate change and environmental destruction continues.

If we consider the origins of the emergence of public-private partnership, it should be noted that it appeared in Great Britain in the early 1990s in the context of the transition to a model of private financial initiative, consisting of the functions transfer for financing state infrastructure facilities to business. In Great Britain of that period, such transport facilities as the Birmingham Northern Ring and the Croydon railway network were built on the principles of PPP. In addition to Great Britain, the leaders in the field of public-private partnership include the United States, France and Germany. In the USA, projects were implemented to build a toll road in San Diego (SR 125 Toll Road) and the Chicago Skyway; in Germany, the reconstruction of the largest airport in Frankfurt am Main; in France, the construction of the Eurotunnel under the English Channel.

The partnership between the state and business is clearly demonstrated by the European PPP market, the current state of which is described by statistical data from the European Investment Bank (EIB). According to the results of 2023, the following is observed:

- an increase in the average transaction size to EUR 367.7 million, which is 67.89% higher than in 2022;
- completed the financial closure of 38 PPP projects (total amount - 13.6 billion euros), which is 17% below the 2022 level (46 projects);
- Germany emerged as the leader in the PPP market;
- more than half (53%) of PPP projects were financed mostly by the state;
- 13 countries closing at least one PPP project, up from 15 in 2022;
- eight major projects were completed (for comparison, in 2022 there were three projects), the total cost of which amounted to 9.33 billion euros (Table 1).

Table 1. The largest PPP projects in European countries closed in 2023.

Country	Project	Cost, € billion
Germany	S-Bahn Munich Public Transport Trains Financing PPP	2.8
France	Grand Est Rolling Stock Fleet Upgrade	1.3
United Kingdom	Bristol City Leap Energy Partnership	1.1
Israel	Tel Aviv Light Rail Green Line PPP	0.98
Israel	Tel Aviv Light Rail Purple Line PPP	0.95
Israel	Highway 6 Upgrade and Expansion PPP	0.88
Germany	Buildings for German Federal Office of Criminal Investigation	0.76
Norway	E10 / RV85 Tjeldsund-Langvassbukta Road PPP	0.56
Total		9.33

Source: compiled by the authors on the basis of Market update Review of the European public-private partnership market in 2023 <https://eib.org>

The table data shows that six projects (total value 7.47 billion euros) out of eight presented are implemented in the area of modernization of transport infrastructure. The largest transport project for financing the construction of the Munich high-speed railway was implemented in Germany, costing €2.8 billion. Of the eight projects presented, three (including two urban high-speed railways) were implemented in Israel, with a total cost of

almost 2 billion euros. In Germany, two projects were implemented, with a total cost of over 3 billion euros. It was found that transport projects predominate in this list, both in quantitative (75%) and in value terms (>80%). Thus, a conclusion was made about the leadership of the transport sector in the largest implemented PPP projects, which is once again confirmed by further analytical studies (Fig. 1).

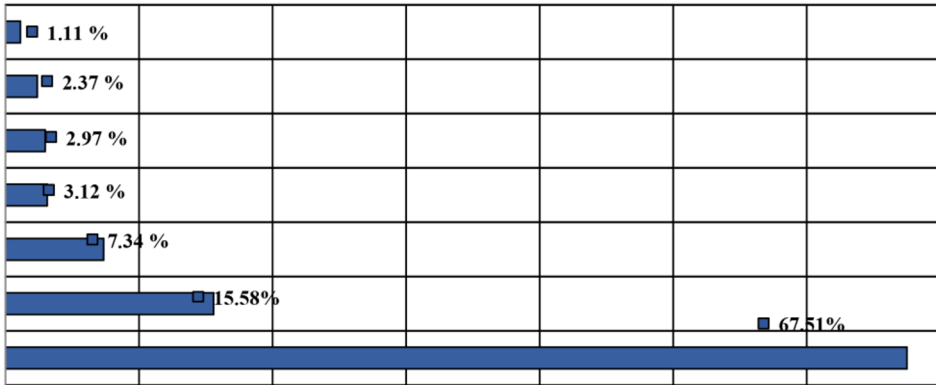


Fig. 1. Sectoral structure of PPP projects in EU countries in 2023 *Source: compiled by the authors on the basis of Market update Review of the European public-private partnership market in 2023 <https://eib.org>*

The data in Figure 1 show that in 2023, 67.51% of all projects (14) are concentrated in the transport sector with a total amount of 9.1 billion euros. In second place are environmental protection projects with a total funding of 2.1 billion euros and a share of - 15.58%. The third position (7.34%) belongs to the public order and security sector, where 6 projects were implemented with a total value of 0.99 billion euros. The remaining four sectors are telecommunications: share - 3.12%, value - 0.42 billion euros, number of projects - 2; defense: 2.97%; 0.40 billion euros and 1 project respectively; education: 2.37%, 0.32 billion euros and 7 projects respectively. Projects in the field of culture and recreation occupy the smallest share in the total volume at 1.11%, only 2 projects with a total value of 0.15 billion euros were implemented. Thus, the results of the analytical study showed that it is the transport sector and environmental protection that are the leading sectors for the implementation of infrastructure projects based on the principles of partnership between the state and business in European countries.

When considering the issue of sustainable development of ecology and transport based on partnership between the state and business, the authors of the article proceed from the fact that in Russia public-private partnership began to develop later than in European countries, only in the late 1990s. However, the ideas of public-private partnership were first applied in the 19th century during the construction of one of the sections of the South-Eastern Railway Ryazan - Kozlov. The initiators were the Voronezh and Tambov zemstvos, and financing was provided by private investors [15]. After the collapse of the USSR, public-private partnership gradually gained momentum, a regulatory framework was formed, and the first PPP projects were implemented. For example, the first PPP project in Russia was the construction of the Yuzhnobutovskaya aeration station in 1998, which was related to environmental protection.

When studying the domestic experience of developing the ESG concept, it was noted that Russian companies began to actively implement ESG principles in their activities relatively recently, but at the same time the regulatory framework in the field of sustainable development began to form much earlier (the adoption of the decree "On the state strategy

of the Russian Federation for environmental protection and ensuring sustainable development" (1994); the Labor Code of the RSFSR (1971-2011); the Civil Code of the Russian Federation (1994) and others). In parallel with the formation of market relations in the new Russia, corporate social responsibility of business was also developing, which was manifested in the implementation of environmental and social projects by large companies. In 1999, the Association of Managers was established, which is currently the leading expert platform on issues of sustainable development. Later, the Sustainable Development and ESG Committee was organized on the basis of the Managers Association, which oversees the exchange of best practices in the field of corporate responsibility to society. In 2019, in order to attract investment in sustainable development, a special sector was launched at the initiative of the Moscow Exchange, consisting of three segments - "green" and social bonds, as well as national projects. By now, Russian practice has accumulated extensive experience in implementing environmental projects. In 2023, within the framework of the program "Best ESG Projects of Russia" [16], laureates were determined in various categories:

- inexpensive clean energy. Rational use of natural resources - Baltika Brewing Company LLC (launch of biological local treatment facilities);
- conservation of marine ecosystems - PJSC Gazprom Neft (conservation of biodiversity and reproduction of aquatic biological resources in PJSC Gazprom Neft);
- conservation of terrestrial ecosystems. Conservation of biodiversity - JSC Zarubezhneft - implementation of the Business and Biodiversity initiative within the framework of the federal project "Conservation of biological diversity and development of ecological tourism" of the National Project "Ecology";
- conservation of terrestrial ecosystems. Support for research and educational projects in the field of ecology - PJSC MMC Norilsk Nickel (eco-technology for restoring the bioproductivity of Arctic lakes);
- combating climate change. Low-carbon economy - Polyus Management Company (development of Polyus' climate strategy); Mosinzhproekt JSC (quantification of greenhouse gas emissions and carbon footprint compensation in Mosinzhproekt Group); Ural Plant of Anti-Icing Materials LLC (eco-saving Bionord product line);
- partnership for sustainable development. Strategic partnership of society and business - JSC AB InBev Efes (the lightest glass bottle in Russia).

Despite the events of 2022, Russian business has not lost interest in ESG plans, i.e. the guidelines for sustainable development have been preserved. The ESG agenda remains relevant for all sectors of the Russian economy - from the energy sector and transport to environmental protection.

According to the non-profit organization Global Risk Profile, a rating (TOP-5) of countries was compiled according to the ESG index, which includes three sub-indices: environment; rights and health; safety and measures the degree of risk (very low, low, medium, high and very high). The results are presented in Table 2.

Table 2. TOP-5 countries by ESG index for 2022-2023

2022			2023		
Country	Score	Rank	Country	Score	Rank
Very low risk					
Finland	15.40	1	Iceland	14.61	1
Iceland	17.35	2	Finland	15.21	2
Norway	18.04	3	Sweden	15.74	3
Sweden	18.86	4	Norway	15.96	4
Portugal	21.06	5	Australia	19.5	5
Low risk					
Spain	25.26	19	France	24.88	19

Irish	25.71	20	Czech Republic	25.15	20
Japan	25.94	21	Malta	26.1	20
Greece	26.21	22	Spain	25.21	21
Slovenia	26.80	23	Lithuania	25.31	22
Medium risk					
Bosnia and Herzegovina	39.03	56	Macedonia	37.41	56
Tunisia	39.15	57	Armenia	37.59	57
Montenegro	39.15	58	Guyana	37.74	58
Singapore	39.21	59	Qatar	38.18	60
Samoa	39.42	60	Bosnia and Herzegovina	38.02	61
Russia	43.92	92	Russia	45.63	106
High risk					
Lebanon	50.49	120	Gabon	48.47	120
Nicaragua	50.63	121	Benin	48.76	121
Gabon	50.68	122	Venezuela	48.96	123
Rwanda	50.75	123	Lebanon	49.4	124
Timor	50.89	124	Morocco	49.09	125
Very high risk					
Myanmar	63.77	166	Afghanistan	64.46	174
Burundi	63.99	167	Eritrea	65.36	175
Liberia	64.83	168	North Korea	67.13	176
North Korea	64.88	169	DRC	67.75	177
Ethiopia	64.89	170	Sudan	68.41	178

Source: compiled by the authors on the basis of Risk Indexes and Rating - ESG Index - Global Corruption Index <https://risk-indexes.com>

The data in Table 1 show the TOP-5 countries in each ESG index risk group. In the first group, “very low risk”, European countries are leading in 2022-2023. In 2022, the country with very low ESG risk is Finland, and in 2023 - Iceland. Low-risk countries in 2022 included Spain, Ireland, Japan, Greece and Slovenia, and in 2023 the composition of countries changed: France, Czech Republic, Malta, Spain, Lithuania. In the medium risk rating, Bosnia and Herzegovina leads in 2022, and Macedonia in 2023. Russia was in the medium risk group during 2022-2023, but by the end of 2023, its place in the rating dropped from 92 to 106. By the end of 2022, Lebanon topped the rating in the group of countries with high ESG risk, and in 2023 - Gabon. The riskiest (very high risk) countries in terms of ESG in 2022 were Myanmar, Burundi, and in 2023 - Afghanistan, Eritrea and others. It has been established that the most favorable situation in the ESG area is typical for European countries, and the most risky in Asian and African countries. Russia is in the average risk range, while the positions have changed, but not for the better. Taking into account the ESG index will allow companies to make informed management decisions to build a sustainable development strategy with a focus on the environmental and social conditions of society [17].

Thus, the conducted analysis of domestic and foreign practice of sustainable development of ecology and transport infrastructure based on partnership between the state and business allowed us to conclude that there is a correlation between the sectoral development of the infrastructure of countries and their socio-economic situation. It was established that it is the transport sector in all countries that remains the most resource-intensive, but at the same time, more and more attention from the state and business is paid to compliance with environmental standards and rules.

The generalization of all the results of the study allowed us to conclude that any state, regardless of its level of socio-economic development and position in the global space, needs to implement projects in the field of transport infrastructure, but in compliance with

environmental standards and rules. The desire of each state for sustainable development transforms the world economy taking into account climate change. The high capital intensity of transport infrastructure projects forces the state to attract private investors for their financing, that is, to use the mechanism of partnership between the state and business.

4 Conclusion

The conducted research allowed us to draw the following conclusions:

- the significant role of international organizations in the formation of ESG is indicated - a concept in the global space, consisting in the approval of sustainable development goals applied in all countries of the world;

- a comparative analysis of the development of partnerships between the state and business in the world indicates a later appearance of the PPP institution in Russian practice. Despite Russia's lag behind foreign countries in this matter, an active phase of implementation of transport infrastructure projects is currently observed, taking into account compliance with environmental standards and rules;

- the modern European PPP market is estimated at 13.6 billion euros by the end of 2023, and the average value of one transaction was 367.7 million euros. The leader of the European PPP market is Germany, which closed projects worth 3.56 billion euros in 2023. It is noted that the transport sector and environmental protection are the leading sectors for the implementation of infrastructure projects based on the principles of public-business partnership in European countries;

- a rating analysis of ESG countries was conducted - the index for 2022-2023. It was found that European countries are more prosperous in the field of ESG, and Asian and African countries are characterized by increased ESG risk. Russia is characterized by an average ESG risk at the global level.

In order to maintain sustainable development priorities within any territory, companies must be fully aware of their tasks and goals, taking into account the interests of society and environmental protection. In order to develop domestic transport infrastructure with minimal negative impact on the environment, it is necessary to use various tools used in foreign practice: implementation of green and social projects; increasing interest in participation in PPP projects on the part of private business; use of bonds as financing instruments; development of own methods and metrics for ESG assessment; holding seminars and meetings between government officials and business representatives to form the necessary competencies and knowledge and eliminate possible mistrust between potential partners.

The above recommendations should be taken into account when forming the basic provisions of partnership between the state and business in the transport and environmental spheres in domestic practice.

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