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European Experience of Public-Private Partnership in the Road Sector

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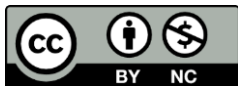
ABSTRACT

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In the current conditions of modernization of transport infrastructure and limited budget resources, public-private partnership is considered one of the key instruments for attracting investments in the road sector. In the countries of the European Union, significant experience has been gained in using various PPP models that combine the interests of the state and the private sector to ensure high-quality construction, operation and maintenance of highways. The relevance of the chosen research topic is due to the need to adapt European practices to Ukrainian realities, given the need for effective development of road infrastructure and increasing its competitiveness. The purpose of the article is to study the European experience of implementing PPP projects in the road sector. The study uses a comparative analysis of European legislation and practice of implementing PPPs in the road sector, systematization of partnership forms and models, as well as generalization of the positive results of implemented projects. The analysis showed that in the EU countries the most common are concession models, DBFO (Design-Build-Finance-Operate) agreements, as well as long-term road maintenance contracts. The key success factors were a transparent regulatory framework, effective risk sharing between the parties, guaranteed financial obligations of the state and the use of innovative approaches to road infrastructure management. The experience of France, Germany, Spain and Poland shows that, provided that PPP is properly regulated, it contributes not only to the construction of new transport arteries, but also ensures their high-quality service, which has a positive effect on population mobility, economic integration and increasing the investment attractiveness of regions. European experience proves that public-private partnership in the road sector is an effective mechanism for infrastructure development under conditions of proper regulatory support, transparency of tender procedures and a clear definition of the responsibilities of participants. An important task for Ukraine is the adaptation of best European practices taking into account national characteristics, which will allow to increase the efficiency of investment use, reduce the burden on the state budget and ensure the sustainable functioning of the road network.

KEYWORDS

public-private partnership, road management, regulatory framework, models.



Європейський досвід державно-приватного партнерства у сфері дорожнього господарства

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СТАТТЯ	АНОТАЦІЯ
Дослідницька DOI: 10.70651/3041-2498/2025.9.14 Авторське право © 2025 автора  Цей твір ліцензовано на умовах Ліцензії Creative Commons «Із Зазначенням Авторства – Некомерційна 4.0 Міжнародна» (CC BY-NC 4.0). 	У сучасних умовах модернізації транспортної інфраструктури та обмеженості бюджетних ресурсів державно-приватне партнерство розглядається як один із ключових інструментів залучення інвестицій у дорожнє господарство. У країнах Європейського Союзу напрацьовано значний досвід використання різних моделей ДПП, що поєднують інтереси держави та приватного сектору для забезпечення якісного будівництва, експлуатації та утримання автомобільних доріг. Відповідність обраній темі дослідження зумовлюється необхідністю адаптації європейських практик до українських реалій, з огляду на потребу в ефективному розвитку дорожньої інфраструктури та підвищенні її конкурентоспроможності. Мета статті полягає у дослідженні європейського досвіду реалізації проєктів ДПП у сфері дорожнього господарства. У дослідженні застосовано порівняльний аналіз європейського законодавства та практики впровадження ДПП у дорожньому господарстві, систематизацію форм і моделей партнерства, а також узагальнення позитивних результатів реалізованих проєктів. Проведений аналіз показав, що у країнах ЄС найбільш поширеними є концесійні моделі, угоди типу DBFO (Design-Build-Finance-Operate), а також довгострокові контракти на утримання доріг. Ключовими факторами успішності виявилися прозора нормативно-правова база, ефективний розподіл ризиків між сторонами, гарантованість фінансових зобов'язань держави та застосування інноваційних підходів до управління дорожньою інфраструктурою. Досвід Франції, Німеччини, Іспанії та Польщі свідчить, що за умов належного регулювання ДПП сприяє не лише будівництву нових транспортних артерій, а й забезпечує їх якісне обслуговування, що позитивно позначається на мобільності населення, економічній інтеграції та підвищенні інвестиційної привабливості регіонів. Європейський досвід доводить, що державно-приватне партнерство у дорожньому господарстві є дієвим механізмом розвитку інфраструктури за умов належного нормативного забезпечення, прозорості конкурсних процедур та чіткого визначення відповідальності учасників. Для України важливим завданням є адаптація найкращих європейських практик з урахуванням національних особливостей, що дозволить підвищити ефективність використання інвестицій, зменшити навантаження на державний бюджет та забезпечити стає функціонування дорожньої мережі.

КЛЮЧОВІ СЛОВА

державно-приватне партнерство, дорожнє господарство, нормативно-правова база, моделі.

1. Introduction

Modern conditions of socio-economic development require the search for effective mechanisms for modernizing and managing road infrastructure. Roads are a key element of the transport system, which determines the level of mobility of the population, the competitiveness of the economy and the integration of the state into global and regional markets. At the same time, in most countries, including Ukraine, there is an acute shortage of budget resources necessary for the high-quality construction, maintenance, and modernization of the road network. This necessitates the search for new institutional forms of cooperation between the state and business in this area.

European experience shows that public-private partnership (PPP) has become one of the most effective tools in the field of road infrastructure at the present stage. Thanks to the attraction of private capital, not only is additional funding provided, but also the efficiency of project management increases, innovative technologies and modern standards of road maintenance are introduced. In the EU countries, PPP mechanisms successfully combine the interests of the state, which seeks to develop transport infrastructure, and private investors, who receive stable long-term income guarantees.

The study of the practice of European countries in this context is extremely important for Ukraine, given the hostilities on its territory and the need for active reconstruction and modernization of the transport system destroyed by the enemy. Adaptation of PPP best practices will not only overcome infrastructure constraints but will also contribute to the integration of the road industry into the European transport space.

2. Literature Review

The issues of public-private partnerships in the field of road infrastructure are widely discussed in scientific publications. Thus, a bibliometric analysis of 734 articles in Scopus on PPP in road infrastructure projects, covering the period from 1993 to 2022, was carried out by several authors – Y. Esperilla-Niño-de-Guzmán et al. (2024) – based on which the general characteristics of the study, the most relevant articles, the most productive journals, the most prolific authors, institutions and countries and their main networks of international cooperation were identified, as well as the main current research topics identified, which are financial management, costs and pricing systems, privatization of transport infrastructure services and sustainable development [1].

K. Mazher (2025) carried out a systematic review of research on risk allocation and sharing in PPP. It was determined that most of the reviewed studies belong to the category of “preferences, practices and models of risk allocation and sharing” and account for 49% of the reviewed journal articles, while the second largest category, “state support and guarantees” accounts for 29% of the reviewed articles [2].

Given the growing importance of contemporary socio-economic and infrastructural discussions on PPP, A. Rejeb (2025) has conducted a study that aims to provide an overview of the academic landscape on PPP. In particular, a review of PPP research was carried out using LDA modeling [3].

E. Steelyana (2023) analyzed trends in the development of PPP in transport infrastructure, as a result of which she found a positive trend in the number of research articles discussing the joint management of the development of toll roads under the PPP scheme [4].

A. Almeile et al. (2022) conducted a literature review with a focus on PPP projects in developing countries. The results of this review provide a critical insight into publication trends over time, the types of projects considered, the research methods chosen, the main research themes identified and their variations, and identify the critical challenges faced by PPP projects in developing countries [5].

I. Hajje et al. (2017) in their study presented a mathematical model of the optimal contract with moral hazard in PPP, based on which the optimal contract for PPP was characterized in the conditions of asymmetric information between the two parties [6].

Separately, it is worth highlighting the publication that presents the results of the first statistically significant study of cost growth in transport infrastructure projects. Based on a sample of 258 transport infrastructure projects representing different types of projects, geographical regions and historical periods, it was found with extremely high statistical significance that the cost estimates for the construction of such projects are very uncertain, and the underestimation is explained by strategic distortion of information [7].

Noteworthy is the article by I. Katsamenis et al. (2022), which presents the development of a robotic system for road infrastructure maintenance. It states that the EU-funded HERON project will

develop an integrated automated system for the proper maintenance of road infrastructure, which will reduce accidents, reduce maintenance costs, and increase the capacity and efficiency of the road network [8].

The authors X. Tao et al. (2022) presented a multi-criteria approach to PPP decision-making for smart vehicles. They developed a public time loss model to assess congestion caused by vehicle breakdown and the corresponding towing process [9].

A. Cepparulo et al. (2020) analyzed the use of PPPs, taking into account their uneven distribution among the countries of the European Union and identified the motivation of public actors in choosing PPPs. In their work, they focused on fiscal incentives to overcome budgetary and borrowing constraints, also taking into account the political specificities and institutional frameworks of countries [10].

3. Problem Statement

The article is aimed at studying the European experience in the implementation of PPP projects in the field of road management, identifying effective models and mechanisms for their implementation, as well as substantiating the possibilities of using best practices in the domestic road industry.

In accordance with the purpose, the article sets the following tasks:

- to analyze the normative legal acts based on which the functioning of PPP in the countries of the European Union is ensured;
- to characterize the main forms and models of PPP used in the field of road construction and road maintenance in European countries;
- to investigate specific examples of PPP projects in EU countries and evaluate their results;
- to analyze statistical data in the context of the issue under study;
- to formulate recommendations on the possibility of adapting European experience to Ukrainian conditions, taking into account modern challenges and needs for the development of road infrastructure.

4. Methods and Materials

The study uses a set of scientific methods that provide a comprehensive analysis of the problems of public-private partnership in the field of road management. The methodological basis for writing the article was the provisions of the theory of public administration and modern concepts of infrastructure development. To achieve this goal, the following methods were used: comparative-analytical method – to identify the peculiarities of the functioning of various PPP models (concessions, life cycle contracts, mixed forms, etc.) in the transport sector; the method of generalization and synthesis – to form conclusions about the possibilities of adapting the European experience in Ukrainian conditions; regulatory analysis – to study the legislative framework of PPP in the EU countries and Ukraine.

The materials for the study in the article were: regulations of the European Union and certain European countries that regulate PPPs in the field of road infrastructure; reports and analytical reviews of European institutions; scientific publications of researchers on infrastructure projects and PPP; and statistical data on the financing and implementation of road projects in European countries.

5. Results and Discussion

PPP in many European countries has long been a key mechanism for the development of road infrastructure. Its application allows you to effectively combine budget resources with private investments, which is especially important in conditions of limited state funding. It is worth highlighting several features that characterize the features of PPP in the EU countries:

- Firstly, the most common form of PPP implementation in the road sector in Europe is concession agreements, under which a private investor undertakes the construction, maintenance and operation of the road, and receives revenues from toll collection or long-term budget payments. Examples of successful projects can be observed in France, Spain and Italy, where extensive toll highway systems have been created that provide stable sources of financing for road maintenance.
- Secondly, in many countries (in particular, the UK, the Netherlands, Germany), life cycle contracts are actively used, which provide for the transfer of a full range of functions to a private partner – from design to operation. This makes it possible to reduce the risks of low-quality construction and stimulates the use of innovative technologies.

- Thirdly, an important condition for success is the creation of a stable regulatory and legal environment. European countries have a developed legislative framework that clearly regulates the rights and obligations of the parties, risk-sharing mechanisms, as well as the system of state control. This contributes to the growth of private investors' confidence and ensures the predictability of the terms of such cooperation.

Relations in the field of PPP are based on a sufficient regulatory framework. Let's consider the regulations of the European Union and individual European countries that regulate PPP in the field of road infrastructure. In Table 1 presents the main EU regulations related to this issue.

Table 1. The European Union's regulatory framework that regulates PPPs in the field of road infrastructure

Regulations	Their explanation
Directive 2014/23/EU on the conclusion of concession contracts (Concessions Directive)	establishes general rules for the procedures for concluding concession agreements in the EU countries, including road projects
Directive 2014/24/EU on public procurement	regulates the use of procurement mechanisms often used in PPP contracts
Directive 2014/25/EU on procurement in the fields of water, energy, transport and postal services	important for infrastructure and transport projects
EU Regulation No. 1315/2013 on the development of the Trans-European Transport Network (TEN-T)	provides for the possibility of financing road projects on PPP terms
European Charter of Public-Private Partnership in the Field of Infrastructure (informal document of the European Investment Banking Group, EPEC)	provides recommendations for countries to implement PPP best practices

Source: Own generalizations.

In some European countries, there are specialized regulations that regulate PPP relations in the field of road management. For example, France has the Public Procurement Code of 2019 (Code de la commande publique), which regulates concessions and public-private partnerships, including in the road sector. In Italy, PPP and concession procedures, including road concessions, are regulated by Decree-Law No. 50 of 2016 (Codice dei contratti pubblici). The country has also developed separate ANAS instructions for the implementation of concession projects.

Spain in 2017 passed the Law on Public Sector Contracts (Ley 9/2017, de Contratos del Sector Público), which includes provisions on concessions and other forms of PPPs. And earlier, in 2003, the Law on Public Works Concessions was adopted, which indirectly related to road facilities.

Germany also has a number of laws, in particular, the Law against Restrictions of Competition (Gesetz gegen Wettbewerbsbeschränkungen), which includes provisions on concessions. It is worth mentioning the Public Procurement Regulation (Vergabeverordnung), which also applies to PPP projects in the transport sector. In practice, there are also specific models: A-models (for autobahns) and F-models (for other objects), fixed by government regulations.

Before the implementation of the Brexit procedure in the UK, the government's policies and standardized contracts (Private Finance Initiative) have been used to implement PPP projects since the 1990s. In 2012, the Government Guidelines for Public-Private Contracts in Transport (PF2 Guidance) were updated.

As for Poland, it is necessary to note the Law on Public-Private Partnership of December 19, 2008 (Ustawa o partnerstwie publiczno-prywatnym), as well as the Law on Concessions for Construction Works or Services of 2009 (Ustawa o koncesji na roboty budowlane lub usługi). Finally, let us recall the Portuguese framework law on concessions and PPPs Decreto-Lei n.º 111/2012, which is actively used in the road sector.

All these acts form the basis for the implementation of road projects under PPP models and provide legal certainty in financing, risk allocation and quality control. Based on the presented regulatory framework, we will consider the legal models of PPP in the field of road management, which have been formed in the EU countries (Table 2).

Summarizing the information presented in Table 2, it can be concluded that, for example, such EU countries as France, Italy, Spain, Portugal focus on concession agreements with payment from users (toll roads). And, for example, Germany and Britain are more likely to use so-called "availability payments" and lifecycle models. In turn, Poland and Eastern European countries apply mixed models, adapting Western experience to their own conditions.

Table 2. Comparison of legal models of public-private partnership in the field of road infrastructure in European countries

Country	Main acts	Model/Approach	Application features
France	Code de la commande publique (2019); Ordonnance 2016-65	Concession model	Developed system of toll roads (autoroutes); Private companies build and operate roads under long-term concessions (20-30 years).
Italy	Codice dei contratti pubblici (2016)	Mixed concession model	Roads and motorways are concessioned to private operators (Autostrade per l'Italia); the state retains control through ANAS.
Spain	Ley 9/2017; Ley 13/2003	Concession agreements + long-term contracts	Both toll roads and "availability payments" are used.
Germany	GWB, VgV; government regulations on A/F models	A-model (autobahns) + F-model (bridges, tunnels)	A-model: Charge from users (MAUT). F-model: the state makes payments for accessibility. Clear distribution of risks.
United Kingdom	Private Finance Initiative (PFI); PF2 Guidance (2012)	PFI/PF2 (Life Cycle Contracts)	A private partner finances, builds, operates the road; The state pays annual payments. A pioneer in the development of PPP in Europe.
Poland	Ustawa o PPP (2008); Ustawa o koncesji (2009)	Hybrid PPP model	A combination of concessions and classic PPP. It is used for the construction of motorways (e.g., A2).
Portugal	Decreto-Lei 111/2012	Intensive concession model	The country has one of the largest road networks in the EU built through PPP; The state often guarantees a minimum income to the investor.

Source: Compiled based on information [11–15].

We will analyze statistical data on the financing and implementation of road projects in Europe in order to conduct a deep and comprehensive assessment of the situation in the field of road infrastructure in the EU countries. Thus, in 2024, more than 7 billion euros of investments were implemented in the European Union under the Connecting Europe Facility (CEF) initiative for 134 transport projects (roads, railways, inland waterways, ports and multimodal hubs). Part of these funds was provided for roads or for projects that affect road infrastructure (for example, safety, intelligent systems, multimodal nodes) [16].

In 2025, around €2.8 billion was invested under the CEF on 94 projects in the form of grants for transport projects. Most of these funds were earmarked for the modernization of railway and water infrastructure, but several projects relate to roads (e.g., safe parking, renewal of road infrastructure within the TEN-T) [17].

During 2017–2022 in European countries, the following expenditures on maintenance and investments in road infrastructure were observed. For example, in Germany these figures amounted to 13.5–17 billion euros annually; in France – about 9–10.5 billion euros; in Italy these figures were variable, but in some years, they amounted to about 6–6.5 billion euros; in Poland, the amount of capital investments amounted to 3–3.2 billion euros, and in Spain – about 3.5–4.5 billion euros, respectively [18]. The presented data include both maintenance and investment costs (new construction, major repairs), and their significant fluctuations depending on the year are explained by economic conditions, political priorities, the level of road deterioration, etc.

Considering investments in roads and railways in the long term, it is worth noting that during 1995–2018 in European countries, about 1.5 trillion euros of investments in road infrastructure were realized, while railway infrastructure received about 930 billion euros (the difference was about 66% in favor of financing the construction and maintenance of roads) [19]. These figures indicate priorities in financing the infrastructure of the European road economy, as roads dominate overall investment in transport.

In total, from 1990 until now, according to the European Investment Bank, there have been 1,800 PPP projects, the total value of which was 368.3 billion euros and of which about 61% was allocated to the transport sector. This included financing of roads, bridges, and tunnels, as well as projects that combine different modes of transport (for example, multimodal hubs). PPP projects in European countries are currently unevenly developed – the leaders in this area are the UK, Spain, Portugal, Greece, Ireland, and other countries have slightly lower road spending [20].

In contrast to the EU countries, in Ukraine, the process of implementing PPP in the road sector is at the initial stage. Although the legislative framework in the field of concessions and public-private partnerships has undergone some improvements, the practical implementation of projects remains limited. The main obstacles are martial law in the country, an insufficient level of institutional capacity of authorities, high investment risks and insufficient transparency of procedures. At the same time, the EU experience confirms that the implementation of effective PPP models can become one of the key tools for the restoration and development of Ukraine's road infrastructure. The use of flexible financial schemes, the involvement of international financial institutions and the adaptation of European management standards can increase the investment attractiveness of the industry.

Figure 1 provides recommendations for Ukraine that should be taken into account in the development of PPP in the field of road management, taking into account the best practices of the European Union countries.

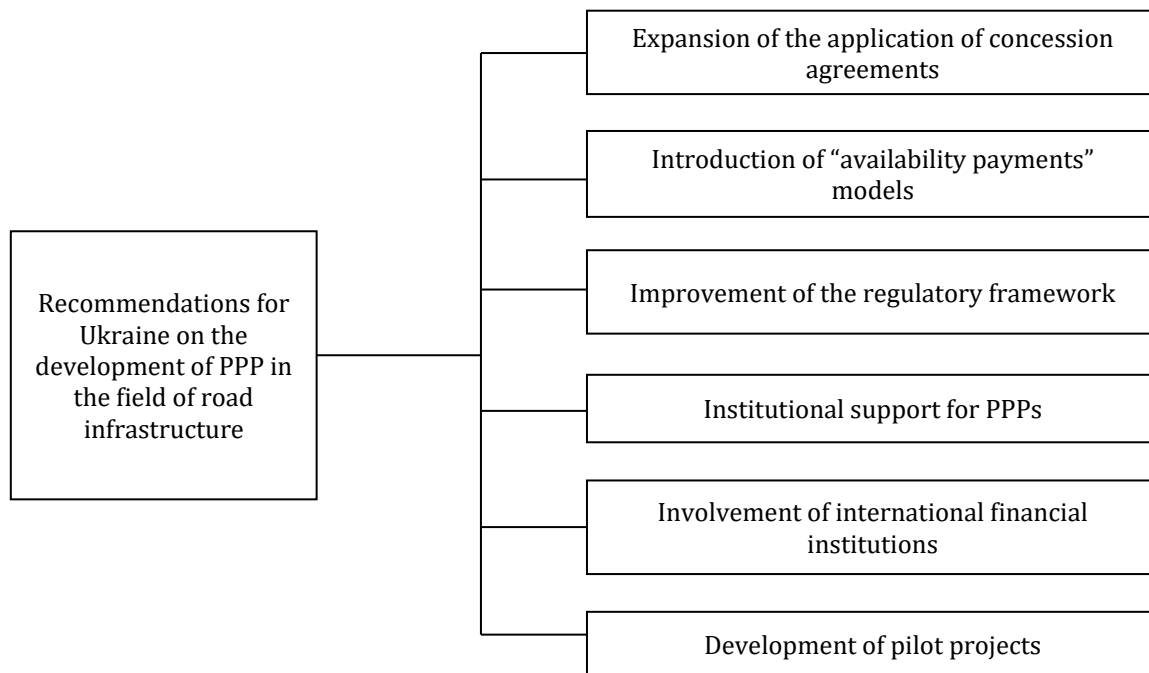


Figure 1. Recommendations for Ukraine on the development of PPP in the field of road infrastructure

Source: Own generalizations.

Based on the recommendations presented in Figure 1, first of all, it is worth paying attention to the expansion of the application of concession agreements. The experience of France, Spain and Portugal demonstrates the effectiveness of concessions in the construction and operation of motorways. In Ukraine, it is advisable to more actively use concessions for new high-load roads (for example, international transport corridors), where a stable flow of vehicles and tolls are possible.

The introduction of models of "payments for accessibility" can be carried out following the example of Germany and the United Kingdom, where, in case of insufficient traffic, the state can make regular budget payments for the accessibility of the road. For Ukraine, this is suitable in regions with a lower traffic intensity, where toll roads will not be commercially attractive.

As for improving the regulatory framework, it is necessary to harmonize Ukrainian legislation with the relevant EU Directives (2014/23/EU, 2014/24/EU, 2014/25/EU). Along with this, clear rules for the distribution of risks between the state and the private partner, as well as reliable mechanisms of state guarantees, should be provided.

Institutional support to PPPs should include the creation of a specialized agency in Ukraine (an analogue of ANAS in Italy or Highways England in the UK) that would coordinate PPP projects in the road sector. This will increase investor confidence and ensure transparency of procedures.

As for the involvement of international financial institutions, the experience of the EU countries shows the effectiveness of cooperation with the European Investment Bank, the EBRD and the World Bank in financing infrastructure projects. For Ukraine, such institutions can act as a guarantor of financial stability and a reduction of investment risks.

An effective recommendation is also the development of pilot projects in the area under study. It is worth starting with the launch of several large-scale pilot concession roads (for example, Lviv – Krakovets, Kyiv – Bila Tserkva), which could become an example of the successful use of PPP and create a positive signal for the market.

In general, Ukraine can combine the Western European concession model (for high-traffic highways) with the German-British model of payments for accessibility (for regional roads), which will ensure the comprehensive development of road infrastructure. In general, European public-private partnership practices can be successfully integrated into Ukrainian conditions provided that hostilities on the territory of the Ukrainian state cease, the legal framework is improved, a favorable investment climate is formed and transparent project management mechanisms are introduced.

6. Conclusions

The article considers the European experience of introducing public-private partnership mechanisms in the field of road infrastructure. It is determined that it is thanks to the active use of concession agreements and models of “payments for accessibility” that the countries of the European Union were able to ensure the dynamic development of the road sector and improve its quality. It has been established that the key success factors are a clear regulatory framework, transparent procedures for the selection of private partners, a fair distribution of risks between the state and business, as well as institutional support from specialized agencies and international financial organizations.

The experience of France, Spain, Germany, Great Britain, and other countries confirms that the use of PPP allows not only to reduce the burden on the state budget, but also to ensure the long-term efficiency of road infrastructure management. At the same time, the results of the analysis prove that there is no universal model: success depends on the correct adaptation of mechanisms to national conditions. For Ukraine, it is relevant to combine the Western European concession model with mechanisms of payments for accessibility, as well as further harmonization of national legislation with EU legal acts. The implementation of these approaches will contribute to attracting investments, improving the quality of roads, integrating into the European transport area, and the overall economic development of the country.

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