

FINANCIAL AND ECONOMIC ANALYSIS OF INFRASTRUCTURE TRANSPORT PROJECTS WITH THE PARTICIPATION OF EU FUNDS

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Purpose/reason for writing the paper: Carrying out a cost-benefit analysis of large infrastructure projects in the area of transport causes considerable difficulties and problems in identifying the positive and negative factors of project implementation, and their translation into cash flows generated by the project. The aim of the paper is to present problem solving in the course of financial analysis and economic analysis of an infrastructure transport project.

Methodology/approach to problem solving/scope of the study:

The scope of the study and the approach to the problem include:

- presentation of the role of cost-benefit analysis in the process of assessing the competitiveness of infrastructure transport projects in terms of making decisions about their co-financing from community funds;
- characteristics of general assumptions of financial analysis and economic analysis of projects in the transport sector;
- discussion of the methodologies of quantification and monetization of socio-economic factors and factors influencing the external environment in the process of assessing the economic effects of a transport project on the regional and national scale;
- indication of the latest sources of methodological support for the preparation of cost-benefit analysis (CBA) of the project;
- embedding the issues of financial and economic analysis in the context of the requirements for beneficiaries' application for grants from the funds.

Arrangements: Different methodologies are used in transport projects to quantify and monetize the impact of individual factors on the external and socio-economic environment. The paper indicates the latest methodological studies, the scope of their application, examples of calculations and recommendations for beneficiaries on how to adjust the information they have to a specific project situation.

Practical implications: Adaptation of the Beneficiary to the applicable and recommendation source materials, knowledge of methodologies for conducting analyses increases the probability of reliable preparation of documentation and obtaining a positive decision regarding financial support for the planned investment project.

Social implications: Correct and consistent analysis of projects increases the effectiveness of obtaining their co-financing from EU funds. On the other hand, the implementation of modern infrastructure transport projects is a social good that increases the comfort of passengers, reduces the operating costs of carriers, reduces carbon dioxide emissions, noise and local environmental pollution, contributes to saving time and reducing road accidents.

Originality/value of the study (for whom?):

The paper is directed and will be useful for investors, as well as beneficiaries of community funds, in order to prepare project documentation for the implementation, execution and operation of infrastructure projects in the field of transport.

Keywords: efficiency of transport projects, cost-benefit analysis (CBA) of transport projects, economic analysis of transport projects, evaluation of the profitability of transport projects.

Paper category: general overview – review and analysis of concepts, techniques and phenomena.

1. Introduction: Financial analysis and economic analysis – two levels of analysis

Infrastructure transport projects are complex in terms of cost-benefit factors. At the same time, the vast majority of such a project has a *low financial efficiency*, and is even ineffective in terms of net cash flows, because it does not generate a financial surplus. However, the newly established transport infrastructure has social and economic benefits (as well as costs). Thus, the project should be assessed not only in terms of financial profitability for the Investor, as well as in terms of *costs and benefits for the region and the country* as a whole. Therefore, we have **two levels of cost-benefit analysis (CBA)** to assess the effectiveness of a large investment project in the field of transport (Kotowska-Jelonek, 2016, p. 465):

- *the first one* – from the point of view of the Investor of the project, i.e. for the assessment of the so-called financial efficiency; in this case the cost-benefit analysis is called **financial analysis** [The basic result of the financial analysis is the value marked FNPV (C)];
- *the second one* – in a broader sense, taking into account the costs and benefits generated by the project for various groups of the community (local, region, country) and from the point of view of the impact on the environment and the broadly understood environment, in order to assess the so-called economic efficiency; then the cost-benefit analysis is called **economic analysis** [The primary output of the economic analysis is the denominated value of ENPV].

In both cases, the range of costs and benefits included in the analysis is **different**. *In financial analysis*, these are simply capital expenditures, operating income and costs, and the residual value in income. *In the economic analysis*, these are the net socio-economic effects, i.e. the monetised balance of the benefits and costs of the project for society and the natural environment. The result of the FNPV financial analysis (C) should be supplemented with socio-economic effects in order to obtain the **overall economic effect of the ENPV project**. The sum of the adjusted cash flow of the financial analysis and the net socio-economic flow is the basis for the calculation of the economic performance indicators of the project,

including the base ENPV indicator. Depending on the value of FNPV (C) and ENPV, the decision-making process on granting co-financing for a project from community funds can be illustrated as shown in Fig. 1.

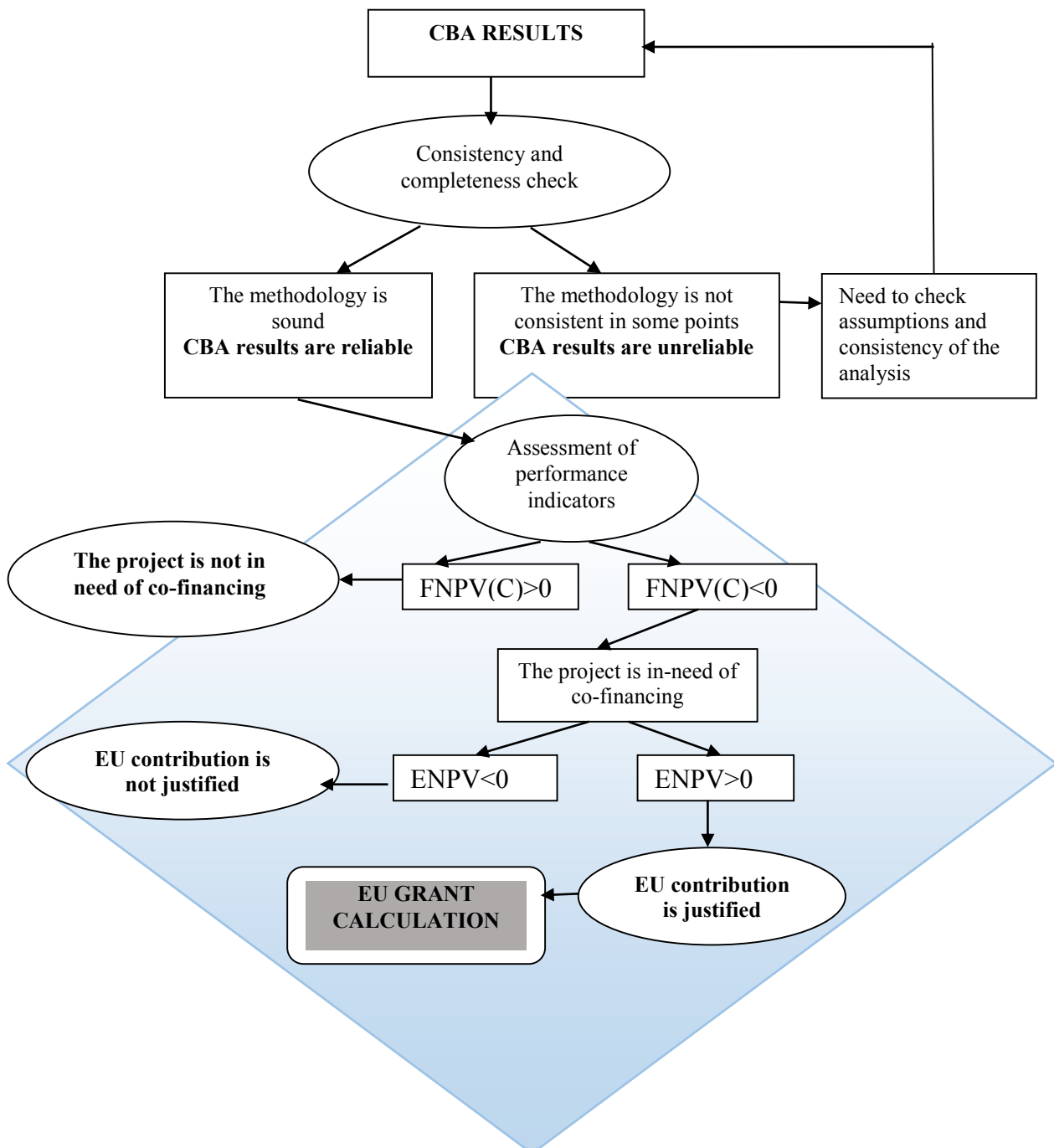


Figure 1. The role of cost-benefit analysis in the evaluation of major projects. Adaptation from: *Przewodnik po analizie kosztów i korzyści...*, 2015, KE, s.13; *Guide to Cost-Benefit Analysis...*, 2014, EC, p. 20.

If the result of the FNPV **financial analysis** > 0 , it means that the project is self-sufficient and financially viable and does not need external funding. However, if $FNPV < 0$, go to the next stage – determining the **economic viability on a national scale**. If the net result of the effects of the economic analysis $ENPV < 0$, it means that the project does not generate an adequate financial surplus for society, the costs exceed the benefits, and therefore such a project is unprofitable for the society, such a project should be rejected when deciding on financial support. As a rule, EU funding is granted to projects the profitability of which can be proven from the socio-economic point of view, i.e. their $ENPV > 0$. The next decision-making step is to calculate the so-called the *financial gap* of the project, i.e. estimating the value (scale) of co-financing, and determining the co-financing rate.

Ultimately, the quantified socio-economic benefits of an infrastructure investment together with net cash flows estimated on the basis of financial analysis constitute the basis for the calculation of economic efficiency indicators of the investment project (Wojewódzka-Król, Rolbiecki, 2018, p. 78); this is the basis for making a decision to co-finance the project according to the algorithm as shown in Fig. 1. **The aim of the paper is** to present problem solving in the course of financial analysis and economic analysis of an infrastructure transport project.

2. Financial analysis and methodological support

The aim of the financial analysis is to assess the **profitability of the investment from the investor's point of view**, to compare the investment outlays of the owner-manager of the transport infrastructure and revenues in the form of user fees for using the infrastructure. The **financial analysis** is carried out using the standard method of valuing benefits in the form of the sum of the net cash flows over the period of implementation and operation of the already completed project. The cash flow generated by the project takes into account the project expenditure with a minus sign and the project revenues discounted at the start of the project in the long term with a plus sign. This value is designated FNPV (C). The **net financial present value** of the investment is the sum resulting from the difference between the discounted value of the expected revenues and the discounted expected costs of the investment and the operating costs of the project:

$$FNPV(C) = \sum_{t=0}^n a_t S_t = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + \frac{S_2}{(1+i)^2} + \dots + \frac{S_n}{(1+i)^n},$$

where:

S_t is the balance of cash flows at time t ,

t is the discount factor selected for discounting at time t ,

i is the financial discount rate (Przewodnik, 2015, KE, p. 45).

The *discount rate* for transport projects implemented in Poland is recommended at the level of 4.5% (Wojewódzka-Król, Rolbiecki, 2018, p. 80). The parameter n is the number of years of the analysis period, in EU projects from 10 to 30 years. In the last year n , the *residual value* of the project is taken into account, reflecting the remaining potential of the fixed assets for which their useful lives have not yet fully expired. Recognition of the residual value in year n takes the form of estimated discounted net cash flows in the following years of the investment beyond the analysed period, or in the form of the market value of fixed assets as if they were to be sold at the end of the period under consideration.

In the case of financial analysis, a detailed presentation of the standard methodology for estimating and comparing costs and benefits in investment projects and calculating the financial profitability of the projects is presented in *Przewodnik po analizie kosztów i korzyści projektów inwestycyjnych. Narzędzie analizy ekonomicznej polityki spójności 2014-2020* (Guide to cost-benefit analysis of investment projects. Tool for economic analysis of the cohesion policy 2014-2020) in chapter 2.7, available in Polish (KE, 2015) and English (EC, 2014). The specificity of transport projects in terms of the costs of operating and maintaining infrastructure facilities, typical sources of income by transport type (fees, tickets, subscriptions, space rental, lease, etc.), as well as example case studies (road project, rail, urban transport) are presented in that *Guide...* in chapter 3.7. On the other hand, the preparation of documentation in part of the financial analysis for an infrastructure transport project, taking into account the application procedures for co-financing from EU funds, includes recommendations developed by the Centre for EU Transport Projects entitled *Analiza kosztów i korzyści projektów transportowych współfinansowanych ze środków Unii Europejskiej. Vademecum Beneficjenta (Cost-benefit analysis of transport projects co-financed by the European Union. Beneficiary Vademecum)* (CUPT, 2016) and *Guidelines* (MIR, 2015) concerning large income-generating projects, which present the methodology for determining the financing gap in a project eligible for external co-financing¹.

3. Economic analysis and methodological support

3.1. Economic analysis – the essence

The financial analysis is sufficient in the case of assessing the profitability of *commercial investments oriented at generating income*. On the other hand, the investment effectiveness calculation is particularly complex and difficult in the case of assessing the effectiveness of non-commercial investments in the field of transport infrastructure. With the traditional, i.e. financial approach to the evaluation of infrastructure projects, they could not be implemented because they would not be financially viable (Wojewódzka-Król, Rolbiecki, 2018, p. 74). Therefore, **economic analysis** should also be applied to such projects,

i.e. *socio-economic analysis*, because transport investments not only provide financial benefits for Investors, but in the first place are a source of economic and social benefits in the region and for the entire economy. In the social aspect, the implementation of a modern transport infrastructure project often results in positive effects, e.g. saving time for transport users, incurring lower operating costs for carriers, increasing revenues for infrastructure owners/managers from collecting fees for the use of infrastructure facilities and additional budget revenues due to taxes; benefits in the form of noise reduction, reduction of CO₂ emissions and other environmental pollutants, reduction of the number of road accidents, increased travel comfort and a sense of safety while travelling, etc.

Therefore, the economic calculation of the efficiency of infrastructure investments cannot rely solely on financial analysis. When assessing the effectiveness of this type of investment, it is also necessary to use a non-standard approach based on the use of **social calculus**, the purpose of which is to assess the contribution of an infrastructure project to the *general well-being of society*. In the economic analysis, unlike the financial analysis, external and environmental effects are taken into account. These effects are not subject to market transactions, therefore they are not valued by the market, which in practice means that the Beneficiary does not include them in the financial analysis (Wojewódzka-Król, Rolbiecki, 2018, p. 74).

3.2. Monetization of costs and benefits

In the entire process of financial as well as economic analysis, - one should:

- identify financial and socio-economic costs and benefits (broken down into groups of factors),
- quantify the costs and benefits in natural units (make a quantitative measurement in the project),
- carry out their valuation in monetary units (**monetize** them) in order to determine the overall *result of the economic analysis*, this process is shown in Fig. 2.

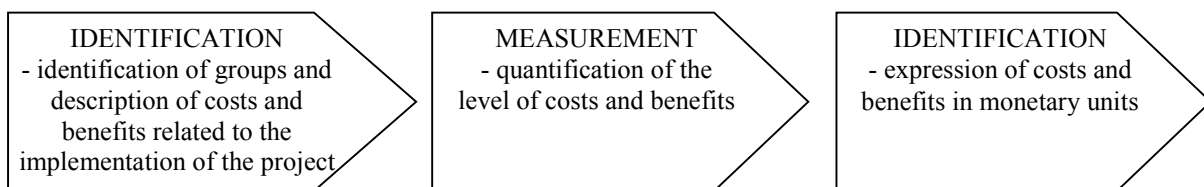


Figure 2. The process of identification, measurement and valuation of costs and benefits in assessing the effectiveness of the project. Adaptation from: (Rogowski, 2013, p. 110).

When carrying out a financial analysis according to standard classical methods, there are no difficulties in calculating the costs and benefits of the project in monetary units, there may only be problems related to the reliability of the forecasted incomeⁱⁱ. On the other hand, it is often difficult to calculate the value of *external effect*, although their identification may be easy. However, the effects of investments for society and the environment can be quantified

(expressed in quantifiable parameters) and monetized (converted into money) using the recommended methodologies.

The monetized socio-economic effects are added to a properly prepared cash flow statement from the financial analysis. It is then a quantitative cost-benefit analysis. The quantitative CBA methodology allows for the determination of the values of **economic efficiency** of investment indicators (ERR, ENPV and BCR) (Beneficiary Vademecum, CUPT, 2016, p. 9).

3.3. Differential method of cost-benefit analysis

The economic calculation of the implemented project is carried out using the differential method on the basis of an **incremental principle**. This means estimating the analysed cash flows in two variants: 1) with the variant "without a project", that is, "do nothing" – W0 and 2) with the variant "with the project" – W1. So it is a comparison of the current state and its duration in the future with the new state after the implementation of the investment, while the difference (W1-W0) will be the cash flow from the project. In the W0 variant and the "do nothing" scenario, the increased costs of operating the facilities in the future should be taken into account, with the current income parameters. Variant W0 can also be adopted according to the "minimum" solution as a counterfactual scenario. The counterfactual scenario assumes minimal replacement and adaptation investments in the current facilities, which will guarantee the maintenance of the infrastructure and its ability to provide services at the current level in terms of quality and volumes, as we cannot assume the discontinuation of services already provided at a level acceptable to users.

In order to identify and convert the socio-economic effects of the project into monetary units one should:

1. Develop **traffic patterns and transport chains** in a hypothetical situation if our project is not to be implemented (W0) and in a situation when it will be implemented (W1). We define the estimated mileage and time of such a travel. Then, we look for the differences between W1 and W0 in terms of externalities in *natural units* (Vademecum, CUPT, 2016, p. 67).
2. In order to facilitate the forecast of traffic volume, classical traffic modelling can be used. The traffic modelling software has a statistics module with the option to export the traffic statistics to a spreadsheet. Having statistical data for previous years, it is possible to generate forecast traffic parameters for projects W0 and W1 in all forecast time horizons. On this basis, we calculate the **differences in the W1 and W0 scenarios**, and we will obtain the *result-effect for the project* in **natural units**.
3. Then, this result is multiplied by the **unit cost of the appropriate natural unit** taken from the **tables** developed by the research teams, expressed in PLN.

3.4. The scope of costs and benefits in the economic analysis of a transport project and methodological support for their valuation

The basic catalogue of costs and benefits in economic analyses is generalized transport costs, including (Vademecum, CUPT, 2016, p. 73):

- operating costs of vehicles of other participants in the transport market than the beneficiary (the beneficiary's operating costs are subject to financial analysis and imported from it for economic analysis);
- time costs (wasted time, both in passenger and freight transport);
- accident costs;
- social costs of greenhouse gas (CO₂) emissions;
- social costs of non-greenhouse gas emissions (i.e. local effects of air pollution);
- social costs of noise emissions (in urban areas).

This catalogue should be treated as obligatory in the application procedures for funds from community funds.

As can be seen from Figure 2, first identify the costs/benefits of the catalogue in **quantification in natural units**, and then convert them into **monetary units**. Several calculation methodologies have already been developed in this regard. In the field of transport projects, it is best to use the methodologies developed at the Centre for EU Transport Projects (CUPT, WWW.cupt.gov.pl), and above all from two publications: *Analiza kosztów i korzyści projektów transportowych współfinansowanych ze środków Unii Europejskiej. Vademecum Beneficjenta* (Cost-benefit analysis of transport projects co-financed by the European Union. Beneficiary Vademecum) (CUPT, 2016), *Najlepsze praktyki w analizach kosztów i korzyści projektów transportowych współfinansowanych ze środków unijnych* (Best practices in cost-benefit analyses of EU co-financed transport projects) (CUPT, 2014). These studies were mainly based on *Przewodnik po analizie kosztów i korzyści projektów inwestycyjnych. Narzędzie analizy ekonomicznej polityki spójności 2014-2020* (Guide to cost-benefit analysis of investment projects. Tool for economic analysis of the cohesion policy 2014-202) (KE, 2015), and methodological manuals, the so-called Blue Books, prepared as part of the JASPERS initiative for road, air, rail and public transport infrastructure projects (NK, 2015).

It should be noted that in the subsequent financial perspectives of EU programs, newer editions of most publications are becoming available, containing improved methodologies of cost-benefit analysis, taking into account the experience acquired by research teams and beneficiaries. An extremely valuable element of the publication *Analiza kosztów i korzyści projektów transportowych współfinansowanych ze środków Unii Europejskiej. Vademecum Beneficjenta* (Cost-benefit analysis of transport projects co-financed by the European Union. Beneficiary Vademecum) (CUPT, 2016) are **unit cost tables** that facilitate the monetization of effects in economic analysis. Also for this purpose, the Blue Books (NK, 2015) containing unit cost forecasts until 2025, and for some indicators until 2050, are prepared.

3.5. Examples of the valuation of social and environmental costs and benefitsⁱⁱⁱ

We compare the **operating costs of vehicles** in road transport in different traffic conditions W0 and W1 and on the basis of the carriers' data on vehicle operating costs. The unit operating costs of vehicles PLN/vehicle-km were also estimated in the Blue Book (NK Infrastruktura drogowa, 2015, p. 119) depending on the terrain (flat, undulating) and travel speed.

In order to calculate the **savings of travellers' time**, e.g. thanks to the construction of a tram line, the statistics of transport performance in passenger hours (pash) should be generated from the traffic model. Comparing the data for W0 and W1 in each year (from the models in the forecast and interpolation horizons in the missing years), we will obtain a *differential result*, i.e. time savings of all passengers in a year, e.g. time savings = 1000 pash. Then we multiply this result by the *unit cost of time taken from the tables*, expressed in PLN/pash (1000 pash × 64.87 PLN/pash = 64 870 PLN) and we get the monetary value of the savings. This way, we will quantify the time savings. Time costs (time losses) in passenger transport are calculated on the basis of data on differential transport performance (pash), broken down into three travel motivations (business, home-work-home commuting and others), these costs are presented in Table 1. There are also studies available showing the estimated percentage of travel types in the total number. There are also other tables of time costs in freight transport in EUR/tonoh calculated in other Member States and methods of their conversion for the beneficiary country (Vademecum, CUPT, 2016).

Table 1.

Time costs according to the JASPERS Initiative (PLN / h, 2015 prices)

Travel motivation	Value of 1 passenger-hour
Business	64.87
Commuting	31.96
Others	26.82

Note. Adaptation from: Beneficiary Vademecum, CUPT, 2016, p. 96.

Savings for the environment due to the transfer of loads from road to rail, thanks to investment in intermodal transport, we need to know the transport work in tonne-kilometres (tkm) performed in W0 by road and in W1 by rail and in the feeder traffic – by roads. Then the transport work in W0 is multiplied by the unit environmental costs of transport of 1000 tkm by road, transport work in W1 for the feeder sections by the unit environmental costs of transport of 1000 tkm by road, and on the main route by rail by the unit environmental costs of transport of 1000 tkm by rail (Table 2). Actions will result in savings in external environmental costs between road-only and intermodal transport.

Table 2.*External costs of freight transport in Europe (EUR/1000 tkm)*

	Road transport		Railway transport	Inland navigation	Sea transport
	Delivery trucks	Freight trucks			
Accidents	56.2	10.2	0.2	0.0	0.0
Pollution of the lower layers of the atmosphere	17.9	6.7	1.1	5.4	2.3
Climate changes (low scenario)	7.6	1.7	0.2	0.6	0.3
Noise	6.3	1.8	1.0	0.0	0.0
Congestion (<i>delay costs</i>)	41.6	13.9	0.0	0.0	0.0

Note. Adaptation from: Beneficiary Vademecum, CUPT, 2016, p. 103.

The **costs of road accidents** and accidents at level crossings are calculated on the basis of the estimated probability of an accident. The methods of calculating the probability of a road accident occurrence are determined for the road transport performance expressed in units of kilometres, and for railway crossings – for the traffic product (Average daily traffic ADT × number of trains) at the railway crossing. The methodology for determining the probability of a road accident is described in the *Blue Book* (NK Infrastruktura drogowa (*Road infrastructure*), 2015). For railway crossings, Polskie Linie Kolejowe (PLK) has an internal *PLK safety methodology* (2012) and it is made available to beneficiaries preparing projects for PKP PLK. On the other hand, the monetization of accident costs in EU projects is made on the basis of data quoted in (NK Railroad Sektor, 2015) and in the *Beneficiary Vademecum* (Table 3). The accident cost forecast for the period until 2043 is presented in (NK Railroad sector, 2015, p. 121).

Table 3.*Accident costs according to (PLN/incident, 2015 prices)*

Cost	Unit value
Fatal victim	2 034 981
Victim badly injured	2 277 424
Victim slightly injured	31 303
Material losses	20 014

Note. Adaptation from: Beneficiary Vademecum, CUPT, 2016, p. 98.

The calculation of the **cost of climate change** in the form of carbon dioxide emissions is based on data from the rolling stock specification in terms of CO₂ emissions in tonnes and multiplied by the cost of climate change caused by 1 ton of CO₂ emissions (this cost is presented in Table 4).

Table 4.*Costs of climate change (EUR and PLN/tonne of CO₂ emissions, prices from 2015)*

Currency	Value 2015	Increase year by year
EUR	34.55	1.15
PLN.	144.59	4.82

Note. Adaptation from: Beneficiary Vademecum, CUPT, 2016, p. 100.

We calculate the costs of emissions of environmental pollutants in road transport in accordance with *NK Road Infrastructure 2015* and on the basis of technical specifications. After quantifying the emission, we monetize it according to the tables (Table 5).

Table 5.

Costs of pollutant emissions in land transport 2015 (PLN/tonne of emissions)

NOx	NMVOC	SO2	PM2.5	
			Urban area	Rural area
63,984.88	7,992.16	68,752.55	1,054,769.33	226,195.17

Note. Adaptation from: Beneficiary Vademecum, CUPT, 2016, p. 99.

The **evaluation of the improvement in passenger service quality at a railway station** is made by means of the *Passenger Willingness to Pay Analysis* (WTP) through questionnaire surveys in relation to the ticket price (Table 6).

Table 6.

Benefits of a comprehensive railway station modernization as a percentage of the average ticket price for journeys beginning or ending at that station

Type of railway junction	WTP (% of the average ticket price)
National change centre	10.21
Regional change centre	8.14
Medium-sized railway stations	13.86
Railway stops	14.69

Note. Adaptation from: Beneficiary Vademecum, CUPT, 2016, p. 104.

The **impact of the project on noise**, e.g. when replacing the ground station with an underground station or when building a tram depot, is quantified on the basis of a noise and population density map. We calculate the number of people exposed to a given noise level and for whom the noise is nuisance. Then, we multiply the number of people determined in this way into the unit costs of noise per person. Noise unit cost tables are included in the *Blue Books* (2015) and in the *Beneficiary Vademecum* and shown in Table 7.

Table 7.

Noise costs depending on its level in Poland (PLN/person/year, prices from 2015)

dB	55–59	60–64	65–69	70–74	75–79
Polish	178	305	432	671	892

Note. dB – de cibel. Adaptation from: Beneficiary Vademecum, CUPT, 2016, p. 102.

In the case of most projects implemented on **railway infrastructure**, we deal with **mixed passenger and freight traffic**. For this type of projects, we use the methodologies of the *Blue Book Railway infrastructure* (NK, Railway sector, Railway infrastructure, 2015). The JASPERS initiative^{iv}, operating under the cooperation of the European Commission, the European Investment Bank and the European Bank for Reconstruction and Development, is in the process of preparing new detailed methodological recommendations for estimating the cost of time in rail freight transport.

4. Summary

In order to calculate the costs and benefits of an infrastructural transport undertaking and to monetize its quantified effects, one should use:

- external sources for macroeconomic forecasts, and
- unit cost tables.

First of all, these are the **Variants of the economic development of Poland** (Portal of European funds, Variants of economic development of Poland, 2020) published by Managing Authorities for beneficiaries of EU funds. These forecasts are updated at least once a year. Some forecasts, e.g. of demographic development, are prepared by the Central Statistical Office or other institutions. However, as regards the **unit costs** needed for economic analysis, it is necessary to: *first*, obtain the most recent data possible; *then* make appropriate adjustments in the direction of:

- conversion of foreign currencies into national currency (if unit cost tables are prepared in other countries and currencies),
- taking into account the purchasing power parity in the investor's country according to the formula:

for the target area = GDP per capita in PPS for the target area/GDP per capita in PPS for the exit area X value for the exit area^v,

- indexation by inflation to raise prices to the level of the year of the analysis,
- indexation with forecasts of economic development indicators.

The unit costs of individual factors for socio-economic analyses are periodically updated, and beneficiaries can expect that after the end of the current financial perspective 2014-2020 and the related settlement procedures in 2023, research teams will develop new updated tables of unit costs in transport. On the other hand, the methodology of quantification and monetization of economic effects in transport infrastructure projects is and will be supplemented and developed in order to present clearer algorithms for its application. The use of the latest sources and methodologies has a significant impact on the credibility of the results of economic analyses of capital-intensive infrastructure transport projects, and is the basis for the effectiveness of obtaining and co-financing projects from European funds in the next financial perspective 2021-2027.

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13. Wojewódzka-Król, K., Rolbiecki, R. (2018). *Infrastruktura transportu. Europa, Polska – teoria i praktyka*. Warszawa: PWN.
14. *Wytyczne w zakresie zagadnień związanych z przygotowaniem projektów inwestycyjnych, w tym projektów generujących dochód i projektów hybrydowych na lata 2014-2020* (2015). Warszawa: Ministerstwo Infrastruktury i Rozwoju – MIR. https://www.funduszeuropejskie.gov.pl/media/68128/wytyczne_PGDI_PH_2014_2020_10_01_2019.pdf, 15.09.2021.
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Notes

- ⁱ The calculation of the funding gap is presented in *Wytyczne (Guidelines)* (MIR, 2015) and in *Vademecum Beneficjenta (Beneficiary Vademecum)* (CUPT, p. 17-18).
- ⁱⁱ The methods of forecasting the demand for transport infrastructure services, and thus the revenues from it, are described in the *Beneficiary Vademecum* (CUPT, 2016, p. 35-48).
- ⁱⁱⁱ The examples are based on: (*Beneficiary Vademecum, 2016, CUPT*, p. 67-105) and (NK, *Blue Books*, 2015).
- ^{iv} JASPERS- Joint Assistance to Support Projects In European Regions. JASPERS initiative aims to assist within EU-funded major infrastructure projects of over € 50 million, such as roads, railways, water, waste, energy and urban transport projects. https://ec.europa.eu/regional_policy/archive/thefunds/instruments/jaspers_pl.cfm, 28.09.2021.
- ^v The GDP per capita index expressed in PPS (*Purchasing Power Standard*) shows the amount of GDP of a given country in relation to the EU average, the value of which was assumed to be 100. It is calculated taking into account differences in the price level between countries. (*Eurostat. Your key to European statistics*). <https://ec.europa.eu/eurostat/web/products-datasets/-/tec00114>), 26.09.2021.