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EVALUATION

Ex post evaluation of major projects in transport financed by the European Regional Development Fund and the Cohesion Fund between 2000 and 2013

{SWD(2020) 42 final}

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Glossary

| LIST OF ABBREVIATIONS | |
|-----------------------|--|
| B/C | Benefit/cost ratio |
| CBA | Cost-benefit analysis |
| CEF | Connecting Europe Facility |
| CF | Cohesion Fund |
| DG REGIO | Directorate-General for Regional and Urban Policy |
| EC | European Commission |
| EIA | Environmental impact assessment |
| EIB | European Investment Bank |
| ENPV | Economic net present value |
| ERDF | European Regional Development Fund |
| ESIF | European Structural and Investment Funds |
| ERR | Economic rate of return |
| EU | European Union |
| FNPV/C | Financial net present value of the investment |
| FNPV/K | Financial net present value of national capital |
| FRR/C | Financial rate of return on investment |
| FRR/K | Financial rate of return on national capital |
| GDP | Gross domestic product |
| GHG | Greenhouse gas |
| GNI | Gross national income |
| ICT | Information and communication technologies |
| IPA | Instrument for Pre-Accession |
| ISPA | Instrument for Structural Policies for Pre-Accession |
| JASPERS | Joint Assistance to Support Projects in European Regions |
| KfW | Kreditanstalt für Wiederaufbau |
| NPV | Net present value |
| NUTS2 | Nomenclature of territorial units for statistics |
| O&M | Operating & maintenance |
| PPP | Public-private partnership |
| TEN-T | Trans-European transport networks |
| TO | Thematic objective |
| ToRs | Terms of reference |
| VOC | Vehicle operating costs |

1. INTRODUCTION

Cohesion policy is the EU's key investment policy. Enshrined in the Treaty on the Functioning of the European Union (TFEU) (Article 174-178), it aims to strengthen economic, social and territorial cohesion by reducing disparities in the level of development between regions. The policy focuses on key areas which will help the EU face up to the challenges of the 21st century and remain globally competitive. The objectives of cohesion policy are to be achieved notably through three Funds: the European Regional Development Fund (ERDF), the Cohesion Fund, and the European Social Fund (ESF¹). Transport infrastructure projects are financed by the ERDF and the Cohesion Fund, so the analysis in this document is limited to those two Funds.

The European Regional Development Fund invests in sectors that contribute to economic growth with the aim of fostering competitiveness and creating jobs in all EU regions and cities. ERDF actions are designed to address territorial, economic, environmental and social challenges, with a special focus on sustainable urban development. The Cohesion Fund supports Member States whose Gross national income (GNI) per inhabitant is less than 90% of the EU average. Countries falling into this categories are known as 'cohesion countries'². The Cohesion Fund aims to reduce economic and social disparities and to promote sustainable development by primarily investing in transport networks and the environment. The funds are managed using the 'shared management' method, in which responsibility is divided between national and regional authorities and the European Commission³. Managing authorities select, finance and monitor investment projects that can best help to serve local needs.

The ERDF and the Cohesion Fund have supported a wide range of projects, ranging from enterprise support to infrastructure, and from urban regeneration to culture and social infrastructure. For almost all the cohesion countries, the two funds accounted for between 20% and 60% of government capital investment between 2000 and 2013 — a crucial contribution in the period concerned. In the rail sector, it is estimated that 10% of overall investments in the EU at aggregate level between 2000 and 2020 originated from large-scale projects financed by the Cohesion Fund, the ERDF (these two constituting the majority) and the Connecting Europe Facility^{4,5}.

¹ Under the current programming period, the ERDF and Cohesion Fund, together with the European Social Fund (ESF), European Agricultural Fund for Rural Development (EAFRD) and the European Maritime and Fisheries Fund (EMFF), make up the European Structural and Investment Funds (ESIFs).

² Four Member States: Spain, Greece, Portugal and Ireland were eligible under the Cohesion Fund from 1 January 2000 (from 1 January 2004 Ireland was no longer eligible as its GNI average exceeded 101%). With the EU enlargement on 1 May 2004, all new Member States (Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia) qualified for the Cohesion Fund. The 2014-2020 cohesion countries are: Bulgaria, Croatia, Cyprus, Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia.

³ See the Financial Regulation applicable to the general budget of the Union and its rules of application (2012), Title IV, Chapter II, Art. 58(b).

⁴ The Connecting Europe Facility (CEF) is a key EU funding instrument developed specifically to direct investment into European transport, energy and digital infrastructures to address identified missing links and bottlenecks.

Cohesion policy is implemented in line with a seven-year multiannual programming cycle. This report covers the 2000-2006 and the 2007-2013 multiannual financial frameworks.

Large-scale transport projects

Meeting significant infrastructure needs has been a major challenge for the EU. Cohesion policy has made a significant contribution in this respect, both at trans-European level and within individual Member States, in particular in less developed states and regions. Over the 2000-2006 period, the EU transport system received €32.5 billion in ERDF and Cohesion Fund co-financing⁵. Between 2007 and 2013, the total cohesion policy allocation to transport was €82.2 billion.

Large-scale infrastructure projects in transport accounted for key investments in operational programmes involving a significant value of financial investment. In both periods, transport projects whose total cost exceeded €50 million qualified as major projects and had to comply with specific rules, including an assessment procedure and a specific approval decision by the European Commission. In the 2000-2006 programming period, out of 258 major projects, 144 were undertaken in the transport sector, while in 2007-2013, 463 out of 945 major projects were transport-related.

Purpose and scope

The ERDF/Cohesion Fund programmes⁶ were subject to *ex ante* and *ex post* evaluation, as provided for in the Financial Regulation⁷. Further evaluation requirements were explicitly included in the Regulations establishing the Funds. For example, specific provisions for the 2007-2013 period⁸ required the Commission to carry out an *ex post* evaluation, as outlined in the quotation below.

‘Examine the extent to which the resources were used, the effectiveness and efficiency of Fund programming and the socioeconomic impact. It will be carried out for each of the objectives and will aim to draw conclusions for the policy on economic and social cohesion. It will identify the factors contributing to the success or failure of the implementation of operational programmes and identify good practice.’

The Commission carried out *ex post* evaluations for both the 2000-2006 and 2007-2013 periods; the evaluations were finalised in 2010⁹ and 2016¹⁰ respectively. While both evaluations covered transport projects, the primary focus of the analysis was not on major transport infrastructure projects, i.e. those with total eligible costs exceeding €50 million. Given the long term nature of such projects and the fact that their effects take longer to materialise, it was too early to carry out an evaluation capable of capturing

⁵ Steer Davies Gleave (2010). *Ex post* evaluation of cohesion policy programmes 2000-2006 co-financed by the ERDF (objectives 1&2) — work package 5a: transport, Final Report.

⁶ Cohesion Fund support was project-based in 2000-2006. In 2007-2013 it was programmed jointly with ERDF in national programmes.

⁷ Commission Financial Regulations applicable to the general budget of the Union and its rules of application (2012), Part I, Title II, Chapter 7, Art. 30.4.

⁸ Article 49(3) of Council Regulation (EC) No 1083/2006 of 11 July 2006, laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund.

⁹ See https://ec.europa.eu/regional_policy/en/policy/evaluations/ec/2000-2006/.

¹⁰ SWD(2016) 318. *Ex post* evaluation of the ERDF and Cohesion Fund 2007-13.

such effects. This staff working document aims to fill that knowledge gap. It presents the *ex post* evaluation of major transport sector projects implemented during the 2000-2006 and 2007-2013 programming periods and co-financed by the ERDF and the Cohesion Fund¹¹.

A total of 10 major projects from the two programming periods were selected to form the scope of the assessment. To capture as much as possible the projects' long term effects, only projects which had been in operation for at least five years were taken into consideration. The choice of projects followed a thorough analysis¹² of all major projects undertaken in both periods, taking account of data availability, and drawing on project documentation, interviews with managing authorities and web/desk research.

The sample chosen is not meant to be statistically representative. The ultimate goal was to select cases that can deliver interesting insights on the possible long term effects of large-scale transport infrastructure projects and capable of providing meaningful project narratives from which to draw useful policy lessons for the future, as the EU will continue to support large transport infrastructure projects through the ERDF, the Cohesion Fund and the Connecting Europe Facility.

Overall, the 10 cases represent more than €3.2 billion of total (national plus cohesion policy) investments, out of which the ERDF and the Cohesion Fund accounted for €1.1 billion of support.

The evaluation addresses the five criteria by which EU support for investment should be judged according to the Better Regulation Guidelines¹³: relevance, coherence, effectiveness, efficiency and EU added value. This is achieved through a consistent use of retrospective cost-benefit and qualitative analysis.

2. BACKGROUND TO THE INTERVENTION

The goals and intervention logic of cohesion policy

The basis of cohesion policy is enshrined in the Treaty. When the 2000-2006 programmes were prepared, the Treaty laid down the following objective for the Union: 'to promote economic and social progress and a high level of employment and to achieve balance and sustainable development, in particular through (...)the strengthening of economic and social cohesion'¹⁴, this objective was later made more specific by saying: 'In particular, the Community shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions or islands, including rural areas'¹⁵.

¹¹ The ERDF and the Cohesion Fund finance a number of activities and projects in other areas. Consequently, the evaluation will have a narrower scope than would have been the case for an evaluation of the funds.

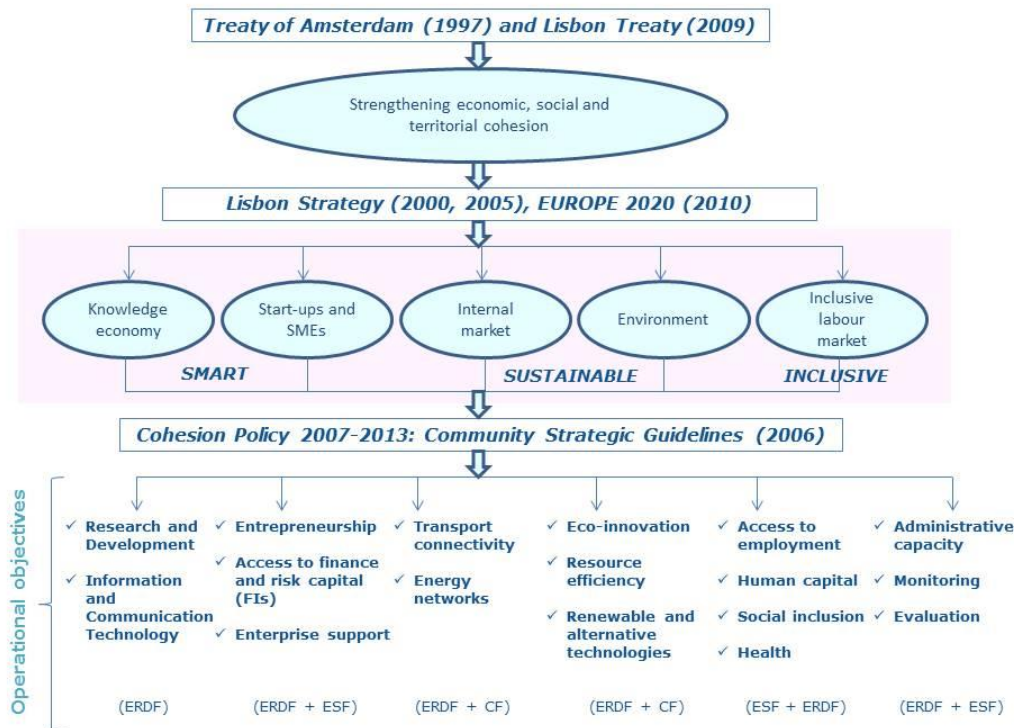
¹² See details in 4.2 and Annex 3.

¹³ SWD(2017) 350. Better Regulation Guidelines.

¹⁴ Article B Treaty of European Union (version 1997).

¹⁵ Article 158 of the Treaty Establishing the European Community (version 2006).

The Lisbon Treaty, which came into force in 2009, made one change, adding territorial cohesion as an objective. Article 3(3) TEU now states that the EU ‘shall promote economic, social and territorial cohesion’¹⁶.



Source: SWD(2016) 318 final. *Ex post* evaluation of the ERDF and Cohesion Fund 2007-13, p. 7.

Cohesion policy translates its objectives at three levels (see diagram above):

1. General objectives: achieving economic, social and territorial cohesion. This is sometimes aggregated into single measures (notably GDP/head). However, disparities in levels of development can also be seen in terms of individual economic goals (such as innovation or entrepreneurship), social goals (such as inclusion and health) and territorial goals (such as access to a quality transport network).
2. Strategic objectives: achieving smart, sustainable and inclusive goals as defined by the Lisbon Strategy and Europe 2020. These are not just a link between economic, social and territorial cohesion on the one hand and the individual investment objectives on the other, they are also a link to Europe’s priorities and goals.
3. Operational objectives: individual policy themes. They contribute to cohesion in two ways. The first, as mentioned above, is cohesion in terms of reducing disparities in the various social, economic and territorial themes. The second is the contribution to the overall strengthening of economic, social and territorial cohesion.

¹⁶ Treaty on European Union. Title XVII of Part Four of the Treaty on the Functioning of the European Union is now devoted to ‘Economic, social and territorial cohesion’.

Shared management — a key feature of cohesion policy

The ERDF and Cohesion Fund are delivered under shared management. Programmes are not run directly by the Commission; instead they are implemented in partnership with the Member States. The principles and priorities of cohesion policy are distilled through a process of discussion between the Commission and Member States. However, the day-to-day management of the policy, including selection of investment projects, is carried out by managing authorities (a national ministry, regional authority or local council) appointed by the Member States.

Large infrastructure projects in transport and their technical aspects

The 2000-2006 Regulation¹⁷ specified that major projects are those ‘which comprise an economically indivisible series of works fulfilling a precise technical function and which have clearly identified aims; and whose total cost taken into account in determining the contribution of the Funds exceeds EUR 50 million’.

In the 2007-2013 period, major projects were defined along the same lines¹⁸. The Regulation initially set a minimal total cost of €25 million in the case of the environment, before being aligned to € 50 million¹⁹, and €50 million in other fields (transport among others). During the 2000-2006 and 2007-2013 periods, major projects had to undergo specific approval procedures. The Commission had to appraise and approve major projects that were co-financed within the operational programmes. When submitting a major project for approval to the Commission, the competent authority presented a **cost-benefit analysis** of the project including: (i) an assessment of financial costs and benefits; (ii) a risk assessment; (iii) information on the economic viability of the project; (iv) an assessment of the feasibility of obtaining full or partial private financing for the project; and (v) an indication of how far the Funds’ contribution would influence whether the projects would be implemented.

In the case of investment in major projects, an analysis of the project’s social costs and benefits was indispensable, including an indication of the foreseeable impact on the development or conversion of the region concerned, and of the application of EU rules on public contracting. With this information, the Commission then assessed the project and took its decision on the basis of the following factors:

- the type of investment planned and, where applicable, the revenue expected;
- the results of the cost-benefit analysis, where the project had to have an overall positive marginal equity (i.e. society would be better off with the project than without the project);
- the result of the evaluation of the impact on the environment;

¹⁷ Art. 25 of the Council Regulation (EC) No 1260/1999 of 21 June 1999 laying down general provisions on the Structural Funds.

¹⁸ Art. 39 of the Council Regulation (EC) No 1083/2006 of 11 July 2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1260/1999: ‘an operation comprising a series of works, activities or services intended in itself to accomplish an indivisible task of a precise economic or technical nature, which has clearly identified goals’.

¹⁹ According to the General Provisions Regulations, the total costs threshold to define large-scale infrastructural projects in the environment and transport sectors as ‘major projects’ equalled to €50 million during the 2000-2006 and 2007-2013 programming periods. For this latter period, the threshold for environmental major projects was initially set at €25 million, before being aligned to €50 million.

- consistency with the priorities in the corresponding assistance;
- compliance with other EU policies;
- a breakdown of the main sources of the expected economic and social benefits, particularly in terms of employment, value of time saved and value of accidents saved, having regard to the financial resources deployed;
- the coordination of the financial instruments and the combination of assistance and loans.

In the 2007-2013 programming period, requirements as regards information submitted to the Commission were similar. Member States were requested to submit:

- an analysis of the forecast impact on the sector concerned;
- an analysis of the forecast impact on the socio-economic situation in the Member State and/or the region concerned and, where possible and appropriate, in other relevant regions.

In 2005, facing the challenge of preparing and approving large infrastructure projects from the Member States that joined the EU in 2004 (the 'EU-10'), the European Commission joined forces with the European Investment Bank (EIB) in a new initiative known as 'Joint Assistance to Support Projects in European Regions' (JASPERS). The aim was to provide Member States with independent advice to help them prepare quality proposals for large investment projects for funding through the EU's Cohesion Fund and ERDF.

The initiative was financed through the Commission's technical assistance budget. Since 2006²⁰ JASPERS has assisted more than 500 projects (mainly major projects). Support from JASPERS is initiated at the request of a Member State, on the basis of an annual action plan. The action plan identifies a number of project tasks that JASPERS will carry out for the Member State in the year in question.

3. IMPLEMENTATION/STATE OF PLAY

Description of the situation

2000-2006

The ERDF and the Cohesion Fund invested €39 billion in transport infrastructure between 2000 and 2006, of which major projects accounted for €24.7 billion (63%²¹). Across 18 Member States reporting output indicators for transport, overall transport investment co-funded by ERDF and the Cohesion Fund resulted in:

- 99,145 km of motorways and other roads, of which 12,744 km were newly built, the rest being reconstructed or not classified;
- 3,714 km of railways, of which 573 km newly built;

²⁰ JASPERS was originally intended to operate for the 2007-2013 period only, but following two evaluations, in 2010 and 2012, the Commission and EIB decided to continue with the initiative.

²¹ Calculated by the Commission, based on the annual implementation reports.

- the modernisation of 31 airports and numerous other infrastructure projects (ports, docks, parking lots, etc.²²)

2007-2013

In the 2007-2013 period, investment in transport was a major focus of support from the ERDF and Cohesion Fund, accounting for 30% of the overall allocation of both funds and totalling €80.9 billion. The vast majority (€54.5 billion²³) of this amount was spent on major projects.

Overall ERDF- and Cohesion Fund-financed transport investments resulted in:

- the construction of around 4,900 km of new roads, mostly motorways, equivalent to nearly half of the Europe-wide TEN-T network, of which around 3,500 were in the EU-10 countries²⁴;
- the upgrading of almost 27,800 km of roads, of which nearly 18,700 km were in the EU-12 countries;
- the construction of 1,050 km of new railway lines;
- the upgrading of 3,900 km of railway lines, almost 1,600 km in the EU-12, and 2,620 km constructed or upgraded lines on the TEN-T network.

4. METHOD

4.1. Short description of methodology²⁵

This staff working document is largely based on a study by an independent consultant²⁶. The analysis was complemented by internal Commission data on fund management, analytical reports²⁷ and past evaluations²⁸. The analysis is intended to answer evaluation questions formulated in the evaluation roadmap, the methodology following the Better Regulation Guidelines²⁹ and the European Commission's guide to cost-benefit analysis³⁰.

The methodological framework is based on an extensive review of the relevant theoretical and empirical literature³¹. It consists of an *ex post* **cost-benefit analysis** (CBA) complemented by qualitative techniques (project site visits, interviews with stakeholders, press articles reviews, etc.), combined in such a way as to produce a history of each project. A comprehensive set of parameters and unit values for the most common direct benefits was developed and applied consistently to all cases. The counterfactual is

²² Steer Davies Gleave (2010). *Ex post* evaluation of cohesion policy programmes 2000-2006 co-financed by the ERDF (objectives 1&2)-work package 5a: transport; Final Report. Separate data for major projects were not collected for the 2000-2006 period, this changed in the following periods.

²³ Open Data Platform: <https://cohesiondata.ec.europa.eu/>.

²⁴ EU 10 countries includes all new Member States which acceded to the EU on 1 May 2004: Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.

²⁵ A full description is provided in Annex 3 — Methods and analytical models.

²⁶ CSIL, Ramboll, Significance BV, TPlan Consulting (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013. The study was conducted between June 2017 and June 2018.

²⁷ The list of literature is available in Annex 1, point 5.

²⁸ See https://ec.europa.eu/regional_policy/en/policy/evaluations/ec/2000-2006/ and SWD(2016) 318.

²⁹ SWD(2017) 350. Better Regulation Guidelines.

³⁰ European Commission (2014). Guide to Cost-Benefit Analysis of Investment Projects. Economic Appraisal tool for Cohesion Policy 2014-2020. December 2014.

³¹ The most relevant literature is listed in Annex 1, point 5.

built on the ‘what would have happened in the absence of the project’ scenario. For most projects, the long term effects were readily available, measurable and suitable for evaluation. They include, in particular, changes in travel time, vehicle operating costs, income for the service provider, and changes in levels of noise and in the level of pollution. Non-measurable effects, though identified and analysed, usually played a minor role in the overall long term effects, so their assessment did not affect the CBA results³². Non-measurable effects include the impact on biodiversity, the reliability of service and institutional learning.

Evidence collection and validation of the results were supported by consultation activities. Consultation took place in three blocks:

- targeted interviews (245 people interviewed) between September 2017 and January 2018 to gather evidence for case studies;
- targeted online consultations³³ between 13 April and 25 May 2018: out of 40 respondents, 27 responded on behalf of a national, regional and local authority or economic operator;
- a technical seminar held on 23 March 2018 in Brussels, which provided feedback and insight into the preliminary results of the project.

4.2. Review and selection of the case studies³⁴

As described in Chapter 3.1, major projects constitute a substantial part of transport investments funded by the ERDF and Cohesion Fund. It is therefore essential to assess whether and how far they contribute in the long term to economic development, the quality of life and well-being of society. In this respect, the projects to be assessed needed to be in operation at least 5 years before the launch of the evaluation as this was the length of time considered necessary for the effects to materialise and stabilise. This criterion was key in the case studies selection process. The first stage involved a thorough analysis of available major project documentation, interviews with managing authorities and web/desk research. On this basis, a shortlist of 30 projects was drawn up. The final list of 10 case studies was then selected on the basis of a scoring exercise. Three broad criteria were used, each with a different weighting to indicate its relative importance in the project selection:

- strategic relevance for evaluation purposes (weighting 40%), i.e. the extent to which the project could contribute to answering the evaluation questions;
- availability and quality of data from existing sources (weighting 30%), i.e. the extent to which data and information needed for the *ex post* evaluation are already available, relevant and appropriate to the evaluation scope and purposes, and are of good quality;
- the stakeholders’ willingness to cooperate and the availability of information to contribute to a project-tailored theory of change analysis (weighting 30%).

³² One exception is the German Autobahn 24 case, where, even with a positive CBA result, the final score for effectiveness is negative. This is because the main objectives of the project were not strictly linked to clear transport needs, but rather to broader economic and political considerations in the reunified Germany. For further details on non-measurable impacts, see Annex 3 —Methods and analytical models.

³³ Targeted consultation replaced a general open public consultation because this specific type of cohesion policy investment (a ‘major project’) is hardly recognised by the public as a separate policy tool.

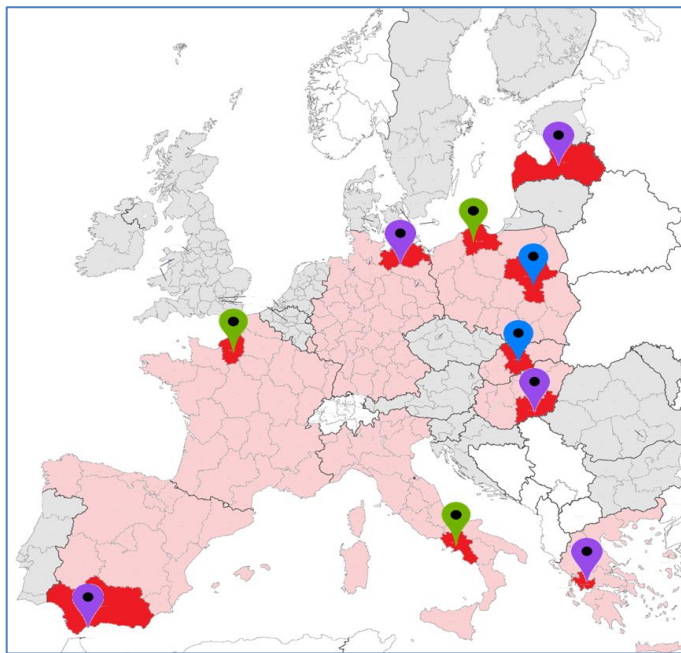
³⁴ Full details are described in the first Interim Report, Vol. II, see also Annex 5.

The second and the third criteria above played a fundamental role in the choice of the projects. Within the context of shared management, Managing Authorities are responsible for the collection and monitoring of data at project level. Except for the Cohesion Fund projects during the 2000-2006 period, the Commission only collects data at the programme level. Data availability and quality at project level may therefore be challenging and the possibility to rely on quality data and stakeholder's willingness to cooperate with the Commission in providing these data are therefore essential requirements for any evaluation purpose. Cohesion policy data monitoring and collection have improved over the recent years. In particular, the introduction of the Open Data Platform has also given a fundamental boost to improving transparency.

The final choice of the ten projects also aimed at ensuring a reasonable geographic and sectoral coverage (taking account of the relative scale of expenditure on the different sub-sectors), financing period, type of projects and type of financing as clarified below:

- Five were road projects (two motorways, two bypasses and a bridge), including an example of a cross-border road (in Hungary) and a private-public partnership project (in Greece);
- Two were railway projects, one modernising a railway line in Slovakia, the other modernising railway track in Poland, combined with the construction of a new rail link to Warsaw airport;
- Three were urban transport projects, including the construction of a tramline in Le Havre, France, and two extensions linked to the renovation of an existing network/infrastructure (Naples and Gdańsk);
- Three projects were financed under the 2000-2006 programming period, while the other seven projects were financed under the 2007-2013 period;
- As for geographical coverage, the 10 cases are situated in 9 different countries. A good coverage of western (Spain, France, Germany and Italy) and central and eastern European countries (Latvia, Poland, Slovakia and Hungary) was ensured;
- The 10 selected projects cover different types of region in terms of economic development. Six projects are located in cohesion countries (Greece, Latvia, Poland, Hungary and Slovakia), and the remaining four in non-cohesion countries: one in a transition region³⁵ (Mecklenburg-Western Pomerania in Germany), two in less developed regions (Western Greece, Andalusia, Spain) and one in a more developed region (Upper Normandy in France).

³⁵ A 'less developed region' is a region whose per capita GDP is less than 75% of the EU average; a 'transition region' is one where per capita GDP is between 75% and 90% of the EU average, while for a more developed region the figure is above 90%.



- Road
 - Germany — A14 motorway
 - Greece — Rio-Antirio bridge
 - Hungary — M43 motorway
 - Latvia — Saulkrasti bypass
 - Spain — Malaga bypass
- Rail
 - Poland — Warsaw rail link
 - Slovakia — Žilina railway modernisation
- Urban transport
 - France — Le Havre tramway
 - Italy — Naples Metro
 - Poland — Gdańsk tramway

Figure 1. Selected case studies; CSIL, Ramboll, Significance BV, TPlan Consulting (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013.

4.3. Limitations and specificity of the methodology applied

In the case of transport infrastructure, it takes differing lengths of time for the effects to realise and stabilise their full potential. Effects directly related to transport projects’ primary objectives, such as time savings or reductions in CO₂ emissions, are relatively straightforward to capture and measure, while wider effects such as socioeconomic impacts, urban image, and spatial or environmental footprints are difficult to isolate and attribute to an individual project. Therefore these were analysed in a qualitative way and their assessment is conservative³⁶. It is also difficult to separate the influence of a major project from a whole set of factors influencing growth, jobs and other long term outcomes: individual projects, even those of a large scale, rarely produce impacts of a significant magnitude that could be reflected in macroeconomic indicators. Finally, the examined period coincided with the financial crisis of 2008, which complicates the analysis even more (see Q2 in 5.1).

The evaluation captures a change that the major projects brought over time; it compares a situation before implementing the project with that after the project’s implementation.

The sample chosen is not meant to be statistically representative. The choice to focus the evaluation on a sample of ten major projects was the result of an internal analysis. It took into account the financial and timing constraints associated with the assessment of a

³⁶ A conservative approach is to some extent compensated by the existing insight into the effects of cohesion policy support on transport infrastructures in general, and mitigates the risk of underestimating the effectiveness. An example of this approach is the *ex post* evaluation on transport of the 2007-2013 period.

wider sample and the need to have quality data. This choice may have led to underestimate effectiveness. Despite this limitation, the ten projects selected are considered as illustrative examples of infrastructure projects capable of providing a range of experience suitable for developing project narratives and drawing policy lessons.

The objective of the analysis was to capture the long term contribution of the projects to economic development, quality of life and environmental sustainability. Only projects which had been in operation for at least five years at the time of the evaluation and therefore “finalised” and mature enough to produce stable outcomes were therefore chosen. This factor *per se* may have created a positive bias.

Since the projects are in operation, it was necessary to cover *ex ante* and *ex post* perspectives (i.e. backward-looking and future values). *Ex ante* values serve as a starting point for the analysis, while the deviations from initial assumptions that are found in the values *ex post* are examined to find the reasons for any differences. The objective of the comparison between *ex ante* and *ex post* assumptions is therefore not to produce an updated cost-benefit analysis, but rather to complement the analysis of the projects’ performance. A straightforward assessment of an *ex ante* CBA against the *ex post* results would have not been informative because the results of these assessments are not easily comparable; even if they rely on the same broad principles and draw on an established CBA methodology, there are often important differences between how they are calculated *ex ante* and *ex post*. The main differences can be observed in the following:

- **Scope:** In the case of Naples, for example, the *ex ante* CBA did not include the tunnel excavation. This was instead included in the *ex post* CBA, in accordance with the principle of the appropriate unit of analysis. In this case, the electrification of the line is functionally linked to the tunnel construction in order to deliver the expected benefits
- **Parameters and unit values:** In an *ex post* perspective both forward- and backward -looking parameters were quantified according to EU benchmarks and consistently adopted throughout all the cases. In the *ex ante* phase, the CBA relied mostly on national parameters
- **Methodological approach:** While the *ex ante* CBA (for example, for the German motorway and the French tramway) expected significant benefits in terms of wider and socioeconomic effects (including employment and urban regeneration), these benefits were not covered by the *ex post* CBA due to the absence of solid evidence of a causal link between the project implementation and the effect. On the other hand, the lack of reliable data was the main reason for not including reliability of journey time in the CBA, although it is in many cases a potentially quantifiable and significant effect. The *ex post* CBA looked into direct transport benefits, mainly time savings and vehicle operating costs.

5. ANALYSIS AND ANSWERS TO THE EVALUATION QUESTIONS

5.1. Effectiveness

In general, the direct effect of transport infrastructure investments is that they improve travel conditions for users of that infrastructure. Such improvements can lead to changes in users’ behaviour, bringing with them wider impacts on the usage of the network. At the same time, investments in transport infrastructure generate externalities (a

consequence not reflected in market prices) for the environment and society, such as pollution and noise.

In addition, there could be further (wider economic) impacts that may contribute to the regeneration of a region that are not taken into account in a traditional CBA, such as effects on accessibility, or level and location of employment³⁷.

On the whole, all projects under consideration shared two general objectives: improvements in connectivity and reducing congestion. In addition, each of them had specific objectives responding to specific local needs such as:

- reduction in travel time
- diverting traffic from densely populated areas to less populated areas
- increased safety
- increasing reliability of transport and user comfort
- boosting local economic development.

The effects generated by the projects were grouped into four different dimensions: economic growth, quality of life, environmental sustainability and distributional effects.

In terms of time scale, effects can materialise in the short and/or in the long term. Direct transport effects can be for example savings in travel time (Rio Antirio Bridge, Malaga Bypass, Gdańsk tram) or reductions in vehicle operating costs (Saulkrasti Bypass, Žilina Railway). Those benefits materialise usually in the first five years after the completion of the project. Some of them may become diluted in the long term — for example travel time savings may disappear due to traffic increases (the Malaga bypass is a clear example). Long term wider impacts are usually linked to changes in sectors indirectly linked to transport; they may influence reallocation of production, changes in trade routes or property prices. These effects take more time to materialise. As there are many other external factors that can influence ‘wider economic impacts’ in the region, it is difficult (if possible at all) to find a direct causal link between the individual transport investment and a change observed.

The spatial scale of impact of major projects in transports vary according to the type of effects. For instance, the Malaga bypass has a positive effect on the whole regional road network, as it is part of a strategic corridor. The same applies to the Latvian major project – Saulkrasti bypass – which is part of the via Baltica road, the most important highway connecting the three Baltic states. Firstly, this major project helped to better connect the Latvian capital to the Estonian border; secondly, it contributed to upgrade the TEN-T road network, which links Prague to Helsinki (European Route E67). Local spatial effects are more related to quality of life effects and environmental ones, such as the reduction in noise externalities, or more comfortable and modern public transports, as in the case with the Le Havre Tramway project.

Past evaluations³⁸ confirm that transport projects funded between 2000 and 2013 delivered planned improvements in the quality of transport systems and reduced travel

³⁷ See the methodology in Annex 3.

³⁸ Applica and Ismeri Europa (2016). *Ex post* evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF), WP 1: Synthesis Report. Applica and Ismeri Europa (2010). *Ex post* evaluation of Cohesion Policy Programmes 2000-2006 financed by the European Regional Development Fund in Objective 1 and 2 Regions; Synthesis Report.

time. They also improved the accessibility to the main centres of economic activity, contributing to better spatial distribution. Strengthened transport links in the EU are more evident in the EU-12 countries, where the transport system was in poor condition after decades of neglect and where important links were missing, as well as in the southern EU-15 convergence regions³⁹. Investment therefore increased the accessibility of the countries and regions concerned and opened up the possibility of increased trade with the rest of the EU, which is vital for economic development.

As regards long term regional prosperity, past evidence⁴⁰ shows that GDP growth is the largest in Poland's Podkarpackie and Warmińsko-Mazurskie regions and in Romania's West region, where the estimated increase in GDP from investment in transport infrastructure alone is expected to be 0.2-0.3% in 2023. Other detailed data on local economic impacts are scarce, so *ex post* analysis usually covers direct transport benefits (travel time savings), neglecting long term effects. The Naples metro could be an exception here — property prices around the five new railway stations increased by 10% (valued at €117.7 million⁴¹).

The analysis of effectiveness of major projects in transport was undertaken by answering six specific questions, considered one-by-one in the following sections.

Q1. Have the examined major projects achieved the objectives stated in the applications for cohesion policy support?

Q.6. How have these changes matched the existing development needs, the priorities established at programme and/or national level, the overall goals of the ERDF and Cohesion Fund?

All projects were implemented within their operational programmes, and contributed to meeting programme objectives. Table 1 shows how the OPs' and projects objectives relate to each other.

For most of the projects, travel time savings and vehicle operating cost savings were the dominant benefits observed *ex post*. By making transport costs cheaper, they also increased productivity and made a positive contribution to the economy. Wider economic benefits initially sought by the project were difficult to isolate and assess, as they could not be directly attributed to the project only. The final assessment of the effectiveness of each project, together with the underlying motivation, is presented in Table 1.

Based on the evidence gathered *ex post*, the smaller benefits estimated in the *ex post* evaluation compared to those forecast *ex ante* do not seem to be related to problems in the physical implementation of the projects: none of them suffered major operational setbacks. To some extent this may be due to the fact that some effects may have not yet stabilised or their full materialisation may be somewhat delayed. For example, the Naples metro line may perform better in terms of passengers served in the future once the necessary new rolling stock is purchased and the additional sections of metro line are opened. Moreover, the effectiveness of transport infrastructure is often influenced by existing or planned networks. Therefore, a project placed within a strategic broader

³⁹ Regions where the GDP per capita was less than 75% of the EU average.

⁴⁰ Applica and Ismeri Europa (2016). *Ex post* evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF), WP 1: Synthesis Report.

⁴¹ See "Naples Metro Line 1 Vanvitelli-Dante section Urban Railway Project" case study.

network plan tends to perform much better. In the case of the A14 motorway, traffic levels were below expectations not only because of inaccurate traffic forecasts, but also due to: (i) a weak analysis of its alignment within existing network; (ii) the motorway's limited accessibility from most parts of the Schwerin area; and (iii) competition from the parallel A20 motorway nearby.

The importance of this aspect was already recognised during the 2014-2020 period with the introduction of specific preconditions for funding 'ex ante conditionalities' in the transport sector⁴² requiring transport projects to be part of comprehensive transport frameworks in order to be granted funding.

The main tangible effects produced by funding large transport infrastructure projects are those immediately related to the projects' pure 'transport' objectives, such as reducing congestion and travelling times. This explains why projects with clearly defined "pure" transport objectives (such as reducing congestion and travelling times), and thus generating direct transport benefits (such as time savings or vehicle operating cost reductions) – which could be quantified - scored much better in terms of effectiveness than projects whose objectives were defined in a broad way, i.e. where the key objectives concerned wide or loosely defined socioeconomic effects as regards urban renewal or socioeconomic development in the catchment areas⁴³, which are difficult to capture in monetary terms and which cannot be disentangled from other external factors.

Even in the case of the Rio-Antirio Bridge, which significantly alters the transport system in the region, the project's contribution to the broader economic effects could be assumed but not quantified. While the qualitative assessment⁴⁴ confirmed that the project contributed to the economic and social development of the territories of the Peloponnese, Western Greece (Etoloakarnania) and Epirus, housing and business development in the wider area around the bridge, these effects could not be captured by the quantitative assessment.

For other projects the *ex ante* expectations of wider effects were not really justified given the nature of the intervention. This was the case for the German motorway and French tramway. To a minor extent this also applies to the Naples metro line and the M43 in Hungary, where clearly defined transport objectives were central to the financing decision and the overall project concept, whereas objectives related to wider effects played an ancillary role. Again, the analysed Malaga case shows that a project perfectly fulfilling its primary transport objectives, such as saving time, may be unable to support wider socioeconomic development in the area, in the absence of adequate synergic measures to exploit the full potential of the bypass.

⁴² Regulation (EU) No 1303/2013, Annex XI, *Ex ante* conditionalities, Transport, p. 443.

⁴³ A 'catchment area' is the vicinity of a stop or station on a public transport line. This area is where most of the non-transferring passengers at the particular stop or station come from. By the same token, the catchment area can be viewed as the customer base for public transport.

⁴⁴ See the specific case study "Rio-Antirio Bridge".

Table 1. Effectiveness score⁴⁵ per project (from 1 to 5).

| Sector | Case study | Objective of the programme | Objectives (as in the project application) | Score | Motivation |
|--------|------------------------------------|---|--|-------|---|
| Road | Germany — A14 motorway | Expansion of the TEN-T, improve regional connectivity | Improving the accessibility of Schwerin Contributing to the region's development Shortening travel time | 2 | Despite a positive CBA, the project failed to fully deliver its expected effects mainly due to its low contribution to local economic development. |
| Road | Greece — Rio-Antirio bridge | Completion of the TEN priority road axis PATHE ⁴⁶ , linking urban centres of Greece to the Balkans | Decreasing crossing travel time Complementing the TEN-T network Reducing congestion in the ports of Rio and Antirio Improving reliability of the crossing service Contributing to the economic and cultural development of the region Fostering housing and Developing the wider area around the bridge Enhancing the competitiveness of businesses (improved connectivity) | 4 | The project achieved its stated objectives of reducing travel time between the Peloponnese and the mainland. |
| Road | Hungary — M43 motorway | Improving national and regional accessibility with European networks | Eliminating bottlenecks in the transit traffic, diverting traffic from urban areas Improving quality of life and well-being Reducing environmental impacts (noise) | 3 | The project achieved its objectives of eliminating bottlenecks and diverting traffic from urban centres. On the other hand, it fell short of generating wider economic impact. |
| Road | Latvia — Saulkrasti bypass | Improving national accessibility to the pan-European network | Contributing to development of the pan-European transport network: - reducing congestion around Saulkrasti - reducing local noise, air pollution and accidents - separating long-distance cargo traffic from local traffic | 4 | The project achieved its main objectives of improving safety, reducing travel time, separating long and short distance traffic, and diverting long-distance flows from more densely populated areas. |
| Road | Spain — Malaga bypass | Enlarging and improving the regional road network | Facilitate long-distance transport in the Malaga area: - reducing travel time - improving the connection of Malaga's suburban areas to the Mediterranean motorway and to the rest of the metropolitan area | 3 | The project achieved its stated objectives of shifting traffic from the old to the new bypass. On the other hand, the lack of any other transport project and poor coordination between local authorities limited the wider economic effects. |
| Rail | Poland — Warsaw airport connection | Increase in share of sustainable public transport in metropolitan areas | Reduce road traffic flows to and from the airport and improve travelling conditions in terms of travel time and reliability | 4 | The project achieved its objective to provide a reliable and comfortable alternative to buses and private vehicles when travelling to Warsaw airport. |
| Rail | Slovakia — Žilina | Modernisation and | Complementing TEN-T network | 3 | The project achieved its objectives associated with modernising the section of |

⁴⁵ The scores range from 1 to 5, as follows:

- 1= The project did not achieve the expected objectives due to endogenous factors.
- 2= The project did not achieve the expected objectives due to exogenous factors.
- 3= The project partially achieved the expected objectives.
- 4= The project achieved the expected objectives with some delay with respect to the projected time schedule. It turned out to be the best option among all feasible alternatives.
- 5= The project achieved the expected objectives on schedule.

⁴⁶ Piraeus-Athens-Thessaloniki-Idomeni.

| | | | | | |
|------------------------|-----------------------------|---|--|---|---|
| | | development of railway infrastructure | Improving the attractiveness of railway transport in order to change modal split in favour of rail services | | railway. On the other hand, the modal shift effect is also attributable to factors external to the project. |
| Urban transport | France — Le Havre tramway | Shift from private to public transport | Transform the image of the city, making it more modern and attractive Increase the modal share of public transport (bus and tramway) compared to private cars, reducing pollution and noise | 2 | The expected transport benefits did not materialise as demand was below the forecast level. Also, the project did not achieve its objective to bring about urban renewal. |
| Urban transport | Italy — Naples metro line 1 | Completion of the regional rail mobility system | Improving accessibility to the city centre Reducing traffic congestion Redeveloping and regenerating surface areas above the metro and the neighbourhoods around its stations Increasing the quality of the urban transport service | 3 | The project partly achieved its transport objectives by providing an alternative to private cars and overcrowded buses. On the other hand, the quality of the service from an operational perspective is poor and needs to be improved in terms of frequency and reliability. |
| Urban transport | Poland — Gdańsk tram | Increase in share of sustainable public transport in metropolitan areas | Improve connectivity with the city centre (reduced time, increased safety) Upgrading rolling stock (accessibility) Providing intermodal solutions | 4 | The project achieved its objectives by improving travel time, increasing safety and the energy efficiency of the line. Although numerous interchanges were created, effects related to intermodal solutions could not be measured. |

Source: CSIL, Ramboll, Significance BV, TPlan Consulting (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013.

As confirmed by past evaluations⁴⁷, transport infrastructure projects contribute to the three pillars of cohesion policy: economic, social and territorial.

In principle, lowering transport costs should boost trade and economic growth, contributing to **economic cohesion**. The new economic geography theory of regional development⁴⁸, however, warns that even if improving transport connections between two cities improves overall productivity, it may not always contribute to economic cohesion. For example, if a city with less efficient firms is connected to one with more efficient firms, the latter might capture the market in the other city, leading to a reduction in economic activity there. As already outlined, out of the 10 analysed cases, economic cohesion effects are assumed to be significant (in particular in terms of spatial effects) in Greece, where the construction of the Rio-Antirio bridge connecting the two sides of the Gulf of Corinth facilitated travel and potentially opened up new trade opportunities from mainland Greece into the otherwise remote Peloponnese. Other road transport projects were part of a broader infrastructure development strategy and their economic impact depends to a big extent on the overall projects' completion.

Large-scale infrastructure projects have a positive effect on **social cohesion**. This effect takes material form in a better connection between the service centre (a city for example) and the suburban areas where most of the low income population lives. Such effects were observed in the Naples metro line 1 and Gdańsk tram projects. Those projects improved

⁴⁷ Steer Davies Gleaves (2010). *Ex post* evaluation of cohesion policy programmes 2000-2006 co-financed by the European Fund for Regional Development (objectives 1 & 2) - work package 5a: Transport. Applica (2012). *Ex post* evaluation of the Cohesion Fund (including former ISPA) in the 2000-2006 period. Synthesis report. Frontier Economics, Atkins, IT (2011). *Ex post* evaluation of cohesion policy interventions 2000-2006 financed by the Cohesion Fund – Work Package B: Cost-benefit analysis of selected transport projects.

⁴⁸ See European Union (2017). *My Region, My Europe, Our future*. Seventh Report on economic, social and territorial cohesion.

connectivity with the centre and provided a more accessible service to elderly and disabled users, by equipping the metro line with elevators or escalators or by replacing old trams with new low-floor rolling stock. In the Slovakian and Polish railway projects, the terminus stop in Warsaw airport and the modernised stations in Žilina were designed with improved accessibility for disabled people. In the case of the M43 motorway, effects on social cohesion are mixed: the new infrastructure improved overall accessibility, but services on existing local road 43 will gradually disappear. The balance of these two events will result in insignificant positive social cohesion effects being attributable to the project.

Territorial cohesion and regional access to markets by road are mainly determined by the spatial distribution of population: impacts will be higher in urban areas, as in the case of the Gdańsk tram. A remote, scarcely populated region will always have a small market, even with large-scale road investments. Accordingly, transport investment, especially in areas with a mature network, cannot radically alter market access. Potential accessibility by road is the highest in regions and cities in the centre of the EU⁴⁹. Many regions in central and eastern Member States, however, are not yet connected by an efficient road network and will only have better access to markets after the completion of the Trans-European Transport Network, to which the cohesion policy contributes.

Conclusion:

Transport policy evaluations, including this one,⁵⁰ show that large-scale transport infrastructure projects not only improved the quality of the transport network and reduced travel time, but also increased the accessibility of the regions and countries concerned. This has opened up the possibility of increased trade with the rest of the EU, which is vital to their economic development. In the context of the 10 case studies here taken into account, at the project level, the achievement of objectives stated in the project applications is overall satisfactory. However, while most of the stated objectives have been achieved, none of the projects fully accomplished all of them.

To improve the effectiveness of EU-funded policies, sharpen the focus on results and reinforce the planning framework for transport investments in Member States and regions, the 2014-2020 programming period regulation introduced specific ‘*ex ante* conditionalities’ which already addressed some of the identified weaknesses. Cohesion policy support was conditional on the existence of comprehensive transport plans or frameworks that ensure planning security for all stakeholders, whether EU, national or private. Also, another important element of the *ex ante* conditionalities were the measures designed to reinforce the administrative capacity of institutions and beneficiaries. For the post-2020 period, the Commission proposed to maintain these pre-conditions, but to reinforce certain areas, for example by requiring economic justification of the planned investments, underpinned by demand analysis and traffic modelling.

⁴⁹ The state of European cities, European Commission and UN-HABITAT, 2016.

⁵⁰ Applica and Ismeri Europa (2016). *Ex post* evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF), WP 1: Synthesis Report. Applica and Ismeri Europa (2010). *Ex post* evaluation of Cohesion Policy Programmes 2000-2006 financed by the European Regional Development Fund in Objective 1 and 2 Regions; Synthesis Report. CSIL, Ramboll, Significance BV, TPlan Consulting (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and Cohesion Fund between 2000-2013.

Q2. What factors, including the availability and the form of finance, influenced the implementation time and the achievement observed, and to what extent?

Project outcomes and the implementation time needed to carry out projects depend on a combination of factors related to: (i) how the project is managed; (ii) its technical features; (iii) the quality of the selection process; and (iv) the capacity to predict future trends and react to unpredicted events. Purely operational and governance issues such as the execution of services or ability to provide ancillary measures also play a role. Forecasting and managerial capacity were the critical determinants of success: solid forecasting capacity ensured good quality at entry, and managerial capacity kept the project on a good track. The 2007-2013 *ex post* evaluation notes that the procurement process in the case of transport (and also environmental) infrastructure may be a potential source of delay in the implementation of programmes, while potentially causing low-quality projects to be carried out and investment to be less effective than it should be⁵¹. Such a situation may be caused by assessing tenders predominantly on the basis of price and underestimating the quality of a bid (i.e. their *ex ante* assessment), and by tenderers lacking expertise or financial viability.

Forecasting and managerial capacity

Forecasting and managerial capacity are understood as the ability to predict future trends and react to unpredicted challenges, and thus estimate and adapt the required resources. Forecasting and managerial capacity are linked to: (i) the technical effort put in place in the *ex ante* phase during project preparation; and (ii) the professional capacity to manage the project in the operational phase to ensure the expected level of service.

The forecasting exercise (including data collection and modelling) is the foundation for sound project performance. The case studies show that *ex ante* **forecasts are often overly optimistic and underestimate completion time**. This may affect project design, the overall timeline, financial sustainability and the actual delivery of long term effects. Forecasting is also the core of the CBA. Thus, deficiencies in forecasts are reflected in the quality of the CBA.

In some case studies, demand was overestimated. This was the case of the M43 motorway in Hungary and the A14 motorway in Germany. Optimistic assumptions about traffic flow can be explained partly by the fact that these two projects are part of larger networks, and partly because traffic demand on these two sections is influenced by the implementation of other investments planned for the network.

Inaccurate forecasts may be caused by a variety of factors, some of which are genuine errors or a lack of technical expertise and tools. The availability of a solid and rigorous transport model may, for example, limit forecasting bias. Evidence shows that there is still a need to develop more sophisticated transport network models that describe the defined catchment area and consider transport demand as a function of the condition of the overall transport network. More common use of data analysis for policy decision-making at other levels is also important, but was in general lacking, particularly with respect to some public transport interventions.

⁵¹ See also Section 5.2.

The two Polish projects are examples of good forecasting capacity: in both of them, project promoters benefited from the technical support of JASPERS in adjusting the traffic forecasts, which led to more conservative estimates for the modal shift. In the Gdańsk project, JASPERS also recommended introducing tariff integration across urban transport services to further increase the attractiveness of the services and encourage people to use public transport, this latter goal being achieved by simplifying switching between public transport modes.

The problem of inaccurate traffic forecasts was also highlighted in the Court of Auditors Special Report No 5 from 2013⁵², which indicated that they lead to an average cost increase of 23% and time overruns of on average 9 months or 41% compared to the initial deadlines agreed in the road construction contracts of the 24 audited road projects. This is broadly similar for all transport projects, whether EU-financed or not. In a review of 258 investment projects with a total cost of \$90 billion, Flyvbjerg (2003⁵³) estimated average overruns for roads of about 20%.

Quality of the selection process

The ‘selection process’ refers to the institutional and legislative framework that determines how public investment decisions are taken, especially those co-financed by European Structural and Investment Funds (ESIFs). In particular, it concerns the processes in place and the tools used to choose between alternative projects. The selection process may affect project performance, as it may be influenced by incentive systems that can lead policy-makers and project promoters to either take transparent decisions (i.e. organising stakeholder consultations) or strategically misrepresent costs and benefits at the *ex ante* stage.

In the projects examined, the selection process went smoothly on the whole and there were no major complications. This is generally because in most cases the projects were included in wider transport and mobility plans for which the planning and selection processes followed well-established regulatory and administrative frameworks. In the examined cases, the steps usually included a preliminary needs-based assessment followed by a feasibility and options analysis. In general, once an option is selected, it undergoes stakeholder consultation, usually in the form of a public hearing where complaints and suggestions are taken into account. Following this, the project design is fully developed and the project is implemented.

Stakeholders’ consultations were part of the selection processes in most of the cases under assessment. Such practices may add complexity and introduce uncertainty if not appropriately steered, while bringing value to the project design and acceptability. In the case of the Naples metro line the public consultation was particularly wide and useful. The stakeholders involved ranged from local government to local stakeholders, guaranteeing that a variety of views was heard.

The Le Havre tramway public consultation went beyond the procedures required by French law. In addition to the public consultations, local authorities organised campaigns informing the public and inviting citizens to engage with and discuss the project. During

⁵² European Court of Auditors Special Report No 5/2013 ‘Are EU cohesion policy funds well spent on roads?’

⁵³ B. Flyvbjerg, M.K. Skamris holm & Søren L. Buhl (2003). How common and how large are cost overruns in transport infrastructure projects? *Transport Reviews*, 23:1, 71-88, DOI: 10.1080/01441640309904 or at: www.tandfonline.com/doi/abs/10.1080/01441640309904.

this process, some concerns were raised regarding the cost of the investment, the impact on the city's architectural heritage, the price of tickets and the impact on real estate prices. These were addressed during open public meetings or communication initiatives. This practice ensured high visibility and social acceptability of the project among the population.

Besides more strategic considerations, the selection process includes **technical and economic assessments** that are expected to guide the decision-making process towards the most promising project solution. Evidence from the case studies shows that option analyses and economic assessments are critical ingredients of a successful selection process. For instance, the decision to select a wider road in Malaga proved to be efficient in the long run. So was the socioeconomic assessment of the railway modernisation in Žilina, which led to the conclusion that a 160 km/h railway for all train types was too costly given the potential benefits: as a result, it was finally decided to use a lower design speed, thus avoiding gold plating and excessive sunk costs.

In some cases, a long selection process did not lead to a significant update of the initial technical and economic analysis. In those cases, the selection process proceeded without reconsidering the project's suitability in light of the new context. This was particularly evident in the case of the A14: the selection process began in the early 1990s, shortly after German reunification, and relied on forecasts and expectations that became outdated by the time of project implementation⁵⁴. Actual traffic flows differ significantly from the assumed flows; only about 40% of private car traffic volumes were achieved, which led to project over-engineering.

On the other hand, the Malaga bypass provides an example of good practice. The project was initially conceived in 1997, with a first feasibility study carried out in 2001. The selection process procedures started in the early 2000s and finished in 2006 with a final detailed project design that took into account public consultations, a robust traffic model and an environmental assessment. The selected project was easily convertible to further upgrades, leaving open the possibility of expanding the road from three to four lanes without necessarily modifying the full project design and thus restarting the procedure.

Timely involvement of the EU in the selection process and project preparation may deliver added value⁵⁵. On the other hand, if interaction with the European Commission only takes place for the funding decision, EU added value is limited by the lack of an extra layer of scrutiny in the selection process, which was reported as beneficial in other cases for project conception and design.

In a number of cases, the selection process was driven primarily by strategic and technical considerations, while the CBA was only prepared at the very last moment in the context of the request for funding. Most of the selected projects were already at an advanced stage of design when the possibility of receiving EU funds materialised. In those cases, the CBA was prepared with the main aim of complying with the rules for Structural Funds and therefore had a limited contribution to the selection process already in its early stages. In such cases, the potential of the CBA to support the iterative decision-making process clearly remains low.

⁵⁴ Demographic and traffic flow forecasts did not match the real demographic and traffic changes.

⁵⁵ See also the section 'EU value added'.

Governance structure

In this document, ‘project governance’ concerns the number and type of stakeholders involved during the project cycle, the degree to which they cooperate effectively, and the way roles and responsibilities are shared.

Project governance has major implications for the financing arrangements, autonomy and responsibilities of the partners, especially in highly regulated network sectors where operators and infrastructure managers may need to be separated. Thus, key decisions determining the financing arrangements for projects should ideally be taken in the *ex ante* phase. A strategic decision, for example, would be the choice of possible options such as corporate financing vs project financing⁵⁶ or programme vs project financing. No unique solution exists since this needs to be considered on a case-by-case basis and has to fit the local context and stakeholders’ capacity. A notable example is the Rio-Antirio Bridge, the only case study project implemented as a public-private partnership (PPP), one of the first of its kind in Greece⁵⁷. The approach proved to be successful in ensuring that the project was delivered on time and on budget.

A strong and stable legislative framework is an important success factor. For example, the project governance of the A14 in Germany relied on highly regulated and well-established national procedures, in line with the EU regulatory requirements. The Commission played an important role in some cases by providing such a framework: this was the case in the Saulkrasti bypass project and proved to be effective despite initial complications during the transition period once Latvia became a member of the EU.

Projects involving a large number of stakeholders require good cooperation. Communication and a clear allocation of tasks, especially in terms of funding responsibility, were determinants of success. Two cases, the Žilina rail modernisation and the Warsaw airport rail connection, are good examples here: both construction and service operations were managed by the railway infrastructure manager, which meant that the construction and service operating phases could be aligned, maximising efficiency of the investment.

In some cases, the experience of the staff involved made a critical contribution to reliable performance. For example, in the Gdańsk urban transport project, the whole investment process benefited from the considerable experience and stability of the management team, including the project managers and coordinators who had gained experience during the previous phases of the wider Gdańsk urban transport development scheme. This experience could then also be applied in other programme components.

Conclusion:

In the analysed projects, forecasting and managerial capacity were the critical determinants of success: a solid forecasting capacity ensured good quality at the starting point and managerial capacity kept the project on track in the implementation phase.

⁵⁶ The corporate finance approach means that the funding for the project is provided from the investor’s own balance sheet resources. ‘Project finance’ is the financing of projects dependent on project cash flows for the repayment of debt and equity used to finance the project.

⁵⁷ For details see Annex 5 Case study for the Rio-Antirio Bridge (Greece).

Q.3. Was the actual implementation on schedule?

Half of the projects under assessment experienced delays; only one project was significantly delayed.

The timely delivery of projects was affected by both external factors (disasters or geological conditions) and internal factors (procurement processes, capacity issues, changes in the project design). In both cases, the identified factors could be predictable or not.

For example, while the discovery and removal of landmines during the construction of the Warsaw airport railway connection and the river flooding near the Malaga bypass were certainly unpredictable, the discovery of archaeological finds during the Naples metro construction should have probably been taken into account in project planning considering the area's architectural heritage.

There is always a certain degree of risk in the construction and excavation involved in large projects, so the project manager should be prepared to tackle such risks.

In most cases, good managerial and technical capacities were therefore an essential factor for the timely delivery of the project. Strong political commitment and upcoming highly visible events⁵⁸ played a key role in delivering the Le Havre tram and the Rio-Antirio bridge project on time.

In only one case (Malaga) were the project delays significant (2 years). The delay was at least partially due to the change in the initial project design, which widened the bypass from 2-3 to 3-4 lanes, but also to unforeseeable river floods.

The *ex post* evaluation of the Cohesion Fund (including ISPA⁵⁹) for the period 2000-2011⁶⁰ also identified procurement as one of the most sensitive steps affecting the performance of ISPA-/Cohesion Fund-financed investments. Shortcomings arose in part because of a lack of experience with open calls for tender and the lack of capacity to manage appeal procedures. In the case of this evaluation, only one project (the Saulkrasti bypass in Latvia) faced delays due to changes in the tendering procedures.

Conclusion:

During the construction phase, half of the projects experienced delays (although only one project had a major delay). A number of unpredicted exogenous factors⁶¹ were usually at the root of such delays, but they did not always translate into cost overruns. Endogenous factors may be addressed by improving forecasting capacities and building capacity within managing authorities.

Q.4. What has changed in the long run as a result of the project? (For example, is there evidence that the project contributed to increasing private sector investment?)

⁵⁸ Athens Olympic Games in 2004; Celebrations for the 500 years of existence of the city for Le Havre, and EURO 2012 Championship in Poland.

⁵⁹ Instrument for Structural Policies for Pre-Accession.

⁶⁰ European Policies Research Centre (2012). *Ex post* evaluation of the cohesion fund (including former ISPA) - work package D: Management and implementation; Final report.

⁶¹ A summary of divergences from the schedule are presented in Table 8 (Efficiency section).

Q.5. Were these changes expected (already planned at the project design stage, e.g. in terms of pre-defined objectives) or unexpected (that emerged, for instance, as a result of changes in the socioeconomic environment)?

Long term impacts produced by major transport projects were grouped into four categories: economic growth, increased quality of life, environmental sustainability, and social and territorial cohesion. Economic growth impacts were the most significant impacts: all major projects under evaluation contributed positively and to a varying extent to it. Impact on quality of life and well-being is on average positive. On the other hand, projects have had only marginal effects on the environmental sustainability and social and territorial cohesion of the regions concerned.

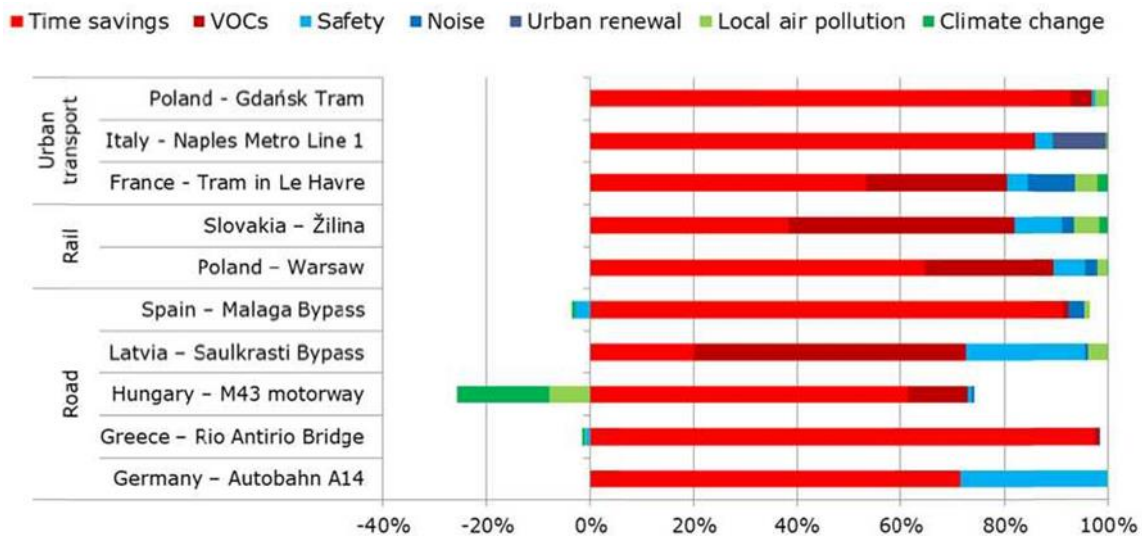


Figure 2. CBA Results — importance of measurable economic effects [%]; Source: CSIL, Ramboll, Significance BV, TPlan Consulting (2018). Ex post evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013, Final report.

Economic growth effect

Most of the effects examined in the case studies are related to reductions in production costs, and increases in the accessibility and attractiveness of the region. In addition, an efficient transport system is a significant factor for international competitiveness as it attracts investment and tends to increase trade⁶².

Six types of economic growth effects were identified: reductions in travel time, lower vehicle operating costs, increased reliability of journey time, higher income for the service provider, wider positive economic impacts, and institutional and technical learning. All the projects had positive effects in terms of economic growth (see Figure 3). However, the nature and intensity of these economic effects vary significantly.

⁶² CSIL, Ramboll, Significance BV, TPlan Consulting (2018), Ex post evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013, Final report.

A reduction in travel time is the most significant effect in road and urban transport projects. Reducing travel time was a primary objective for most of the selected projects and, on the whole, all projects were effective in delivering it. The stakeholders' consultation confirmed that result. In some cases, travel time savings alone would justify the whole intervention. This is particularly evident in the cases of the Rio-Antirio bridge, Malaga bypass and Gdańsk tram where travel time savings account for over 90% of the benefits quantified in the *ex post* CBA and match the *ex ante* expectations.

Table 2. Monetised travel time and vehicle operating costs (VOCs) savings as % of total benefit.

| Sector | Case study | Travel time savings [%] | VOCs reduction [%] |
|-----------------|------------------------------------|-------------------------|------------------------|
| Road | Germany — A14 motorway | 73 | Marginal, not measured |
| Road | Greece — Rio-Antirio bridge | 89 | 0.2* |
| Road | Hungary — M43 motorway | 83 | 15 |
| Road | Latvia — Saulkrasti bypass | 20 | 53 |
| Road | Spain — Malaga bypass | 95 | 1 |
| Rail | Poland — Warsaw airport connection | 65 | 25 |
| Rail | Slovakia — Žilina | 38 | 43 |
| Urban transport | France — Le Havre tramway | 53 | 26 |
| Urban transport | Italy — Naples metro Line 1 | 86 | 0.3 |
| Urban transport | Poland — Gdańsk Tram | 93 | 4 |

* Vehicle operating cost changes are calculated as incremental tolls for diverted and induced users on the bridge and fee savings for the users of the ferries. Source: CSIL, Ramboll, Significance BV, TPlan Consulting (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013.

In a limited number of cases, the reduction in travel time was not significant enough; this hampered the overall positive performance of the project. This is the case for example with the Le Havre tramway where, on average, travel time savings are 2.1 minutes for former bus passengers and 1.05 minutes for those changing from a car. This has hardly changed the overall mobility in the city, especially considering that congestion was not a major problem previously. In the case of the Naples metro, the insufficient service offered cancelled out the 30 minutes average time saving as poor frequency and reliability discourage the use of public transport.

Reduction in vehicle operating costs (VOCs) is the second most significant effect in some of the projects, although in general this has a more limited impact than travel time on project effectiveness. The Saulkrasti bypass is the only project where a reduction in VOCs is the dominant positive effect, with 52% of total benefits arising from savings in VOCs for both light and heavy vehicles using the Saulkrasti bypass as well as those remaining on the old road. Reduction in VOCs is also an important effect of the selected railway projects as a result of the shift from costlier road transport. In Žilina, the improved railway network provides a cheaper alternative to private road vehicles.

Reliability of journey time is a crucial positive effect for urban transport when the project is tackling severe congestion problems. This is particularly evident in the case of the Warsaw airport project. Before the rail link to Chopin Airport was put in place, travel time from the city centre to the airport varied from 90 minutes in peak hours to 15 minutes under normal traffic conditions. The new railway connection — every 30 minutes — provides a much more reliable service. Increased reliability is also important for road projects, especially for the Rio-Antirio Bridge, as ferryboat travel times were often affected by adverse weather conditions that caused delays of hours, or sometimes days. In the case of road transport too, eliminating congestion has positive impacts not only on average travel times, but also on reliability. In the case of the Malaga project, interviews to local stakeholders have highlighted that the improved road service ensured by the new bypass has increased the reliability of journey time for taxis and local public services.

Other effects considered under the category ‘economic growth’ (i.e. income for the service provider,) were on average rather marginal. Discussions with local stakeholders in close to the LeHavre tramway area have for example indicated that so far the infrastructure has not materialised into economic gains in terms of employment or local revenues.

Effects on quality of life and well-being

Effects on quality of life and well-being are factors affecting social development and the level of social satisfaction. They depend on the perceptions of users and the general population. Other effects include security⁶³, crowding, service quality, aesthetic value and urban renewal. Those impacts are underestimated in the analysis because only noise and safety effects were quantified across all cases and included in the CBA. Compared to economic effects, the contribution of quality of life effects to the overall performance of the projects was small except in one case, and not higher than 10% in terms of monetised value.

The impact of projects on **safety** (measured by the change in the number of accidents) is arguably the most substantial effect in terms of quality of life. It was included in the CBA for all projects and — in some cases — carried a remarkable weight in overall project results. This is evident when the new project has a higher safety standard than the existing infrastructure, as was the case with the Saulkrasti bypass in Latvia, where quantified benefits linked to increased road safety constituted 23% of all quantified benefits. Projects encouraging a modal shift from cars, such as railway and urban transport projects, also have a positive effect on safety. Even though the decrease in road accidents in the areas covered by the projects was not fully attributable to the projects themselves, a rather clear correlation emerged in all the selected cases.

Security effects (defined as the security of passengers in the vehicle, at stations and stops, and on platforms, and the security of goods transported) are relevant only for railway and urban transport projects and are in general quite marginal. **Noise**-related effects measure the population’s exposure to noise and are relevant for all selected projects. However, their weight on the projects’ overall performance is lower than safety effects and rather marginal. Benefits from the reduction in noise externalities are particularly evident when traffic is diverted outside inhabited areas, and depend on the size of the affected population. For instance, reduction in noise externalities amounts to 3.1% of the total benefits brought about by the Malaga bypass. This is mostly due to the fact that the new bypass runs outside the city suburbs while the old bypass crossed the city centre.

The **crowding effect**, which measures reduction of overcrowding in public transport, is relevant only for one project, the Le Havre tramway. Buses in Le Havre were often overcrowded. The tramway eased overcrowding thanks to the vehicles’ larger capacity and the service’s increased frequency. The **service quality** effect is relevant in many projects and has an influence on the projects’ overall performance in both positive and negative ways. The two contrasting cases of the Le Havre tramway and the Naples metro Line 1 are interesting in this respect. According to surveys, users of the Le Havre tramway were largely satisfied with the service quality of the overall public transport

⁶³ Understood as a transport users’ perception of security in the areas inside and outside the stations.

system. Overall, satisfaction has increased since the introduction of the new tramway. On the other hand, the poor quality of service of the Naples metro line 1 is a major limitation to the project's performance. According to local stakeholders, the current frequency of the metro service is too low and inadequate to satisfy mobility demand in Naples⁶⁴. The main cause of this situation is the finances of the service provider.

Aesthetic value and **urban renewal effects** were relevant only for the Naples metro line 1 and the Le Havre tramway, and these were strictly linked to the local urban development strategy. The building of 'art stations' with high aesthetic value in the Naples metro, along with urban regeneration in the areas close to the metro stations, helped tackle urban decay in deprived areas. This led to a documented increase in real estate value in the stations' catchment areas (i.e. 500 m² around the station).

The effects of the projects on environmental sustainability

Environmental sustainability requires ensuring the needs of present generations without compromising the environmental conditions of future generations.

Local air pollution and the effect on climate change are the most significant environmental effects. The former concerns the change in emissions of pollutants (such as PM_{2.5}, NO_x, NMVOC and SO₂), while the latter refers to the emissions of greenhouse gases (GHGs). While GHG emissions have a global impact, air pollutant emissions penetration is limited to the project's surroundings.

Transport projects are likely to generate both positive and negative environmental externalities. The positive externalities derive from reducing traffic congestion by shifting traffic from populated areas (such as city centres) to less populated areas or by encouraging modal shift to more eco-friendly means of transportation. Traffic shift to less populated zones is the major factor in the delivery of **local air pollution** benefits. This is particularly clear in the Saulkrasti bypass, where the traffic was diverted from the town centre to a suburban area. This is less the case for the modal shift promoted by the analysed urban transport and railway projects. These projects have a positive yet marginal effect on local air pollution. In the case of the Le Havre tramway, they only amounted to 4.7% of total benefits. On the other hand, negative effects on local air quality may be caused by newly induced traffic, as in the case of the Rio-Antirio Bridge and the M43 motorway.

Effects on **climate change** in the projects examined are less significant than those linked to air pollution. While in many projects there were significant savings in terms of per vehicle emissions due to shorter trips, the overall increase in trips made by car means that the aggregate level of emissions did not improve. However, this meant a significant improvement for another parameter, reduction in emissions due to standstill operations (low speeds and congestion). This explains why GHG effects are either neutral or negative for road projects.

Biodiversity effects were marginal or irrelevant in the 19 projects analysed, due to the environmental standards imposed on the implementation of such projects. Most of the projects were not located in environmentally protected or sensitive zones.

⁶⁴ Metro service intervals in major European cities range between 2 and 5 minutes. In Naples, trains pass once every 10 minutes.

On the whole, therefore, the transport projects discussed in this report had marginal effects on environmental sustainability as they neither deliver significant environmental benefits nor cause severe environmental externalities (with some sectoral differences). The road projects examined have, on average, slightly negative effects on climate change because of induced traffic (which directly increases the amount of greenhouse gas emissions), while they may have a slight positive effect on local air pollution by shifting traffic outside inhabited areas.

The railway and urban transport projects under examination do not have significant environmental effects. Despite encouraging (and in some cases achieving) the expected modal shift, the associated reduction in environmental externalities remains limited.

Biodiversity impacts are usually offset by mitigation measures (eco-ducts, green infrastructure) and, in a few cases, are only marginal.

Distributional effects

Distributional impacts relate to two main different concepts: ‘social cohesion’, which is the allocation of the main benefits over income and social groups, and ‘territorial cohesion’, which describes the allocation of the main benefits over central and peripheral areas.

By ensuring a better connection of suburban areas, where most of the low income population is often located, urban public transport projects have a positive effect on social cohesion. This was particularly the case of the Le Havre tramway and the Naples metro line 1. Social cohesion effect was also ensured by providing a more accessible service to elderly and disabled users; this was achieved in the Gdańsk tram and the Slovakian and Polish railway projects.

Contribution to territorial cohesion was particularly significant for the Rio-Antirio bridge, Naples metro line 1 and Gdańsk tram projects. The Greek project clearly linked the two sides of the Gulf of Corinth, and opened up a whole new set of trade and travel opportunities from mainland Greece into the otherwise remote Peloponnese. The two other projects contributed to reducing the unequal distribution of resources and opportunities among districts by bringing public transport to the city centre. In some cases, territorial cohesion effects were less than expected. The Le Havre tramway was conceived as a tool for generating territorial cohesion in the urban area. However, while delivering some positive effects to the city centre area, it did not change the transport habits of people living on the outskirts, who still preferred to use their own cars. The Malaga bypass positively impacted territorial cohesion by serving outlying areas of the city which were previously outside the old bypass’s catchment area. However, the lack of infrastructure linking local inner roads to the bypass limited its effect.

Conclusions:

On average, all major projects under evaluation provided a positive contribution to economic growth, quality of life, well-being, and social and territorial cohesion. Economic growth impacts were the most significant, albeit to a varying extent.

Impacts on quality of life and well-being were on average positive. The effects on the regions' environmental sustainability were, on the other hand, more limited.

5.2. Efficiency

Efficiency is defined in terms of the relationship between the resources used by an investment and the generated benefits. Differences in the way the project was approached and conducted can have a significant influence on the effects, making it interesting to consider whether other choices could have achieved the same benefits at less cost (or greater benefits at the same cost). In the evaluated cases, the projects addressed clear transport needs, which could not have been met by solutions alternative to transport. This explains the lack of a proper analysis of alternative options in projects' applications. The *ex ante* assessment looked mainly into design options, such as the number of lanes as in the Malaga bypass project, the quality of rails to accommodate high or lower speed trains (the case of Žilina), or the number of stops and the frequency of public transport. Therefore analysis of efficiency was mainly driven by the CBA and complemented by a qualitative assessment.

Assessing the efficiency of a transport project in the long term involves verifying whether the financial sustainability in the operational phase is ensured by looking into its current performance. This is done by an analysis of how costs and benefits relate to each other and how they stand against their *ex ante* values.

Large-scale infrastructure projects, including those financed by national sources, are prone to a high incidence of delays and cost overruns⁶⁵. It is difficult to draw conclusions about projects' efficiency on the basis of those two factors, since there are a wide range of potential reasons for both cost and time overruns, many of which are outside the control of contractors or contracting authorities. However, they clearly indicate the importance of planning and budgeting capacity. The 2000-2006 *ex post* evaluation⁶⁶ indicates that in general this was not done adequately for most of the projects investigated.

The calculation and the comparison of unit costs of infrastructure projects across regions is challenging without a detailed breakdown of the various features of the project and explicit consideration of the factors affecting costs (for example data on environmental externalities are hardly available). Each project functions within its own specific setting (terrain, geological or weather conditions), which has a major effect on the cost of construction of roads or railways. Equally, costs can vary significantly if projects differ in their features (a three-way motorway as opposed to a two-lane one, for example).

A meaningful comparison of unit costs unavoidably entails having detailed data on the cost of the various elements involved in the construction process, not only the carriageway itself but also different types of bridges and tunnels. Such data, however, were not generally available from the authorities that carried out the projects in question, and the aggregate data which did exist did not enable meaningful comparisons of unit costs to be made. The first effort to address this shortcoming is the Commission rail unit

⁶⁵ See the discussion under Q2 above.

⁶⁶ Applica and Ismeri Europa (2010). *Ex post* evaluation of Cohesion Policy Programmes 2000-2006 financed by the European Regional Development Fund in Objective 1 and 2 Regions; Synthesis Report.

cost calculator⁶⁷ designed in 2018 to facilitate the assessment of investment costs in rail infrastructure projects. The calculator works by performing a benchmarking analysis and verifying if the investment cost of rail infrastructure is comparable to the investment cost of similar projects elsewhere.

Two questions were asked in the evaluation roadmap and will be discussed below.

Q.1. To what extent have the interventions been cost-effective?

The *ex post* analysis shows that most of the projects were efficient in that they gave rise to benefits which exceeded the costs⁶⁸. This is well-reported by the *ex post* CBA results outlined in the figure below, which shows that the ratio between discounted benefits and costs (the B/C ratio) is more than 1 for all but one of the selected projects.

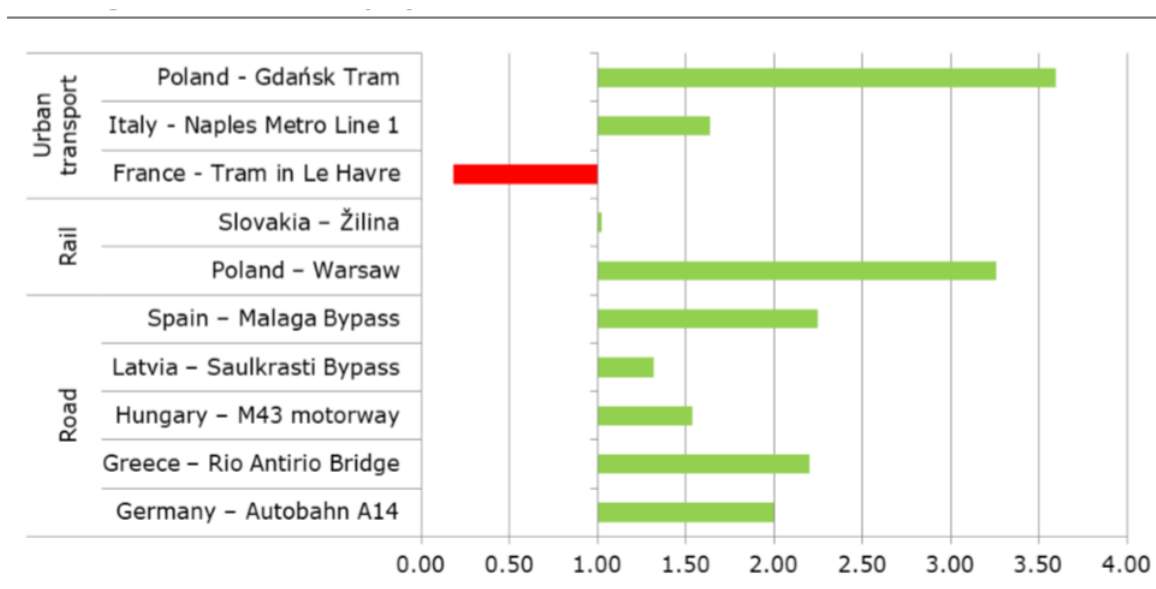


Figure 3. Selected projects — B/C Ratio; Source: CSIL, Ramboll, Significance BV, TPlan Consulting (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013.

None of the 10 selected projects were financially profitable and all of them were therefore in need of public funding. In all but two cases (the Le Havre tramway and the A14 motorway), the EU grant was decisive in ensuring that the project went ahead (see further in the analysis of EU value added). In addition, funding for the projects was ensured through other public sources. Only one project (the Rio-Antirio Bridge) was implemented through a public-private partnership (PPP). During the expert seminar, some participants argued that PPPs may provide a way of making projects financially sustainable because they incorporate a life-cycle approach into them. Nevertheless, the success of this form of governance requires public authorities to have the capacity to manage technically demanding contracts, which is not always the case.

The funding structure of each project is summarised in the table below.

⁶⁷ PwC (2018). Assessment of unit costs (standard prices) of rail projects (CAPital EXpenditure); Final report.

⁶⁸ A B/C ratio > 1 is a necessary condition for the Commission’s adoption of all Major Projects: the project is suitable to be supported because the benefits, measured by the present value of the total inflows, are greater than the costs, measured by the present value of the total outflows. See European Commission (2014). Guide to Cost-Benefit Analysis of Investment Projects. Economic appraisal tool for Cohesion Policy 2014-2020, Annex VII; Commission Implementing Regulation (EU) 2015/207.

Table 3. Funding structure of each project

| | Funding | | | Loans |
|---------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | National Contribution or Equivalent | Infrastructure Manager Own Sources | ERDF or CF | EIB |
| Gdańsk Tram (PL) | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Napoli Metro Line 1 (IT) | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | |
| Le Havre Light Rail (FR) | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Žilina-Krásno nad Kysucou (SK) | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | |
| Warsaw Chopin Airport Link (PL) | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | |
| Malaga bypass (ES) | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | |
| Saulkrasti bypass (LV) | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | |
| Szeged-Makó M43 motorway (HU) | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | |
| Rio Antirio Bridge (GR) | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| Autobahn A14 (DE) | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | |

Source: CSIL, Ramboll, Significance BV, TPlan Consulting (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013.

Financial sustainability indicates project efficiency during operation. It assesses the project's capacity to cover its costs throughout the investment and operating phases. The evaluation and the stakeholder feedback from the technical seminar proved that the projects' financial sustainability was not a straightforward issue.

In principle, the costs of operating and maintaining the transport infrastructure should be borne by its users. This happens either in the form of a tax (circulation tax, excise duty on fuels or other forms of taxation depending on the national tax structure), or in the form of a toll. The way the project is financed affects the demand for the end product: in cases where transport externalities and the project's costs are fully internalised by fiscal policy, users who would have to pay a toll may be less inclined to use the road. This is why the financial structure of a project should be appropriately discussed in the project design, contracting and selection process.

The collection of tolls does not necessarily guarantee financial sustainability. In most cases, even where the revenues generated by the analysed projects were significant, they were usually not sufficient to cover the operating costs of the infrastructure. The projects' long term financial sustainability is maintained by public funding from local, regional or national sources.

At this stage, only the Rio-Antirio Bridge and the Warsaw railway airport connection cover operating and maintenance costs through their own revenue.

Conclusions

All but one of the projects were cost-effective, although none of them was financially profitable, showing the need for the public financing. Only two out of the ten cases are financially sustainable, meaning that the revenues created can cover operating costs.

Q.2. Are there any significant differences between the costs and benefits in the original cost-benefit analysis (CBA) and what can be observed once the projects have been finalised? If so, what are the causes?

As explained in Section 4.3, comparing *ex ante* assumptions with *ex post* data for any long term investment project is not straightforward. Parameters and unit values may change, so can the methodology used for CBA⁶⁹.

Project efficiency may be influenced by several factors affecting either the costs or the benefits, or both. Cost overruns and delays⁷⁰ are common in large transport projects, and certain types of projects are more risky by nature than others. In their review, B. Flyvbjerg, K. Skamris & S. Buhl (2003) found that in projects involving primarily the construction of special structures such as tunnels and bridges (for metro systems, or for rail or road links crossing natural bottlenecks in terms of topography), costs turn out to be on average 34% higher than expected. One in six projects of this type generally ends up doubling the costs initially predicted.

As shown in the ‘effectiveness’ section under Question 2, solid forecasting based on reliable models is crucial to ensure timely and within-budget delivery. Good managerial capacity can minimise the negative impacts of unexpected circumstances. Moreover, transparent and inclusive **procurement processes** play an important role in budget control but do not guarantee cost savings.

Half of the selected projects fully complied with the initial project schedule by delivering the operational project on time. As regards planned cost, in most cases the project’s final costs were in line with the estimated budget. See the summary in the table 8 below.

⁶⁹ See also introduction to the efficiency section and the methodology chapter.

⁷⁰ See Q.3 under effectiveness.

Table 4. A summary of divergences from the schedule and budget.

| Case study | Was the project completed on schedule? | Was the project completed within budget? |
|---|---|--|
| Germany – Autobahn A14 | ● Project schedule was fully respected. | ● Final costs were 10% under budget. |
| Greece – Rio Antirio Bridge | ● Project schedule was fully respected. | ● Final costs were within budget. |
| Hungary – M43 Motorway | ● Slight delays (seven months) mostly due to adverse weather conditions. | ● Slight cost overrun (+7.9%) mostly due to currency exchange fluctuations. |
| Latvia – Saulkrasti Bypass | ● The change in tendering procedures delayed the start of the construction phase by almost two years. | ● The total project costs rose from EUR 48 million to EUR 130.5 million because of delays and fluctuations in the exchange rate. |
| Spain – Malaga Bypass | ● The project design was changed before the construction phase leading to a two year delay. | ● The project recorded a substantial cost-overrun (+34% for the construction cost) mainly due to the change in project design. |
| Poland – Warsaw Line 8 Modernisation and Airport Connection | ● The project was completed nine months late due to unexpected events such as the removal of WWII petroleum derivatives. | ● Final costs were 10% under budget. |
| Slovakia – Žilina Railway Modernisation | ● The contract was extended by six months due to the installation of additional noise abatement measures. | ● Final costs were 2% under budget. |
| France - Le Havre tramway | ● The project fully respected its schedule. | ● The final costs were 26% higher than budgeted. ⁷¹ On top of that, costs may rise by an additional EUR 10 million to EUR 30 million depending on the outcome of litigation procedures. |
| Italy - Naples Metro Line 1 | ● The investment co-financed by the ERDF (technological works on the Vanvitelli-Dante section) was completed on time. However, delays occurred in the excavation phase and in the adjacent section (Dante-Garibaldi), which is not fully completed yet. | ● The investment co-financed by the ERDF (technological work on the Vanvitelli-Dante) section did not experience significant cost-overruns. However, cost-overruns occurred in the excavation phase and in the adjacent section due to archaeology and soil composition. |
| Poland - Gdańsk Tram | ● The project fully respected its schedule. | ● Additional costs due to technical reasons were covered by savings in the procurement phase and no cost-overrun was recorded. |

Legend: ● = Yes ● = Mostly yes ● = No

Source: CSIL, Ramboll, Significance BV, TPlan Consulting (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013.

Unforeseen circumstances can lead to large cost overshoots. For instance, the project in Le Havre was completed on time, but with a budget overshoot of 26%⁷¹. This was partly due to a fire at the site and unpredicted instability in the foundations caused by the presence of an old mains sewer.

In non-euro area countries such as Latvia⁷² and Hungary, currency fluctuation led to divergences between the planned and the actual costs. In the M43 case, the sharp depreciation of the Hungarian forint led to cost savings in euro (-3.8%) and cost overruns (+9%) in the local currency. In the Latvian case, the situation was even more complex: due to substantial changes in the tendering procedures and the changing macroeconomic situation, the project accumulated a two-year delay. The country experienced rapid economic growth shortly after its accession to the EU, which resulted in increased inflation (the consumer price index rose from 2.9% in 2003 to 6.2% in 2004) and fluctuations in exchange rates. All these factors led to significant cost overruns, as the

⁷¹ Half of the projects examined in the 2000-2006 *ex post* evaluation (Applica, 2010) exceeded their budget, with an average cost overrun of 21%.

⁷² Latvia joined the euro area in 2014 when the project was already operational.

total nominal costs rose from €48 million to €130.5 million. The EU co-financing was then adjusted from €30.79 million to €40.03 million to respond to cost increases. However, neither the cost overrun nor the delays affected project performance. Moreover, the overall result was positive. The project economic net present value is much higher than initially expected in the *ex ante* evaluation. This is related to larger traffic volumes on the bypass, and a larger reduction in number of accidents.

Only in the case of the Malaga bypass were cost overruns the result of a significant change in project design. The decision to widen the road from three to four lanes per carriageway inevitably led to an increase in the final costs compared to the budget. Construction and land purchase costs were 34% and 73% higher respectively, but it is difficult to assess whether and to what extent the increase is due to the change in project design or to underestimation of costs (optimism bias) during the planning phase. Despite this increase, the Malaga bypass is overall in line with the average cost per kilometre for other motorway sections on the A7 Spanish motorway.

Finally, in projects undertaken in **phases**, delays and cost overruns in other phases or sections may affect the performance of the section under assessment. This is clear in the case of the Naples metro Vanvitelli-Dante section. While the investment phase co-financed by the ERDF (i.e. technological work along the Vanvitelli-Dante section) did not experience any significant cost overrun or delay, the preceding excavation phase took longer and cost far more than expected. Also, the adjacent Dante-Garibaldi section faced significant delays and costs rose due to technical issues (such as archaeology and complex excavation on the site with layers of groundwater). This cost increase aggravated the financial situation of the service provider, resulting in fewer resources being available to ensure service quality.

Projects characterised by cost overruns and delays may remain efficient (and still have a good B/C ratio) whenever benefits still exceed the costs. This is clear in the Saulkrasti and Malaga bypasses which — despite having the most significant delays and cost overruns — score relatively well in terms of efficiency.

Administrative costs⁷³

Administrative costs are costs linked to the administrative tasks of any fund programme body. They include both the costs of the administrative workload and the costs of the purchase of services (for example expertise) and goods. Managing and implementing ESIF programmes demands financial and personal investment from all those involved. Carrying out cost-benefit analyses may be costly and burdensome for beneficiaries⁷⁴, often leading them to outsource such tasks. This results in a loss of buy-in and the CBA potentially becoming a box-ticking exercise (see also Q.2 in ‘Effectiveness’).

The *ex post* evaluation of large transport projects did not study the overall administrative cost of preparing and managing these specific projects. However, a recent study by Spatial Foresight & t33 (2018⁷⁵), which established a new baseline for the administrative costs and burden of the current ESIF programming period, concludes that administrative

⁷³ Administrative costs were not analysed in detail in the case studies; the analysis below is based on the report by Spatial Foresight & t33 (2018). New assessment of ESIF administrative costs and burden, final report.

⁷⁴ *Ibidem*.

⁷⁵ Spatial Foresight & t33 (2018).

costs linked to managing ESIFs are reasonable overall and decrease as a share of the budget as the size of the project increases.

Conclusion:

Comparing the values of *ex ante* and *ex post* costs and benefits is not a straightforward exercise. Delays and cost overruns do not always affect projects' efficiency, as this depends on the circumstances. Available evidence shows that robust and dynamic forecasting and good management can often mitigate negative outcomes⁷⁶.

5.3. Relevance

Q.1. To what extent did the original objectives of the examined major projects match the existing development needs, the priorities established at programme and/or national level, and the overall goals of the ERDF and the Cohesion Fund?

The relevance of the analysed projects proved to be high when the main driver of the project was tackling a well-identified and urgent transport need. The relevance of the project was weaker in cases where considerations were more closely related to broader socioeconomic development and where urban regeneration needs were also part of the motivation for project implementation.

Meeting urgent and long-lasting transport needs

The major finding emerging from the 10 case studies is that the vast majority of projects were aimed at solving well-identified existing development needs. In some cases, these needs were particularly urgent, calling for immediate action. For instance, before the building of the Malaga bypass, the only way to bypass the city while avoiding the city centre was by means of an existing standard road used by long-distance traffic, the local population and tourists alike. The road was severely congested at peak times, especially during the summer: in 2008, it carried more than 180,000 vehicles per day and was nearing its full capacity.

In other cases, the project responded to long-lasting mobility issues. For instance, the Rio-Antirio Bridge was originally envisioned more than 100 years earlier as a direct connection between the Peloponnese and the Greek mainland, a connection that was then offered only by a ferry service that did not operate under bad weather conditions. The lack of a direct connection between the two regions was considered a limitation to economic development, not only for the region but also nationwide.

In the case of urban transport projects, a common mobility need in expanding cities was to reduce congestion by providing rail-based public transport alternatives to individual or collective road-based transport. Both Polish cases addressed this need, albeit in different ways. In Gdańsk, rapid economic growth and the city's expansion into outlying areas led to an increase in car use and congestion in the city. The tramway expansion aimed to reduce road traffic by providing an alternative efficient public transport solution. The same applies to the Warsaw airport line. While there was already a road connection to the airport, journey times varied unpredictably during peak hours.

⁷⁶ AECOM, KPMG (2016). *Ex post* evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF). Work Package Transport. Final Report.

Broader development needs

In some cases, the decision to implement the project was influenced by the desire to: (i) generate economic development by creating positive framework conditions; and (ii) support wider urban regeneration strategies (particularly for local public transport projects). When such considerations were not backed by well-identified and urgent transport needs, there is evidence that the project effectiveness was less satisfactory than expected. That was, for example, the case with the Le Havre project, which was primarily aimed at transforming the image of the city. Conversely, there are cases where wider effects can reasonably be expected from projects addressing a clear transport need of a significant magnitude. This is, for instance, the case for the Rio-Antirio Bridge, which was a mega-project significantly altering the transport system in the region.

Alignment with national and/or EU priorities

All major projects were included in the respective operational programmes, so they were screened against their strategic objectives. Moreover, the projects were part of wider sectoral plans aimed at achieving strategic transport objectives in the region. Strategic alignment with national and EU objectives is a condition that major projects must fulfil to have access to EU funds. This aspect has been further strengthened in the 2014-2020 period with the introduction of ‘*ex ante* conditionalities’⁷⁷, a mechanism for trying to ensure that the necessary conditions for the effective and efficient use of ESIFs are in place.

The analysed case study projects were developed as a part of a larger network and thus were part of wider local, regional, national or even international development plans. Moreover, all projects examined matched priorities established either at national or EU level. In particular:

- All the selected projects have specific European relevance, albeit to varying degrees. Six projects (the Saulkrasti bypass, the Rio-Antirio bridge, the A14 in Germany, the Žilina railway modernisation in, the M43 in Hungary, and railway line 8 in Poland⁷⁸) are part of the TEN-T network. The three urban transport projects are located in cities situated along the TEN-T network, while the Malaga bypass is part of the E-15 European network.
- Road and railway projects respond to national (and in some cases international) priorities, while urban transport projects are usually included in local (regional or municipal) development plans. For instance, both the Malaga bypass and the Rio-Antirio Bridge were included in their respective national transport plans, whereas the Saulkrasti bypass and Žilina railway modernisation were included in national schemes. On the other hand, Naples metro line 1 included under the 1997 urban transport plan while the Gdańsk tram was included in the local urban development programme.

⁷⁷ Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006, Chapter III, Art 19.

⁷⁸ Only the last 2 km is part of the TEN-T.

Including projects in wider transport plans rather than implementing them in isolation is a factor positively influencing the projects' relevance.

Conclusions

The majority of the analysed projects were relevant in that they aimed to solve well-identified existing needs and were aligned with national and European priorities. Even higher relevance should be guaranteed in the current programming period by the greater focus on the needs and objectives of each project and by the need for projects to really form part of a wider transport framework as required by the new preconditions for an efficient implementation of Cohesion policy funds introduced through the requirements of the *ex ante* conditionalities.

5.4. Coherence

Q. 1. To what extent were the examined major projects consistent with other national and/or EU interventions carried out in the same region or sector?

Most of the projects are consistent with other action at various levels (EU, national, regional, local) in the transport sector.

This holds in particular for projects with a clear national interest. For instance, the Žilina railway modernisation and the Saulkrasti bypass are consistent with the broader strategy to modernise the Slovakian railway system and the upgrading of the Latvian section of the Via Baltica and broader state road network as part of the TEN-T corridor respectively. This is also true for urban transport projects such as the Gdańsk tram and Naples metro, which were implemented alongside other relevant actions both in the transport and urban development sectors and included in regional operational programmes. Both projects were consistent with previous phases of urban transport plans.

However, while consistency with broader priorities at EU and/or national level is generally ensured, consistency with more specific and local action is more difficult to guarantee. The case of Le Havre is significant in this respect: the objective of supporting a modal shift away from cars and buses was not in line with the existing parking and mobility systems in the city, which in fact provide an incentive for the use of private cars. Another case that is illustrative in this respect is the Malaga bypass. This was implemented by the Ministry of Infrastructure to improve road conditions for long-distance transport in the Malaga area, but was also aimed at providing a better connection to the city outskirts, including to logistics facilities and industrial zones. Although the project was in line with national priorities of removing long-distance traffic from the city of Malaga, the approach taken was not particularly consistent with regional and local action aimed at improving the connection to the outskirts of the city.

Conclusion

Most of the projects are consistent with other transport projects at various levels (EU, national, regional, local). However, while consistency with broader EU, national and regional priorities is generally ensured, consistency with more local and/specific priorities appears more difficult to guarantee.

5.5 EU added value

The rationale for the overall EU support for transport was outlined in the *ex post* evaluation of cohesion policy programmes 2007-2013⁷⁹. An efficient transport network is important as a support for the EU internal market, and is necessary to create more efficient links both within and between regions across the EU as a way to promote economic development. This applies in particular to EU-12 countries, where the road and rail networks were in urgent need of improvement, but also to convergence regions in the southern EU Member States and in Germany, where networks were underdeveloped compared to the rest of the EU-15. Much of the support for transport in all Member States was related to the trans-European network for transport (TEN-T) — i.e. it went to projects with a potential value added for both the EU and for the countries and regions in which routes were located.

EU support was particularly important during the financial and economic crisis which coincided with the 2007-2013 programming period. It ensured maintaining investment in transport at a time when national sources of investment funding were being cut back. As a result, Member States could undertake major projects that they might not have been able to carry out without support. In consequence, the funds became the primary, and in some cases, the only source of financing for public investment and for public support for businesses in many countries, in the EU-12 in particular but also in the southern Member States. This led to growing interest in accessing the funds and increased competition for them, and interest in the projects they helped to finance. Finally, thanks to the EU support, Member States are more likely to develop coherent long term strategies for transport.

Q.1. What is the EU added value resulting from the examined major projects?

EU as a fund provider

This first dimension of EU added value is the most obvious and easy to detect. The availability of a significant and critical share of funding in many cases accelerated and made possible project implementation. It was especially important at the time of the economic crisis when national budgets could not support so many investments of such a scale. To give an overview of the level of the EU financial support for each project, Figure 4 below shows the respective shares of EU co-financing in the 10 projects.

⁷⁹ See Chapter 3.2.2 of Applica and Ismeri Europa (2016). *Ex post* evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF), WP 1: Synthesis Report.

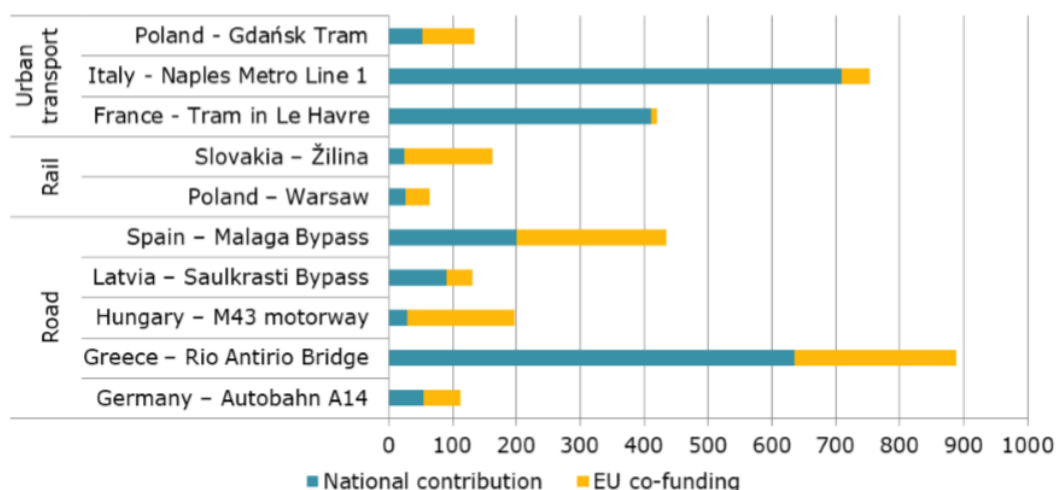


Figure 4. Level of EU co-financing (€ 2017, million); Source: CSIL, Ramboll, Significance BV, TPlan Consulting (2018). Ex post evaluation of major projects supported by the European Regional Development Fund (ERDF) and the Cohesion Fund between 2000 and 2013'.

The share of the EU grant in the total investment cost ranges from a maximum of 85% (for the Slovakian railway modernisation and the M43 motorway in Hungary) to a minimum of 2% (i.e. in the case of the tramway in Le Havre). In Latvia, Greece, Slovakia and Hungary, the EU grant was decisive for project implementation as the projects could not have been financed by the Member States alone. This was also the case with both the Saulkrasti bypass and the Rio-Antirio Bridge, which, due to their financial scale and complexity, could have not been implemented without EU support. In such cases, the EU played an important role in accelerating the realisation of EU transport (TEN-T network) projects, thus promoting cohesion policy objectives.

In some cases, however, the EU added value in terms of financial support was more limited. In such cases, the project would have been realised without the additional funds from the EU due to a high political desire for the project and/or the availability of the necessary financial resources. This was the case with the A14 motorway in Germany and the Le Havre tramway in France.

Sometimes, the need for EU financial support is questionable, as the decision to provide EU financing comes late, or even after a project has been initiated. In a few cases, projects were co-funded during the construction stage or even once the infrastructure was in the operational phase, by applying 'retrospective EU assistance'⁸⁰. For example, in the case of Naples, the co-financing request was issued by the managing authority in August 2003, and the Commission's final decision to grant assistance to the project was taken in August 2005 when the project was already operating⁸¹. In Malaga also, the application for co-financing was submitted by the managing authority when the project was already under construction. The Commission has already addressed this issue, introducing for the

⁸⁰ 'Retrospective support' is the award by a managing authority of EU assistance to an operation that has already incurred expenditure from national sources or is already complete before EU assistance is formally applied for or awarded. See http://ec.europa.eu/regional_policy/en/information/publications/cocof-guidance-documents/2012/guidancenote-to-the-cocof-on-treatment-of-retrospective-eu-assistance-during-the-period-2007-2013

⁸¹ The decision to co-fund the project was based on the fact that the project was functionally interconnected with and complementary to the previous operating segments of Line 1.

2014-2020 period provisions prohibiting support for operations which have been physically completed or fully implemented.

Technical support and institutional capacity building

EU added value can materialise during project preparation and the application process itself, in which the interaction with the EU institutions plays a key role. In a number of cases, the need to comply with the requirements of the application procedure for EU co-financing: (i) led to improvements in the project design; (ii) ensured a better allocation of resources, which had positive effects also during implementation; and (iii) helped Member States to improve their capacity to realise large-scale projects. Also, as recognised by participants of the technical seminar of 23 March 2018, the information provided by project promoters gives the Commission a broader and more precise view of large transport infrastructure development and implementation in the Member States. This knowledge can feed into improved project selection and management for all Member States.

In several cases, JASPERS ensured the streamlining of the preparatory phase, especially in terms of forecasting capacity, demand analysis, financial sustainability and risk assessment, which were important aspects of the subsequent realisation of the projects. JASPERS was involved in preparing the Žilina project, the M43 motorway and the two Polish projects. In all four cases, the advice it provided was perceived beneficial by project promoters, as it helped them to adjust project parameters and other broader aspects, such as the ticketing system and financial sustainability during the implementation phase⁸².

Capacity building and institutional learning due to EU action are visible in a number of cases. For example, in the Saulkrasti case study, EU support acted as a catalyst to improve internal administrative procedures and capacity. Contractors indicated that the project contributed to strengthen mutual cooperation and improve the existing technical know-how at regional as well as national level. The same applies to the Gdańsk project, where EU support had positive spillovers in the programming and implementation phases, since it contributed to improving administrative procedures and streamlining project delivery. In the case of the M43 motorway between Szeged and Makó, the EU played an important role in setting up the institutional background and monitoring the implementation phase. Interviews with NIF (National Infrastructure Developing Co. Ltd) reinforced this finding: coordination among the various actors (national and private bodies) was one of the main challenges. The EU support played a crucial role in helping them to coordinate and develop more stringent and consistent national regulation in the field of subcontracting.

Finally, the Rio-Antirio Bridge was a unique project from the technical and organisational points of view. As stated earlier, its implementation was carried out through a private-public partnership, which was new to the Greek public administration. The use of Structural Funds and the EIB's involvement in the project were thus essential, not only to make the project financially feasible, but also for project governance and to build up the capacity of the Greek authorities to implement PPPs.

Q.3. To what extent do the issues addressed by the examined interventions continue to require action at EU level?

⁸² See the section on factors influencing effectiveness.

Q.2. Did they achieve EU-wide effects (e.g. building trans-European transport networks, etc.)?

The EU plays an additional strategic, and possibly influential, role through its capacity to influence the strategic framework in which projects are implemented.

This means ensuring that the planning and selection processes lead to project implementation investments which are in line with EU priorities and objectives. For example, EU funding meant that the projects had to comply with environmental standards, which required mitigation measures for the possible environmental impact that building the infrastructure would have on some animal species. For the projects implemented in Poland, Hungary and Latvia, EU support clearly contributed to bringing the national transport network systems in line with EU standards in terms of their technical design and performance. Nevertheless, these achievements are not specific to major projects as compliance obligations are relevant to all investment projects co-financed by the EU.

The rules underpinning major projects require⁸³ them to be implemented within the scope of operational programmes: they are therefore expected to contribute to the programmes' strategic objectives, as well as to wider sectoral strategies. Through the process of major project selection and financing, the Commission was in a position to check that major projects contributed to operational programme objectives, sectoral strategies, and more generally to the implementation of EU policies and priorities.

Pursuing **EU-wide objectives** is another clear aspect where EU action adds value to major projects. To support the functioning of an internal market and to reinforce economic and social cohesion, the EU is contributing to the establishment and development of Trans-European Networks in the areas of transport (TEN-T). Several of the projects under assessment contributed to the implementation of TEN-Ts. For example, the Saulkrasti bypass is located on the Via Baltica route, which is part of the TEN-T and is the most important highway connecting the Baltic States. Likewise, the Žilina railway modernisation is part of the Rhine-Danube and Baltic-Adriatic core network corridors and corresponding rail freight corridors.

The evaluation shows that through large-scale transport infrastructure projects, the European Regional Development Fund and the Cohesion Fund have provided a positive contribution to the EU objectives of developing a modern infrastructure network that makes journeys quicker and safer, while promoting sustainable and environmentally friendly solutions.

The 10 EU-funded transport projects analysed in the report proved **effective** in achieving their objectives, even if they did not always achieve their initial (at times over-ambitious) targets.

The most effective projects were those initially designed to tackle clear transport needs. In this respect, the major benefits they delivered were reducing heavy congestion and vehicle operating costs, time savings and improving the reliability of journey times. By making the transport of services and goods cheaper and faster, the projects are also expected to make a positive contribution to economic growth.

⁸³ This provision did not exist in 2000-2006.

Positive effects on quality of life and well-being by improving road safety conditions, service quality and noise reduction were another feature of some of the transport projects evaluated. However, these effects are not considered as significant as those mentioned previously. The same applies to improving the sustainability of transport, e.g. improving air quality and encouraging the shift to more sustainable transport means etc. Here, positive but more limited effects have been registered, in particular in the area of urban transport and rail.

By improving public transport and services, notably in cities, some transport projects also improved access to work and services, thus helping address the mobility challenges faced by disadvantaged groups in urban areas.

Finally, major transport projects also contributed to enhancing Member States' administrative capacity to plan and implement major infrastructure projects and evaluate the projects' potential impacts in light of their economic, financial and environmental sustainability (cost-benefit analysis, environmental impact analysis, etc.)

Out of the 10 projects, nine were cost-efficient, thus delivering benefits that exceeded their costs⁸⁴, even if several projects were not as **efficient** as originally expected. This was primarily due to cost overruns, delays in the construction phase and unpredictable external factors, such as severe weather conditions or archaeological discoveries on the project site. Effective project management and well-run procurement processes were the main factors mitigating these problems.

The stakeholders consulted in this evaluation indicated that cost-benefit analyses carried out in the context of major projects have improved over the last decade and that the standardisation of CBA methodology across the EU allows for greater comparison between projects. The quality of the CBA varied between the projects analysed, in particular as concerns the demand analysis and the accuracy of forecast of construction costs. Although the CBA has proved to be a useful tool for justifying the economic and social pertinence of projects, the approach has its methodological limits: for projects that were part of a larger transport network, a standalone analysis often failed to capture the network impact. In some cases, the analysis appeared to be biased to justify a higher funding gap calculation; the absence of reliable tariff policies in Member States could not be properly factored in and rendered the analysis rapidly out-of-date or ad hoc.

The evaluation shows that insufficient attention was generally paid during project preparation to ensuring that the projects would be financially sustainable in their post-completion and operational phases. Only two of the ten selected projects cover operating and maintenance costs through revenues. Their financial sustainability in the medium to long term is therefore mainly ensured through public funding.

Unsurprisingly the main factor determining the success of the projects analysed was their quality at entry⁸⁵, which was the result of a solid technical and economic analysis, and a proper project selection process. A project's capacity to respond to evolving needs is a second broad condition for success, and goes hand in hand with quality project governance and managerial capacity.

⁸⁴ The only project with a negative B/C (benefit to cost) ratio was the Le Havre tram (France).

⁸⁵ 'Quality at entry' is understood as accurate demand analysis, even-handed analysis of alternatives, an *ex ante* CBA, stakeholder involvement, assessment of the governance structure and verification of financial sustainability.

On average, the selected projects scored well in terms of **relevance** and **coherence**. Most of them responded to important and urgent needs and were in line with priorities at various levels of government. None of the 10 projects evaluated were designed and implemented in isolation. They all fitted into wider plans and were consistent with EU or national/regional priorities. The strategic importance of this factor for all transport projects, and not just the large ones, has been recognised in the 2014-2020 programming period by introducing a specific precondition for financing (*‘ex ante conditionality’*) for transport investments, requiring them to be part of a comprehensive transport network. The same will apply to the post-2020 period, in which transport investments will need to be included in a multimodal planning system of existing and planned infrastructures.

EU value added materialised in several ways. First of all, by providing a significant and sometimes critical share of funding, the EU played a fundamental role in the actual implementation of the project, which otherwise would not have been possible or would have been delayed. This is especially relevant in the case of cohesion countries, where the share of EU co-financing accounts for most of the public investment.

Secondly, EU support was instrumental in pushing national authorities to adopt a more strategic approach, for example by prioritising investments in TEN-T infrastructure over national or regional transport priorities. By doing so, the emphasis of EU investments was on addressing bottlenecks, leading to better connectivity and functioning of the internal market.

Finally, technical assistance provided by the EU institutions was another source of added value by strengthening the projects’ technical quality and contributing to administrative capacity building in the national and regional authorities.

6. CONCLUSIONS

The evaluation of the 10 large infrastructural projects in the transport sector confirm previous evaluations⁸⁶ and indicate that by supporting large transport projects, including major projects, cohesion policy has made a significant contribution to improving connectivity at EU and national level and has encouraged the development of sustainable transport. Investments increased the accessibility of the countries and regions concerned and opened up the possibility of increased trade with the rest of the EU, which is vital for economic development.

As indicated by the analysed projects, the main tangible effects produced by large transport infrastructure projects are those immediately related to the projects’ pure ‘transport’ objectives, such as reducing congestion and travelling times. However, when embedded in larger transport framework and strategies, these projects also have the potential to contribute to the economic growth and development of the areas concerned.

⁸⁶ Steer Davies Gleaves (2010). *Ex post* evaluation of cohesion policy programmes 2000-2006 co-financed by the European Fund for Regional Development (objectives 1 & 2) - work package 5a: Transport. Applica (2012). *Ex post* evaluation of the Cohesion Fund (including former ISPA) in the 2000-2006 period. Synthesis report. Frontier Economics, Atkins, IT (2011). *Ex post* evaluation of cohesion policy interventions 2000-2006 financed by the Cohesion Fund – Work Package B: Cost-benefit analysis of selected transport projects. CSIL, Ramboll, Significance BV, TPlan Consulting (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and Cohesion Fund between 2000 and 2013. Final report.

The most important determinants for the projects' success are their quality at entry, project governance and management. On the other hand, the long term financial sustainability of the EU-funded projects is challenging for large transport investments. Some of the critical points identified in the 2000-2006 and 2007-2013 periods have been addressed in the current programming period. The specific requirements of the *ex ante* conditionality on transport are a case in point, particularly with respect to the need for the funded projects to be part of a comprehensive transport network.

In the future, the EU will continue to support large infrastructural projects in the transport sector through the European Regional Development Fund, the Cohesion Fund and the Connecting Europe Facility, which will channel part of the financing. According to the Commission's proposals, no procedural distinction would exist any longer for transport projects over a specific size. In the future, all transport projects, regardless of their size, would benefit from a strengthened selection process which would incorporate some of the features of the major projects procedure. This would include a clear prioritisation of projects designed to maximise the contribution of EU funding to achieve operational programme objectives. Moreover, the 2021-2027 legal framework proposed by the Commission also requires the multimodal mapping of existing and planned infrastructures through a dedicated enabling condition which would, for the first time, require an economic justification of the planned investments, underpinned by robust demand analysis and traffic modelling.

The most important projects from a strategic perspective would need to be explicitly included in the relevant operational programme and would have to undergo enhanced monitoring, both in discussions with national and regional authorities and with the Commission in the annual review process. Projects would have higher visibility and more stringent communication requirements attached to them.

Responding to the strong calls on the Commission to simplify policy delivery, the Commission proposes to simplify and harmonise the approach for all projects. The dual approach for the 2014-2020 programming period would therefore be discontinued. Under the old approach, a CBA was required for major projects but not for projects below the threshold (under €75 million in eligible costs for the transport sector). The requirement that projects selected are prioritised and represent the best value for money presumes that an assessment tool or mechanism is in place, to enable programme authorities to fulfil this requirement. The proposal for 2021-2027 does not prescribe how this should be done — it may depend on the sector, the average project size, whether the investment takes the form of infrastructure or on other measures. Nevertheless, it is likely that many Member States will continue using CBAs, especially for bigger infrastructure projects, given their experience over the preceding periods and the straightforwardness of this tool. The Commission would further facilitate this process by proposing the use of a 'simplified'/rapid CBA, especially for smaller projects.

After decades of project development experience in the framework established by the Commission, Member State administrative authorities and beneficiaries have developed their own economic and financial assessment capacity and skills, which fit flexibly in the context they operate in, including requirements at national and regional level. The actions to build administrative capacity that have been supported so far have been instrumental in this regard; these should continue in 2021-2027 and continue to be promoted by the Commission. These would further enhance the effectiveness of programme implementation and the programmes' longer term results. Selected operations would

anyway need to feature the best relationship between the amount of support, the activities undertaken and the achievement of objectives. Beneficiaries would also be required to have the necessary financial resources and mechanisms to cover operating and maintenance costs, thus addressing the financial sustainability issue identified above. This would prevent the unfortunate situations experienced in the past where some project capacities could not be fully utilised given the lack of financial resources for operating and maintaining the infrastructure built.

ANNEX 1: PROCEDURAL INFORMATION

Lead DG, Decide planning/CWP references

DG Regional and Urban Policy (DG REGIO) was the lead DG.

Decide Planning: 2018/REGIO/001 — Planning (planned) — 19/6/2017

Organisation and timing

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| Tender procedure launched | December 2016 |
| Contract signed | May 2017 |
| First steering group meeting | September 2017 |
| Last steering group meeting | 5 June 2018 |
| Final report accepted | June 2018 |
| Number of steering group meetings | 5 |
| Participating DGs (in addition to DG REGIO) | CLIMA: Climate Action ENV: Environment MOVE: Mobility and Transport GROW: Internal Market, Industry Entrepreneurship and SMEs RTD: Research and Innovation SG: Secretary General |

Exceptions to the Better Regulation Guidelines

As a general open public consultation on cohesion policy was taking place as part of the post 2020-multiannual financial framework consultations, the *ex post* evaluation on major projects was exempted from general open public consultation in order to avoid duplication and confusion. Besides, the major project concept is not widely recognised, so a public consultation would not add value to an initiative largely unknown outside the stakeholders directly involved in managing the projects.

Consultation of the RSB

The draft staff working document (SWD) was presented at the Regulatory Scrutiny Board (RSB) meeting on 5 June 2019 and the RSB issued a negative opinion on 7 June. The RSB comments were addressed in this final document as indicated in the following table.

| RSB comment | Comments addressed |
|---|---|
| The evaluation does not show how the small sample of 10 case studies adds value to other programme and project evaluations of the ERDF and Cohesion Fund. It should not overstate the validity of the findings on the basis of 10 case studies. | The SWD puts into context the reasons which led to the choice of the small sample selection (the focus on projects in operation for at least five years in order to capture the long term effects of projects; timing and budgetary considerations; quality data availability). It also better clarifies the rationale behind the selection, which was not to identify the most |

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| | <p>statistically representative projects, but rather to consider illustrative examples of infrastructure projects capable of delivering interesting insights on the possible long term effects of major projects, from which lessons for the future could also be drawn. Other studies and evaluations on transport are also referred to in order to expand the analysis where possible.</p> |
| <p>The report should be transparent about risks of e.g. selection bias of the case studies. Its selection criteria may have favoured more successful major transport projects. References to other studies or evaluations would help to validate the conclusions. The report should be more forthcoming about uncertainties. For example, it should acknowledge that as some of these projects were bundled with other initiatives, it may be difficult to isolate the contribution of the evaluated project to longer term outcomes.</p> | <p>The SWD now better clarifies the risks deriving from the selection of the case studies, primarily the fact it only looks at ten projects and that it primarily focuses on the direct effects of transport projects, taking a conservative approach as regards broader impacts (such as the impacts of efficiency improvements in trade flows or changes in land values). It also clarifies the ‘positive bias’ towards ‘well-performing projects’ deriving from the need to select only completed and functioning projects in order to capture their long term effects. These risks, uncertainties and methodological limitations are now better described in Chapters 4.2 and 4.3. The methodology is also described in detail in Annex 3. References to past evaluations are added across the document when relevant.</p> |
| <p>With a narrow focus on user costs, the report does not sufficiently link the transport projects to the objectives of the funding programmes. This requires a more detailed explanation of the wider social and economic impacts, compared with <i>ex ante</i> expectations. It includes a discussion of the methodological limitations and the possible needs for future data collection.</p> | <p>Data availability was a major challenge in this evaluation, especially data on user costs, which were not generally available from the authorities responsible for carrying out the projects in question. Also, the available aggregate data did not allow for meaningful comparisons of unit costs. To address these comments, the SWD now provides a link to the programmes objectives in Chapter 5.1 (table 2). Methodological limitations are broadened in Chapter 4.3.</p> |
| <p>The report does not adequately explain its conclusion on the simplification of project assessment and selection procedures. In the proposed future cohesion policy, there would no longer be a procedural distinction between transport projects of different sizes. The report should describe these changes more fully and explain how the evaluation’s findings are relevant in this new policy context. It should also deepen the analysis of how the Commission already has taken some</p> | <p>Explanations on how some of the findings have already been taken into account in the 2014-2020 programming period, particularly through <i>ex ante</i> conditionalities, are included in the relevant sections. The ‘results’ and ‘conclusion’ chapter have been redrafted to better explain the simplification aspects of the post-2020 arrangements, clarifying that the EU will continue to support large infrastructure projects even if no procedural distinction will exist any longer for transport</p> |

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| <p>of these findings into account in the 2014-2020 cohesion policy. It should discuss further which findings remain relevant for the future and how the Commission has taken them into account in the proposals for post 2020.</p> | <p>projects over a specific threshold. The new text also refers to i) the enhanced post-2020 selection process which will concern all projects and incorporate some of the features previously included in the major projects procedure (project prioritisation); (ii) the introduction of the enabling condition requiring multimodal mapping of existing and planned infrastructures; and (iii) the request for an economic justification of the planned investments underpinned by robust demand analysis and traffic modelling. The decision not to pursue compulsory CBA post-2020 is also explained.</p> |
| <p>The report should assess how projects are selected for EU funding also from the point of view of efficiency. It should discuss its understanding of efficiency in this context and justify the choice of methodology (e.g. relevance of the tendering process). The analysis should go beyond the question of whether benefits exceeded costs for each project and also assess whether the selection process favoured those projects with the best cost to benefit ratio.</p> | <p>The efficiency chapter (5.2) was redrafted to include a discussion about different approaches to efficiency and to justify the methodological choice. It now clarifies the difficulty inherent in calculating and comparing the unit costs of infrastructure projects across regions without a detailed breakdown of various project features and explicit consideration of the factors which affect costs (data on environmental externalities are hardly available). Such data were not generally available from the authorities responsible for carrying out the projects in question, and the aggregate data which did exist did not enable meaningful comparisons of unit costs to be made.</p> |
| <p>The report should make more use of the input from stakeholders.</p> | <p>References to stakeholders' opinions were expanded throughout the report.</p> |

Evidence, sources and quality

This staff working document is largely based on a study by an independent consultant. The European Commission also contributed to the study through active participation in the Interservice Steering Group (ISG), which ensured the quality of the study.

The analysis is complemented by internal Commission data on fund management, analytical reports and past evaluations. The analysis is intended to answer evaluation questions formulated in the roadmap, the methodology following the Better Regulation Guidelines and the European Commission's guide to cost-benefit analysis. The following list describes main sources of information:

- European Commission (2018). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and Cohesion Fund between 2000 and 2013. Final report.

- European Commission (2005). *Ex Post* evaluation of a sample of projects co-financed by the Cohesion Fund (1993-2002) — Synthesis Report.
- European Commission (2010). *Ex post* evaluation of cohesion policy interventions 2000-2006 financed by the Cohesion Fund (including former ISPA) — Work Package B — Cost benefit analysis of transport projects, DG Regional Policy.
- European Commission (2012). *Ex post* evaluation of investment projects co-financed by the European Regional Development Fund (ERDF) and Cohesion Fund (CF) in the period 1994-1999, European Commission, DG REGIO, Brussels.
- European Commission (2014). Guide to Cost Benefit Analysis of Investment projects.
- European Commission (2016). *Ex post* evaluation of Cohesion Policy programmes 2007-2013, focusing on the European Regional Development Fund (ERDF) and the Cohesion Fund (CF) — Work Package 5 — Transport, Final Report.
- AECOM Economics (2012). ‘JASPERS evaluation’, final report, available at; https://ec.europa.eu/regional_policy/sources/docgener/evaluation/pdf/eval2007/jaspers_evaluation/final_report_131212.pdf.
- Spatial Foresight& t33 (2018). ‘New assessment of ESIF administrative costs and burden’, final report.
- Steer Davies Gleave (2010). *Ex-post* evaluation of cohesion policy programmes 2000-2006 co-financed by the ERDF (objectives 1&2)’ — work package 5a: transport; Final Report.
- Open Data Platform: <https://cohesiondata.ec.europa.eu/>
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ANNEX 2: STAKEHOLDERS CONSULTATION

The consultation strategy envisaged three main consultation activities as follows: interviews for the case studies, targeted online consultation and a seminar with stakeholders.

Interviews for the case studies and the targeted online consultation took place between September 2017 and April 2018. The first interviews on two pilot case studies were held in September, followed by eight other case studies from November 2017 to January 2018. The seminar took place in March 2018.

| <i>Consultation activities</i> <i>Stakeholders</i> | Interviews (for case studies) | Seminar | Online consultation |
|---|---|---|---|
| Managing authorities responsible for programmes, including major projects | Relevance, coherence, effectiveness, efficiency, EU added value, sustainability | Relevance, coherence, effectiveness, efficiency, EU added value, sustainability | Relevance, coherence, effectiveness, efficiency, EU added value, sustainability |
| Beneficiaries of major projects covered by the 10 case studies and major transport projects in general | Effectiveness, efficiency, sustainability | Effectiveness, efficiency, sustainability | Effectiveness, efficiency, sustainability |
| Regional/national authorities responsible for the area where the major transport projects were implemented | Relevance, coherence, effectiveness, EU added value | Relevance, coherence, effectiveness, EU added value | Relevance, coherence, effectiveness, efficiency, EU added value, sustainability |
| Experts and academics | Relevance, effectiveness, EU added value | Relevance, effectiveness, EU added value | - |
| Economic operators in the regions/transport businesses | Relevance, effectiveness, EU added value | - | Relevance, coherence, effectiveness, efficiency, EU added value, sustainability |
| NGOs, interest groups | Relevance, effectiveness on quality of life and well-being, EU added value | - | Relevance, coherence, effectiveness, efficiency, EU added value, sustainability |

Interviews for case studies

The interviews provided informative insights into the projects' performance. Field visits were carried out for each case study, and an extensive interview plan was designed to collect primary data as well as the views and perceptions of a broad range of stakeholders. The questionnaire addressed five evaluation criteria (relevance, coherence, effectiveness, efficiency, EU added value). A total of 245 people were interviewed, mainly face to face (some involved phone interviews). The people interviewed included civil servants (Commission officials, national ministries, managing authorities), experts (engineers and planners), project managers, policy-makers (mayors, regional and municipal councillors), users' and citizens' associations and journalists.

Targeted online consultation

A six-week online targeted public consultation was held, covering both individual citizens and organisations from Member States. The structure of the consultation questionnaire included 17 closed questions and 13 open questions, offering the possibility of comments/examples from the respondents on the five evaluation criteria i.e. the relevance, effectiveness, efficiency, coherence and EU added value attached to the support provided by the two Funds. Some respondents used the opportunity just to make statements without a clear link to the questions.

The consultation targeted stakeholders who had experience in designing, implementing and/or evaluating major projects in the field of transport. These were:

- regional/national authorities and managing authorities for ERDF/Cohesion Fund operational programmes supporting transport major projects;
- project promoters/beneficiaries of transport major projects supported by ERDF/the Cohesion Fund;
- economic operators in the transport sector;
- NGOs or interest groups;
- Experts and academics specialised in economics and/or quantitative and qualitative analysis methods for transport infrastructure.

The questionnaire was available in the three working languages of the European Commission: English, French and German. For the open questions, the stakeholders were allowed to reply in any of the EU's 24 official languages.

The consultation generated 40 responses from 17 countries (eight from PL, six from IT, five from ES, four from HU, three from EL and LT, two from BE and one from BG, CZ, EE, DE, LV, NL, PT, RO and SI). A total of 27 of the respondents claimed to have detailed knowledge about transport major projects financed by the two funds, while 11 declared just general knowledge. Out of 40 respondents, 27 responded on behalf of a national, regional and local authority or economic operator. In almost equal proportions (25%) the responses related to three key areas: railway, road and urban transport (metro). The rest defined their involvement as 'other'.

Effectiveness

33 of the respondents believed that the ERDF and Cohesion Fund were successful in strengthening economic, social and territorial cohesion, particularly by having long term effects on:

- economic growth (travel time, income for the service provider, wider economic impacts, institutional learning);
- quality of life, well-being and social cohesion (safety, crowding, service quality, noise, urban renewal, effects on social groups, effects on territorial areas);
- environmental sustainability (combating local air pollution and climate change, preserving biodiversity).

Efficiency

21 respondents noted that the major projects had been efficient from the perspective of the cost vs benefit analysis. In the open contributions, respondents pointed out that the separation of different funds (ERDF vs Cohesion Fund) is not beneficial due to different regulations being in force for different funds. Respondents agreed that funds would need to be better integrated. The other issue mentioned was that the administrative burden for applicants was considered too high, both in the application process and during the project implementation and project closing phases.

For some respondents, funds are not attractive enough due to the even stronger focus on results and the shift towards fewer but larger projects, combined with the high administrative burden and low probability that projects will be approved.

Relevance

Some 38 out of 40 respondents considered that the funds addressed the real needs on the ground (cumulative approach for the responses 'I agree' and 'I strongly agree'). The respondents consider that the major transport projects positively affected travel time, reliability of journey time, economic development in the region, journey safety, service quality, noise, local air pollution, climate change, biodiversity, social cohesion and territorial cohesion.

Coherence

In the view of 79% of respondents, the major projects showed a good level of consistency with other programmes and priorities, especially the Connecting Europe Facility and the trans-European networks for transport.

EU added value

An important chapter in the questionnaire was devoted to identifying the most appropriate way to characterise the EU added value for the major transport projects.

Most of the respondents 'strongly agreed' that without the EU support the projects would have not been implemented and that the EU support contributed to faster preparation and/or implementation of the projects (58%).

They also 'agreed' with the statements that: (i) without the EU support the projects would have been undertaken but their scope would have been different or less ambitious; and (ii) the EU support helped ensure better consideration of specific priorities in project design and implementation, such as preserving the environment, combating climate change and strengthening the trans-European transport network. Respondents also 'agreed' that EU action contributed to coordination gains among the partners and levels of decision-making in the preparation and implementation of the projects.

Some respondents 'disagreed' that the EU support helped private partners get involved in co-financing the projects.

Seminar

The seminar took place on 23 March 2018 in Brussels and gathered 48 experts and European Commission representatives. It focused on three main cross-cutting issues:

- **Drivers of the financing decision for major transport projects:** participants concluded that the quality of *ex ante* CBAs had improved over time and that the quality of transport models determined the outcome of the *ex ante* analysis. Moreover, the standardisation of CBA methodology across the EU allows for greater comparison between projects. Some participants pointed out that CBA may be challenging for long transport corridors which cross national borders as different countries may have different political priorities. International transport development strategies were seen as a solution to this. *Ex post* evaluations are limited by the availability of data gathered and models made for the *ex ante* CBA. This has implications for the scope of the CBA; due to such limitations, urban renewal, reliability and employment are addressed in a more qualitative way.
- **EU added value of major transport projects:** experts argued that the EU added value in the financing of major transport projects has three dimensions: (a) whether the EU support is necessary for the project to take place; (b) whether the project has EU-wide effects; and (c) whether future EU action is required for the project to be successful. The study focused mostly on the first two dimensions. Experts emphasised that the fact that a project is co-financed does not necessarily mean that it would not have been carried out without EU support. For the case study in Latvia, it was found that EU support really was necessary for the project to be carried out, whereas in Germany the project would have taken place regardless of EU support. Representatives of the beneficiaries agreed that the EU had provided added value to their projects in two main ways: (i) by providing finance when other finance was not available; and (ii) by improving standards thanks to the technical assistance provided by JASPERS and the EIB on the design and implementation of major projects. In particular, ‘structural programme loans’ were mentioned by representatives of the beneficiaries as a way to help Member States kick-start the projects and keep them on schedule.
- **Governance and financial sustainability:** there was consensus that the financial sustainability of a project depends on how it is financed and that the way the project is financed affects the demand for the end product. For example, if users have to pay a toll, they may be less inclined to use the road. The financial structure of a project should therefore be appropriately discussed in the project selection process. Several participants argued that the EIB and the European Commission currently do not focus enough on the financial sustainability of projects; instead they pay major attention to a project’s preparation and implementation rather than on its post-completion operation costs, including maintenance. However, sustainability problems usually arise later on during the project’s operation. This means that continuous monitoring of the project should be performed and that a life-cycle approach should be adopted.

ANNEX 3: METHODS AND ANALYTICAL MODELS

Project selection process and outcome

The methodology used for the *ex post* evaluation consists of *ex post* Cost Benefits Analysis complemented by qualitative analysis. The aim of the *ex post* evaluation was to analyse the long term contribution of ten major projects implemented in the European Union (EU) in the transport sector during the 2000-2006 or 2007-2013 programming periods and co-financed by the European Regional Development Fund (ERDF) or the Cohesion Fund. The main goal was to assess the long term role of those projects in the economic development, the improvement in the quality of life and well-being of citizens, and their effects for the environment. The *ex post* evaluation only concerns major projects supported by cohesion policy's direct investments in the transport sector.

Case studies were the main tools used in the entire evaluation: the focus of the exercise was evaluating 10 illustrative examples of large scale transport projects capable of delivering interesting insights on the possible long term effects of infrastructures and on the causal chain leading to those effects.

Process of selection

Firstly, the European Commission services provided a list of 30 major transport projects financed in the abovementioned programming periods and particularly relevant to the scope of the evaluation.

The selection of the above mentioned projects relied on various criteria: the Commission analysed cohesion policy allocations and identified the Member States which dedicated the most financial resources to transport policy in absolute figures and in comparison to their cohesion policy envelope. The available data sources meant that allocations could be extracted by major transport mode: road, rail, water and urban transport.

The selection process only took into account projects which: i) had been operational for at least five years by the time the evaluation was launched and; ii) had not been covered by case studies in another evaluation done by DG REGIO. The size of the EU contribution was decisive if the number of identified projects was too high. Member States were then ranked and grouped: those which scored best on both of the criteria were ranked first, followed by those which scored best in at least one of the criteria.

The 30 projects summary sheets were prepared by carrying out the following activities:

- a thorough analysis of project documents available at the Commission services as well as collected by the national and local authorities in charge of the projects;
- interviews with Managing Authorities or Intermediate Bodies, Beneficiary Institutions and, when relevant, other informed parties, as well as knowledge of the national correspondents about the project history;
- Web desk research of the information and data publicly available (including project web-sites, press articles, reports and studies).

This review process aimed to structure the information collected on each of the 30 ERDF or Cohesion Fund projects, to assess the availability and quality of existing information and to provide a judgement on their suitability for evaluation. In gathering data and information, the experts followed a predetermined template and data collection grid, to ensure consistency across the 30 projects.

The ultimate goal of the selection process was to select 10 illustrative examples of infrastructure projects that can provide a panorama of experiences suitable for developing interesting project narratives and drawing policy lessons.

This was assessed using the three broad criteria set out below, each one with a different weighting to express its relative importance in the project selection:

1. Strategic relevance for evaluation purposes (weighting 40%). This criterion measures the extent to which the project can contribute to answering the evaluation questions identified in the roadmap and in the conceptual framework;
2. Availability and quality of data from existing sources (weighting 30%). This criterion measures the extent to which data and information (both *ex ante* and *ex post*) needed for the *ex post* evaluation are already available, relevant and appropriate to the scope and purposes of the evaluation and of good quality;
3. Stakeholders' availability and willingness to cooperate and the availability of information for a project-tailored theory of change analysis (weighting 30%). This criterion captures the extent to which information is available to support the project evaluation from the perspective of the theory of change and based on considerations about the willingness of people contacted to support the evaluation.

The evaluation team developed the evaluability grid⁸⁷ used to allocate scores to the projects, with the aim of rating the investments. A qualitative comment was also incorporated into the scoring exercise, further detailing the reasons underlying the judgement for each project.

Moreover, the following variables were also considered in order to ensure the selection of a balanced sample of projects.

1. Financing period: 2000-2006 or 2007-2013, knowing that a trade-off exists between more mature and more recent projects. While there is a high chance with the former that long term effects have already fully materialised, they may be less informative for the next programming period as they may be associated with issues that have already been addressed or discussed. In contrast, while more recent projects are in principle more informative, they have been operational for a shorter time span, making it more difficult to capture their long term contribution to well-being
2. Location: Member State, urban areas/outside urban areas, TEN-T core network, TEN-T comprehensive network, Non-TEN-T
3. Type of infrastructure project: new construction, upgrading, modernisation
4. Project financing: revenue generating project/non-revenue generating project, PPP project.

Once qualitative and quantitative information was gathered, case studies' authors aggregated the evidence as to form a unique story. In order to guarantee consistency, the evaluation team developed a common case study template to be followed by case studies' authors.

⁸⁷ See details in the First Interim Report, Vol. II in CSIL, Ramboll, Significance BV, TPlan Consulting (2017). *Ex post* evaluation of major projects supported by the European Regional Development Fund (ERDF) and Cohesion Fund between 2000 and 2013.

Analysis — method

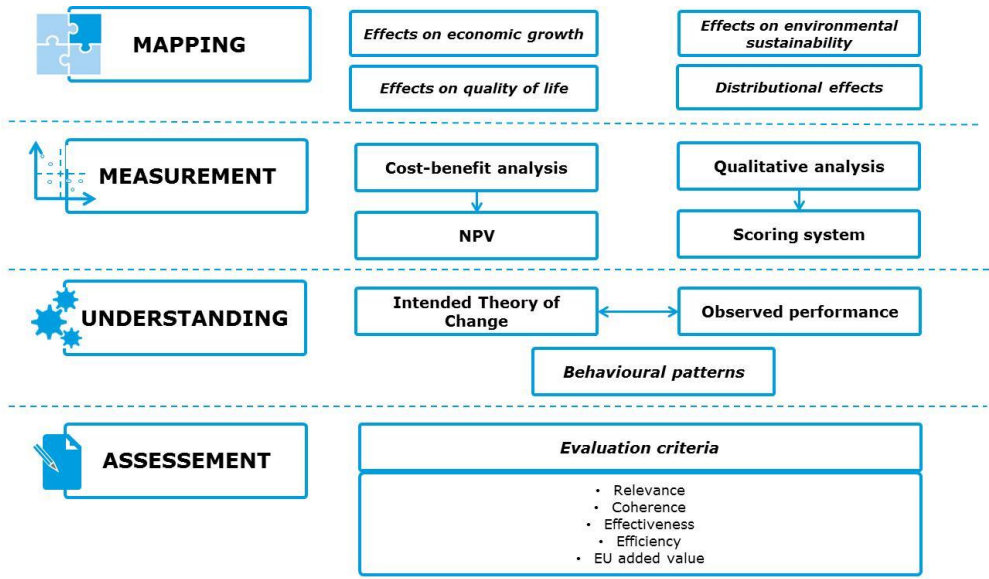
The methodological approach used to undertake the evaluation consists of an *ex post* Cost Benefit Analysis combined with qualitative techniques (project site visits, interviews with stakeholders, press articles reviews, etc.).

The evaluation team built up and developed the methodological framework on the basis of an extensive review of the relevant theoretical and empirical literature. It was then uniformly applied to all ten selected case studies. This homogenous approach allows comparisons between case studies and to gather common policy lessons.

The adopted methodology consists of four building blocks:

- 1) Mapping the effects of large infrastructural environmental projects
- 2) Measuring their effects
- 3) Understanding their effects
- 4) Synthesis and conclusions.

Assessment Framework



Source: CSIL and Ramboll

Mapping the effects

The first step was mapping the effects through a comprehensive literature review: it aimed at identifying a list of potential effects delivered by the implementation of transport major projects and a common understanding of their nature. The reason why transport infrastructures — including road, rail, airport, port and urban transport infrastructure — have traditionally been a cohesion policy priority is that such infrastructures are expected to generate positive effects by creating international links, increasing accessibility and, more

broadly, by facilitating the free movement of people and goods throughout the EU. According to the most recent literature, the long term effects generated by transport (and more generally investment) projects can be considered under four broad categories:

- effects on economic growth
- effects on quality of life
- effects on the environment
- effects related to distributional issues.

Measuring the effects

Cost-benefit analysis is the most suitable technique for evaluating infrastructure projects' effects. Other evaluating methods exist, e.g. cost-effectiveness analysis (CEA), macroeconomic simulation models, input-output models, multi-criteria analysis (MCA), and information elicitation techniques. However, these show greater disadvantages if compared to CBA in the context of project evaluation⁸⁸.

This method was selected for the following reasons: i) it is the most suitable quantitative method to investigate the details required to isolate the impact of an individual project; ii) it is a reliable tool to express project benefits and externalities in monetary terms; iii) it measures all impacts in terms of welfare changes, thus it allows to rank projects and reach conclusions about their social desirability.

The effects are as set out below.

- A. Effects that by their nature are already in **monetary units** (e.g. transport costs savings). These can therefore be easily included in a cost-benefit analysis.
- B. Effects that are quantitative, but not in money units, and that can be converted into money units in a reasonably reliable way (e.g. transport time savings, accidents, air pollution⁸⁹). These effects can also be included in the CBA.
- C. Effects that are **quantitative, but not in money units**, for which there are no reasonably reliable conversion factors to money. These effects are discussed in a qualitative way together with the CBA's overall outcome.
- D. Effects that are **difficult to measure in quantitative (cardinal) terms**, but which lend themselves to ordinal measurement (i.e. a ranking of the impact of different projects on such a criterion can be provided, such as very good, good, neutral, bad, very bad). In the context of this evaluation, these effects were discussed in qualitative terms.
- E. Effects that might occur, but which are subject to a high degree of uncertainty: these were treated as part of the risks/scenario analysis that was included in the CBA.
- F. Effects that might occur but which cannot be expressed even in an ordinal (ranking) manner: these are **residual effects that can be mentioned in qualitative description** in the case study report.

⁸⁸ The strengths and weaknesses of different evaluation methods are discussed in the First Interim Report, Vol. II.

⁸⁹ Methods to establish such conversion factors include: stated preference surveys (asking respondents about hypothetical choice alternatives), hedonic pricing or equating the external cost with the cost of repair, avoidance or prevention, or with the costs to achieve pre-determined targets.

Ex post cost-benefit analysis

The overall methodological reference for the CBA adopted for the evaluation is the European Commission's CBA guidelines⁹⁰, which is the current reference for the appraisal of major infrastructure projects co-funded by the ERDF and Cohesion Fund. Therefore, a standardised set of cash flow tables is produced for the investment costs, operating costs and revenues, sources of financing, economic benefits. These allow for the calculation of:

- the financial return on investment i.e. calculation of the FNPV(C) and FRR(C);
- the financial sustainability;
- the economic return (i.e. calculation of the expected net present value and economic rate of return).

However, with respect to what is proposed in the CBA Guide, the approach used here is slightly adjusted to take into account the *interim perspective* provided by the assessment. While the European Commission's CBA guide adopts an *ex ante* perspective, the evaluation covers projects in operation from at least five years from the launch of the study itself, placing *de facto* the assessment in an intermediate viewpoint in comparison to the whole projects' time horizon. For this reason, the approach presented in what follows also draws lessons from Florio (2014⁹¹), which contains useful insights for carrying out an *ex post* CBA, as well as from previous experience acquired by the evaluation team in applying the *ex post* CBA to a sample of major projects co-financed by the ERDF and the Cohesion Fund between 1994 and 1999⁹².

The first implication of the interim perspective of the study is that while the most significant share of effects expected to be observed *ex post* will be those also reflected in the *ex ante* CBA (e.g. value of time, vehicle operating costs), the *ex post* CBA can be a little bit more ambitious in terms of effects to be accounted for as the risk of optimism bias is mitigated by the possibility to rely on observed data. Actually, the perspective of an *ex ante* CBA, where prudence is fundamental to avoid optimism bias, is different from an *ex post* CBA, where there is much more certainty and knowledge on what actually happened and is observed.

Also, the fact that the CBA is carried out during the lifetime of the selected projects leads to a hybrid CBA typology, sharing the features of both an *ex ante* CBA and a pure *ex post* (i.e. retrospective) CBA. In this context, the analysis is undertaken from a 'today' perspective, meaning that the CBA is both backward-looking, i.e. using past evidence on the project performance until today, and forward-looking, i.e. forecasting future developments of the project from today onwards. This makes it necessary to mix historical data with both present data and forecasts.

The main aim of the analysis is to assess the selected projects' long term contribution to economic development and quality of life rather than comparing the *ex ante* with the *ex post* CBA. For this reason, the *ex ante* appraisal is used as a reference to better understand the rationale of the project selection and the underlying assumptions needed to better reconstruct

⁹⁰ European Commission (2014). Guide to Cost-Benefit Analysis of Investment Projects. Economic appraisal tool for Cohesion Policy 2014-2020.

⁹¹ Florio, M. (2014). Applied welfare economics: Cost-benefit analysis of projects and policies. Routledge: London, UK.

⁹² European Commission (2012). *Ex post* evaluation of investment projects co-financed by the European Regional Development Fund (ERDF) and Cohesion Fund (CF) in the period 1994-1999.

the decision-making process, but it is not necessarily a comparator for the observed *ex post* CBA.

The intermediate perspective poses some challenges to the treatment of key parameters in the CBA, as well as some related important issues. These are:

- Time horizon - it is set in line with EC guidelines (30 years for railway; 25-30 years for roads and urban transport). The starting year (Year “zero”) is the first year of capital expenditures. The backward period includes the entire construction phase as well as operating phase until the present time (year 2017). The forward period runs from 2018 to the end of the time horizon.
- Choice between current and real prices - in line with EC guidelines, the CBA is carried out at constant prices (2017).
- Project identification - in line with EC guidelines, the identification of project is based on two criteria 1) self-standing, 2) pertinence.
- Reference scenario - the incremental principle of CBA requires comparing costs and benefits against a reference (counterfactual) scenario. From an *ex post* perspective, the counterfactual scenario is what would have happened in the absence of the project.
- Forecasting the future - the today viewpoint requires forecasting inflows and outflows from today until the end of the time horizon. In this regard (forecasting exercise), the *ex post* approach does not significantly differ from the *ex ante*.
- Discount rates – it is the rate used to discount economic costs and benefits in the future, as it reflects how society evaluates today’s wellbeing versus future wellbeing. As in the context of this evaluation, the CBA is carried out in the middle of the project’s lifecycle, it is necessary to discount future cash flows and capitalise past ones. For this reason, a backward and a forward SDR are needed. Ad-hoc SDR country-specific values are provided. Unlike SDR, a unique backward and onward Financial Discount Rate (4%) is applied to financial flows in the financial analysis.
- Shadow prices - when market prices do not reflect the opportunity cost of inputs, the usual approach is to convert them into shadow prices. In a hybrid *ex post* CBA, two sets of conversion factors should be ideally estimated for the two levels of analysis (backwards and onwards) as the opportunity cost may change over time. For this reason, ad hoc backward and onward conversion factors of labour at regional level have been computed. As far as other major inputs (such as land and utilities) are concerned, ad hoc conversion factors have been estimated on a case-by-case base, depending on available data and according to National Guidelines where applicable.
- Conversion factors - the Standard Conversion Factor (SCF) is used to adjust the cost of all inputs entering in the financial analysis for which a specific conversion factor is not available. For the purpose of this study and based on methodological considerations, the SCF has been set equal to 1.
- Monetisation of economic benefits- unit values of typical economic benefits and costs generated by transport projects are estimated by using the standard methodologies that are currently used for the CBA analysis on major projects for the programming period 2014-2020 and updating values to today’s value.

Findings from the CBA were complemented by qualitative analysis. The qualitative techniques which were be put in place are presented in the following table.

| TECNIQUE | DESCRIPTION |
|--|--|
| Documentary analysis and desk research | <p>An in-depth documentary analysis was performed to enrich the description of the context and history of the project. To this end, collected data can be of two different natures:</p> <ul style="list-style-type: none"> - <i>Ex ante</i>: all data and documents prepared before the project implementation, such as feasibility studies, EU fund application forms, financing decisions, cost-benefit analyses, environmental impact assessments, economic impact assessments, etc. - <i>Ex post</i>: all data and documents drawn up after project completion and during the operational phase, such as monitoring data, project financial reports, mid-term and final evaluation reports, studies, customers' surveys, polls, etc. - In addition, and to provide an unbiased picture of the project performance, other non-institutional sources such as studies of independent experts, press releases, reports from NGOs and citizens' representatives, were consulted. |
| Interviews with stakeholders | <p>The interviews addressed different types of stakeholders deemed relevant for the understanding of the whole project 'history', starting from its design and financing decision to the present time. In particular, 20-25 interviews were carried out for each of the 10 selected projects to be analysed. The interviewees included:</p> <ul style="list-style-type: none"> - the managing authority and/or intermediate bodies; - the project beneficiary/project manager; - the infrastructure operator and/or service supplier; - the contractor(s) in charge of building the infrastructure; - desk officers at the European Commission's geographical desks; - the local and/or national regulatory authority ; - policy-makers; - representatives/associations of users and citizens; - independent experts; - representatives of EIB/JASPERS; - representatives of the financing institutions; - journalists; - environmental agencies or NGOs; - other relevant actors involved or informed about the project design/implementation/effects. <p>To address the potential problem of strategic bias in selecting the relevant stakeholders for interviews, the experts in charge of case study preparation tried to identify and contact stakeholders not directly involved in the project implementation and those that were not in favour of it.</p> |

Source: CSIL and Ramboll

The objectives of the qualitative analysis are:

- Describing the project with a critical focus on its identification
- Analysing the socio-economic context
- Reconstructing the decision-making process
- Assessing possible alternative options
- Collecting evidence on non-quantifiable effects and factors influencing project performance.

Effects investigated in qualitative terms were then aggregated to measurable effects and a comprehensive assessment is provided through a scoring system from -5 (the highest negative effect has been generated) to +5 (given the existing constraints, the highest positive effect has been generated). The purpose of this scoring system was to intuitively highlight which were the most important effects generated for each case study, regardless the fact that they were measurable or not.

Understanding effects

Once the project effects have been identified and measured, and the causal chain linking different categories of short term and long term effects has been investigated, the third building block in our methodological approach entails reasoning based on the elements, both external and internal to the project, which determined the observed causal chain of effects and influenced the observed project performance.

The evaluation team acknowledged six stylised determinants of project outcomes and their development:

- Relation with the context, which includes considerations on the institutional, social and economic environment into which the project is inserted;
- Selection process, which relates to the institutional and legislative framework that regulates how public investment decisions are taken;
- Project design, which refers to the technical capacity to properly design the infrastructure project;
- Forecasting capacity, which relates to the possibility and capacity to predict future trends and forecast the demand level and technical challenges;
- Project governance concerns the number and type of stakeholders involved during the project cycle and how responsibilities are attributed and shared;
- Managerial capacity refers to both the professional ability to react to changes in the project context and to unforeseen events and the professional capability to ensure the expected level of services in the operational phase.

The six stylised determinants were highly interrelated and they may mutually reinforce or dilute each other. Moreover, determinants may change over time. Therefore, it is important to make clear the link between identified determinants and the specific effect triggered. In doing so, the research team identified stylised typical “paths” or project behaviours linking the interrelation of different determinants in a dynamic fashion. These patterns represented common stories describing recurring pattern of performances, as well as typical problems that may arise and influence the chronicle of events.

Summary and conclusion

The fourth building block of the methodology consisted in a synthesis of the findings of the selected projects, by using a set of evaluation questions, which enabled a final assessment along a set of evaluation criteria hereinafter mentioned:

- Relevance (were the project objectives in line with the existing development needs and the priorities at the programme, national and/or EU level?)
- Coherence (with other national and/or EU interventions in the same sector or region)
- Effectiveness (were the stated objectives achieved, and in time? Did other effects materialise? Were other possible options considered?)
- Efficiency (costs and benefits relative to each other and to their *ex ante* values)

- EU added value (was EU support necessary, EU-wide effects, further EU action required?).

A stakeholder seminar was integral part of the methodology and aimed to discuss the preliminary evidence stemming from the ten case studies. The seminar was held on March 2018 in Brussels and was attended by 48 people, including policy makers, academic experts and local stakeholders. The main topics discussed in the seminar were:

- The drivers of the financing decision for major transport projects
- EU Added Value of major transport projects financed by the ERDF
- Governance and financial sustainability.

ANNEX 4: CASE STUDIES

PROJECTS IN THE ROAD SECTOR

A14 motorway



This case study illustrates the construction of **the Schwerin-Nord to Jesendorf motorway section, part of the A14 Wismar-Magdeburg in Germany**. This major infrastructure investment was co-financed by the EU over the 2006-2009 period.

The project concerns the construction of a **four-lane motorway section with a total length of 14.31 km** between Schwerin-Nord and Jesendorf junctions in the federal state of

Mecklenburg-Western Pomerania (northern Germany). It completed the northern section of the A14 Schwerin-Wismar connecting the two east-west running coastal motorways A20 and A24 (Hamburg to Berlin).

The project was intended to **close the gap between the two existing sections** and to divert long-distance traffic from secondary roads to the motorway, bringing improvement in terms of travel time saving and reduced pollution. In addition, the project was in line with the political objective of **closing the gap between West and East Germany after reunification**: the construction of this section of A14 was expected to improve the accessibility and, in turn, competitiveness of Schwerin and the wider region. Today, the project section is part of the TEN-T comprehensive network, as classified in EU Regulation 1315/2013. It also contributes to the EU Strategy for the Baltic Sea Region (EUSBSR). However, those roles were attributed only after the project section had been built and did not play a role in the planning process.

The A14 — stretching from Dresden to Wismar — was initially conceived in the 1950s, mainly for military purposes. The first section connecting Leipzig East-Grimma to the Nossen interchange was finalised in 1970-1971. In the 1980s, the A24 (Hamburg-Berlin) was built with funding from West Germany. Remaining financial resources from the building of the A24 were used for the construction of the A14 motorway from the Schwerin junction towards Wismar. In 1985, the continuation of the motorway further north was stopped due to financial problems. The completed section was called the ‘Schwerin connector’, stretching from the junction with the A24 to Schwerin-Ost. After German reunification in 1989, **the case for completing the A14 between Wismar and Schwerin grew stronger**. Policy-makers believed that the infrastructure would **support economic development** (especially tourism) in the region. The section between Wismar and Jesendorf opened to traffic in 2006. **The section under analysis (Schwerin-Jesendorf) was the last to be completed, and was finalised in 2009**. Despite being planned in 1998, the actual construction of the section under analysis began only in late 2007 due to technical delays and environmental constraints. The project was included in the ERDF Federal Transport Operational Programme for the 2007-2013 programming period in Germany. The project was opened to traffic on schedule on 21 December 2009. The total cost of the project was €112.5 million, of which €57.7 million (i.e. the 51% of all costs) were covered by ERDF financing. The remaining €54.3 million were provided by national public funding.

After 9 years of operation, the economic effects of the Schwerin-Nord to Jesendorf section are mixed. On one hand, the *ex post* assessment of this project points towards an overall positive outcome from the project section of the A14 motorway in northern Germany. The reduction of travel time appears to be the most significant benefit by far. Additional benefits are reductions in vehicle operating costs and accidents due to improved road infrastructure. On the other hand, the project fell short in delivering the expected wider benefits in terms of the region's economic development. At the time of the assessment, the motorway is running under capacity and the population in the area is constantly decreasing. Traffic forecasts were highly over-optimistic. However, the positive effects from the project are expected to spike in 2022 upon completion of the southern extension of the A14 from the A24 to Magdeburg, which should lead to increased traffic flows on the motorway.

Rio-Antirio Bridge



The **Rio-Antirio Bridge** is a major infrastructure investment co-financed by the EU-funded Operational Programme 2000-2006 'Road Axes, Ports, Urban Development' in Greece.

The project consisted of the construction of a **bridge connecting the two sides of the western passage into the Gulf of Corinth, Greece**. With a suspended deck of 2,252 m, the **Rio-Antirio Bridge is one of the longest bridges of its type worldwide**. The bridge is equipped with a seismic monitoring system,

and in case of an earthquake the piers can move laterally on the sea floor, with the gravel bed absorbing the energy. These cutting-edge technical features resulted in the Rio-Antirio Bridge winning several prestigious international engineering prizes such as 2005 ASCE Outstanding Civil Engineering Achievement Award (OPAL). The bridge was intended to play a significant role in strengthening the **links between western Greece and the rest of the country**. The bridge is located along the itinerary of the TEN-T Orient East Mediterranean Core Network Corridor (formerly TEN-T Priority Project No 7) and interconnects with two major roads: the Patras-Athens-Thessaloniki motorway and the western axis of the Kalamata-Patras-Igoumenitsa road.

The origin of the Rio-Antirio Bridge dates back **more than a hundred years**. The bridge was the vision of Charilaos Trikoupis, then Greek Prime Minister (1889), who saw it as a way to cross the Gulf of Corinth, connecting Rio on one side with Antirio on the other, thus opening up a whole new set of trade and travel opportunities from mainland Greece into the otherwise remote Peloponnese. Despite the project being consistently named as a national priority, it was constantly postponed due to technical difficulties. The first invitation to tenders was held in 1980 but did not go beyond the first phase, which included expressions of interest and general suggestions. This was because there was no interest from construction companies. **Greece's entry to the EU in 1981 marked a turning point** in the bridge's history as the prospect of EU funding made the project more feasible. In the late 80s, several companies responded to the invitation to tenders, and the final contract was signed in 1996. The project was implemented as public-private partnership (PPP) initiative. The construction works started in 1998 and were completed early August 2004. At a cost of €888.3 million, the bridge opened for traffic on **12 August 2004**, right before the start of the Olympic Games on 13 August 2004.

After 14 years of operation, the project fully achieved its objectives. The results of the *ex post* CBA, with the expected net present value at €2,041 million and the economic rate of return equal to 6.65%, confirm that the expected effects have materialised to such an extent that the project provides a good social return on the invested resources, making it worthwhile from the point of view of EU society. The most significant benefit is travel time saving, as the bridge makes it possible to cross the Gulf of Corinth in about 5 minutes, compared to 45 minutes by ferry. The project positive performance is the result of a combination of factors: a good start after lengthy negotiations, good planning and design, a well-grounded selection process, and profitable involvement and commitment from all the relevant stakeholders.

M43 motorway



The **M43 motorway runs between Szeged and Makó in Hungary. It was** co-financed by the EU Cohesion Fund in the 2007-2013 programming period.

The project consists of the construction of a **31.6 km motorway section running between Szeged and Makó in southern Hungary.** It is part of the M43 motorway

from Budapest to the Romanian border. The objective of the investment was to **improve the country's international accessibility** and to construct the missing section of the expressway network towards the national border. The project also aimed to **eliminate one of the existing bottlenecks** in the N4 TEN-T Corridor by providing safer traffic conditions. In addition, the project was expected to divert traffic from the urban areas of Szeged and Makó towards less populated suburban areas. The project also improves the pan-European transport network as the M43 motorway constitutes part of the Hungarian section of the TEN-T network (the Orient/East-Med Corridor, which had not been completed at the time of writing).

The original project for the M43 was originally conceived in the early 90s, and the first feasibility study was carried out in 1993. Between 1997 and 2008, the feasibility plan was reconsidered several times due to changes to the main line. These changes were based on new traffic models and tried to determine the optimal solution. This also involved the re-drafting of the environment protection plans. Finally, **the changes were approved in 2004.** The construction phase lasted from 2008 to 2011, and the section opened to traffic later the same year. According to interviews and press, the **project was perceived as urgent by local stakeholders, but often delayed for lack of financial resources.** The availability of EU funding proved to be crucial in the project realisation. The total costs of the project were €197.2 million, of which €167.6 million (85%) was the Cohesion Fund contribution.

Almost 7 years since start of the operations, **the economic effects of the project are positive but below expectations.** The project has contributed to improving the accessibility of the area by providing a faster and safer road infrastructure. The largest benefit is that heavy vehicles now avoid built-up areas. This represents a win-win situation in that the quality of life of local inhabitants has improved and there are better speed conditions for the lorry drivers on the motorway (as their speed can be closer to what is appropriate for them). This benefit is captured in the positive result of the CBA, in which the travel time savings is by far the most significant effect. However, this overall positive performance is significantly below the *ex ante* expectations, which were rather over-optimistic due to deficiencies in the traffic forecast.

Saulkrasti bypass



The Saulkrasti bypass on the Latvian state main road A1 connects Riga to the Estonian border. The bypass was co-financed by the EU over the 2000-2006 programming period.

The project consists of the construction of a **20 km-long bypass to divert long-distance traffic away from the coastal town of Saulkrasti**, which was one of the main bottlenecks on the Via Baltica in Latvia. Before the project's implementation, the existing A1 road (a two-lane carriageway with

a 50 km/h speed limit) was the only road traversing the full length of the town, which stretches along the Gulf of Riga; as a result, it served local traffic, public transport, and international and transit traffic. **The road crosses the urban area of Saulkrasti, a town with clear tourist potential, affecting its liveability.** Beside the construction of the bypass, the project included the rehabilitation of 14.8 km of the existing road A1 passing through the settlement of Saulkrasti (the A1 has now been downgraded to local road V101). The project under assessment is located on the Via Baltica route, which is part of Transport Corridor N.1 within the TEN-T network, the most important highway connecting the Baltic States.

The Saulkrasti bypass forms part of a multi-stage scheme to rehabilitate and upgrade the Latvian section of the Via Baltica. This was a priority not only at national but also at European Level. The rehabilitation of the Via Baltica was originally envisaged in the mid-1990s when the first Via Baltica investment programme 1996-2000 was approved with the aim of implementing infrastructure maintenance projects. After independence, the Latvian road system was in poor condition due to lack of maintenance and needed to be integrated into the European network. Being part of the Via Baltica, the project became a national priority included in the ISPA strategy. The Saulkrasti bypass was the first new construction project since Latvian independence to follow ISPA **procedures**. The lack of experience in drawing up the necessary documents and the complex and lengthy administrative procedure for document coordination led to significant delays, and the project construction phase started 2 years later than planned (2005). Furthermore, after Latvia's entry to the EU, there was an overall increase in construction prices; this affected project costs and resulted in cost overruns. The initial planned total cost was €48.81 million, but the final total project cost was €130.5 million. The project opened to traffic on 27 September 2007.

After more than 10 years of operation, **the *ex post* assessment points to an overall positive outcome** from the Saulkrasti bypass in spite of the considerable cost increase in the investment phase. Overall, the investment was the right and necessary initiative to implement to avoid traffic bottlenecks on one of the main arteries of Latvia's road network and to sustain the local development of Saulkrasti. After project implementation, long-distance traffic was effectively diverted from Saulkrasti town centre to a wider and upgraded road located on the outskirts.

The story of the Saulkrasti bypass illustrates that a major project can play a pivotal role in developing the technical, legal and administrative capacity of the public authorities involved in the project conception, selection and implementation. This is a gain which should be banked for future projects. At the same time, there needs to be a clear idea of the institutional capacity needed to implement such projects from the beginning in order to avoid adverse negative events such as delays, cost overruns and benefit shortfall.

New West Malaga bypass



The **new west bypass for Malaga (Spain)** was co-financed by the EU during the 2007-2013 programming period. The project concerns the construction of a **21.4 km motorway bypassing the city of Malaga on the west side**, going through the industrial and logistical areas in the outskirts of the city. It has **four lanes per carriageway along almost all its length, and three in one section**. Since the bypass runs through a hilly

area and crosses a number of local roads, the project included the construction of 2 bridges, 8 viaducts, 9 overpasses, 14 underpasses and a 1,250 m long tunnel through the mountain. The main objective of the project was **to relieve congestion from the old inner western bypass (MA-20)**, which was often impassable due to high traffic intensity, especially during summer. In addition, the new west bypass was expected to **provide a better connection** to the industrial and logistics areas in the city's northern outskirts outside the catchment area of the old bypass. Despite not being included in any TEN-T network, the new bypass is part of the Mediterranean motorway A-7/E-15, a European route running from Algeciras (Spain) through France and England up to Inverness, Scotland.

The new west bypass was originally conceived in 1997, just 5 years after the old bypass was opened to traffic. **The MA-20 motorway was supposed to bypass the densely populated city centre** and alleviate the traffic congestion problems in the urban area of Malaga. However, as the city continued its expansion westward, it became clear very soon that the **MA-20 road would provide only a short term solution** to the problem. Indeed, in the early 2000s, Malaga's economy was thriving and its population significantly increased. In that period, the MA-20 was the only road bypassing the city, and as a result absorbed **both long-distance and local traffic**. This led to **frequent congestion**, which was a major limitation to economic development and quality of life. In 2006, the contracts for the construction of the new bypass were awarded and the construction phase began in April 2007. Meanwhile, the situation on the MA-20 worsened. In 2008, the MA-20 served more than 180,000 vehicles per day and was close to full capacity. The two first sections of the new bypass were opened in 2010, while the last section was finalised in 2012 following a 24-month delay on the original schedule. Construction costs were 34% higher than planned, mainly due to the decision to expand road width (from three to four lanes per carriageway). The project was included in the Andalusia Operational Programme 2007-2013 and thus co-financed with ERDF funds. The application for co-financing was made in 2010, after the beginning of the construction phase.

After 6 years of full operation, the project can be regarded as successful. Indeed, **it fully achieved its primary objective of shifting traffic from the congested MA-20** to the wider new west bypass. This is reflected in the positive outcome of the CBA, which mainly depends on benefits related to travel time savings. In addition, the new bypass improved territorial cohesion, providing reliable transport infrastructure to Malaga's outlying areas outside the catchment area of the old bypass. However, various complementary investments are necessary to maximise positive spillovers as the local road network has a relatively poor capacity compared with the bypass.

RAIL PROJECTS

Construction of a new rail link from Warsaw to Chopin Airport and modernisation of railway line no 8



The modernisation of **railway line no 8 between Służewiec and Okęcie stations in Warsaw**, and the construction of a **new rail link to Chopin Airport located at Okęcie**, a neighbourhood in the Polish capital city was co-financed by the EU over the 2007-2013 programming period.

The project is part of a **wider scheme to modernise the Warsaw-Krakow rail line**. The project connected the city of Warsaw with Chopin Airport, based on the existing railway line no.8 to the terminus station

located at Chopin Airport, covering a **total length of 1.99 km**. The works also included modernisation of 1.2 km of track no 1 on railway line 8 and the reconstruction of Służewiec station. The project aimed to provide **an alternative connection to the airport, one that was integrated with long-distance railway services**. Indeed, the airport was already connected to the city centre by bus and metro services. The city of Warsaw is a core network of the TEN-T North Sea-Baltic and Baltic-Adriatic corridors. According to the TEN-T Regulation (Regulation (EU) 1315/2013), Warsaw airport should be connected to core networks by 2030.

At the beginning of the 2000s, **Warsaw was suffering from a lack of adequate and fast public transport connections between the airport** and the urban, suburban and regional transport systems. Furthermore, the city was experiencing **significant economic growth** associated with an increase in the total number of airport passengers, and sustained growth in the number of motor vehicles on the roads. These resulted in **increased traffic congestion** and worsening travel conditions, due to longer travel times and lower reliability. The possibility of using EU funds (following Poland's EU accession in 2004) facilitated implementation of the project. In 2006, an agreement was signed between the Polish Treasury, the state-owned airport company and the national railways, taking the decision to build a direct railway connection to the second terminal of Chopin Airport as an extension of line 8 (Warsaw-Radom). One year earlier, approval had been granted for the modernisation of railway line 8 between Warsaw Zachodnia (West) and Warsaw Okęcie. The construction phase began in 2007 and finished in 2012, just in time for the EURO 2012 Championship despite a delay of 9 months. Total costs were €64 million, 10% less than budgeted. Most of costs related to the construction of the tunnel connection to the airport (€34 million), with only a minor share being spent on the modernisation of line 8. The EU financing decision was taken in 2011 and further amended in 2015 to extend the co-financing rate of eligible costs from 65% to 80%.

After 6 years of operation, **this major project is a good example of a railway transport infrastructure project that promotes sustainable transport in a wider metropolitan area**, including accessibility to a major transport hub and better passenger transfers between transport modes in a core urban node of the TEN-T network. The outcome of the CBA shows that benefits largely exceed costs, especially in terms of travel time savings and vehicle operating costs. Another important — but not quantified — benefit is the reliability offered by the railway service, which is not affected by traffic on the urban road network. However, the positive performance of the project may be affected in the long run by the construction of a new airport located between Warsaw and Łódź. This new infrastructure — which is planned to open in 2027 — will take over operations from Chopin Airport, which will subsequently be used for military purposes only.

Modernisation of railway line in Žilina



The **modernisation of the Žilina-Krásno nad Kysucou railway line in Slovakia** is a major infrastructure investment co-financed by the EU over the 2007-2013 programming period.

The project concerns the rehabilitation of an **18.92 km-long double track electrified section of Slovakia's main railway network**, between Žilina railway station and Krásno nad Kysucou located in the north of the country. This section is part of **line 127 between Žilina (in Slovakia) and Cadca (in Czechia)**. The project was included in a plan to rehabilitate railway lines launched in the early 2000s to develop the TEN-T network. The section under assessment has **strategic relevance** as Žilina is an important transport node interconnecting the two main Slovakian corridors. The works

mainly related to the rehabilitation of the railway substructure and superstructure of the existing line, including the modernisation of relevant stations. There were **no major route changes** as 89% of the modernised line remained on its original alignment. The project is located along the cross-border itineraries of the Rhine-Danube and Baltic-Adriatic TEN-T core network corridors and corresponding RFC9 and RFC5 rail freight corridors.

In the early 90s, the Slovak railway network was in poor condition overall. Similar to other countries in Eastern Europe, the railway network had received insufficient maintenance, particularly at the end of the communist era. Some equipment and structures had passed the end of their expected operating life, and some technologies were obsolete and not in line with modern standards. Stations had in many cases no platforms. As the section under analysis was part of an important cross-border line, **it was first included in an ambitious programme for the modernisation of the trunk railway networks of Czechia and Slovakia**. This was drawn up during the 1990s with the involvement of the EU Delegation. However, **major modernisation works in Slovakia commenced only in the 2000s**. As for the Žilina-Krásno nad Kysucou section, modernisation works began in 2008 after the finalisation of the feasibility studies in 2007. The works ended in 2011 with small delays on an over-optimistic time schedule. The decision to co-finance the project was issued in August 2009 after construction had already begun. In line with the JASPERS recommendation, it was decided **not to opt for a full modernisation**, meaning that the overall speed supported by the modernised track was lower than the initial 160 km/h. This proved to be a wise decision as modernisation in line with the full initial scope of the plan would have resulted in a total project cost at least twice what was actually incurred. The final cost was €162 million, 2% below budget.

The rehabilitation of the Žilina-Krásno nad Kysucou section **is a step towards the modernisation of the core network along the Rhine-Danube Corridor**. After 6 years of operation, the project's performance is only marginally positive. This can be explained by a combination of factors: the short length of the section, the relatively high investment costs, the overall low levels of demand in the area, and delays in the completion of the programme to modernise the entire corridor sections in Slovakia.

PROJECTS IN THE URBAN TRANSPORT SECTOR

Naples metro line 1



The **Vanvitelli-Dante section of the metro line 1 in Naples, Italy**, is a major urban transport investment project co-financed by the ERDF in the 2000-2006 programming period.

The project concerns the construction of the Vanvitelli-Dante section of metro line 1 in Naples, southern Italy. The investment consisted of the **construction of a 5 km twin tunnel with five stations** and pedestrian tunnels connecting line 1 with line 2 and with the city's archaeological

museum. Remarkably, all the five stations included in this section are considered 'art stations' i.e. built with high architectural and aesthetic criteria, including contemporary artworks both inside and outside the stations. The Vanvitelli-Dante section was at the heart of a sustainable mobility and territorial development strategy at regional level whose aim was to tackle the mobility problems of Naples — an overcrowded city overrun by traffic — and to address urban degradation issues.

In the mid-1990s, Naples was facing both traffic problems and urban environmental degradation, which were hampering the transformation of the city along a sustainable development path. As far as mobility is concerned, the city was so congested that it was blocked by semi-permanent gridlock from early morning to late in the evening, with the very concept of peak times coming into question. The cause of this situation was an inadequate and unreliable existing public transport system in the city, which was insufficient to absorb the increasing mobility demand. Along with mobility issues, Naples was also characterised by a general urban decay and degraded mobility infrastructure, which contributed to this poor quality landscape. The extension of metro line 1 to the city centre via the Vanvitelli-Dante section, as conceived in the Naples 1997 transport plan, was the starting point for addressing these problems. Afterwards, in agreement with the Region of Campania, the project was integrated in a new, ambitious and wider transportation programme started in Naples in 1997, extended to cover the Naples metropolitan area in 2000 via the 'Plan of 100 Stations', and further extended to the whole Campania region with the 2001 regional metro system.

The excavation and the construction of tunnels and stations took place between 1991 and 1998. The completion works (i.e. the catenary system and electricity supply network, anti-vibration tracks, signalling, spacing and traffic management system; lift and escalator systems) were carried out between 1998 and 2003, while the operational phase started in 2004. The EU provided financial support for the completion works through an ERDF grant of €44 million in the 2000-2006 programming period. The final Commission decision to grant assistance to the project was taken in August 2005 when the project was already operating, and therefore took the form of 'retrospective' EU assistance. The total initial investment cost of the project was €474 million, including excavation, the tunnels, the 'art stations', and the completion works.

The story of the Vanvitelli-Dante section is strongly intertwined with that of the whole line 1, including its performance and generated effects. The *ex post* assessment reveals a project that was successful in terms of urban regeneration but which underperforms from the public transport service viewpoint as the transport service is currently unsatisfactory to meet the demand of mobility in the city. The CBA suggests that the balance of these two aspects

returns a slightly positive net benefit for society. Compared with the situation in the 1990s (i.e. when the new urban and regional mobility strategy was conceived), appreciable results have been achieved, but they are below the *ex ante* expectations.

Le Havre tramway



The new tramway line in Le Havre, in the Normandy region of France, is a major infrastructure investment co-financed by the EU over the 2007-2013 programming period.

The new tramway line is 13 kilometres long and composed of 23 stations and a 575 metre-long tunnel. A total of 22 trams operate on it.

The tram line has a distinctive y-shape, composed of a common section which then splits into the 'A' and 'B' lines.

The project also included the construction of a tramway and bus depot, park-and-ride

facilities and bicycle lanes. **Overall street renovations** were carried out alongside the construction of the tramway. Indeed, the project was the consequence of a political desire to **transform the image of the city to make it modern and attractive**, but also to align with current practice in urban transport in France towards **the use of trams as a modern and sustainable transport mode**.

Although the tramway was the most costly option, it was preferred to a system of trolleybuses. This was because of a political preference for trams, which were seen as better than buses at encouraging modal shift from cars to public transport, and which were expected to improve the environmental performance of the public transport system and foster social cohesion. The construction phase started in 2010 and was completed on schedule, and the tramway opened to service on 12 December 2012 as planned. The total project costs were €420 million, an overshoot of 29% from the 2009 budget. The financing decision from the European Commission approving ERDF funding was signed in June 2010 for a maximum amount of €52 million, representing 21% of the total eligible amount of €249,450,000, which was calculated *ex ante*. The final amount for the ERDF subsidy was finally set at €10 million. After 5 years of operation, the tramway is still struggling to reach a satisfactory level of demand. With 38,461 passengers per day projected in 2017, the tramway is falling short of its transport objectives of 56 000 passengers per day. This shortfall is likely due to optimism bias with regard to its ability to stimulate a modal shift in Le Havre. The poor demand is reflected also in the negative outcome of the CBA analysis: the high costs of the tramway are not compensated by quantifiable benefits. Urban renewal effects — not included in the CBA — are difficult to assess. On one hand, the tramway has had immediate effects for citizens related to quality of life, with external renovations which have brought aesthetic value to the city. On the other hand, there is no evidence that the project has led to rises in property prices. In conclusion, the Le Havre tramway project had perhaps over-optimistic expectations, both in terms of transport and urban renewal objectives. However, the project's successful integration into an urban renewal policy for the city is likely to reap new benefits as other projects are developed, creating synergies that will help achieve overarching social cohesion, environmental sustainability and economic objectives.

Gdańsk tram



The Gdańsk urban transport project (phase IIIA) is a major infrastructure investment co-financed by the EU over the 2007-2013 programming period in Poland.

The Gdańsk urban transport project (phase IIIA) concerns the construction of 3.35 kilometres of a new tram line in the Gdańsk city district of Chełm. The new tram line is a continuation of the tram connection between the city centre and the southern districts of Gdańsk, which were previously served by bus only. Further to the extension of the line, the project also includes the construction of park-and-ride and park-and-bike facilities, the reconstruction of 12.06 km of existing dual track tram network, as well as the purchase of 35 new tram cars and reconstruction of the old tram depot.

It is therefore a major investment affecting the entire public tram system and with benefits spread over the entire network of the municipal public transport system. The project was expected to improve the overall accessibility to the city not just for the residents but also for visitors. At the time when the project was implemented, the flow of tourists was expected to receive a boost due to Gdańsk being one of the venues of the 2012 European Football Championship.

In the second half of the 1990s, the city's public administration started considering how to improve and develop the public transport system in Gdańsk. In this context, the city administration developed a wide urban transport programme — the Gdańsk urban transport project (GPKM) — with the ultimate aim of improving urban mobility. However, it was not until Poland joined the EU that an intensive investment programme was put in place to implement the GPKM. The programme is being implemented in phases, reflecting changes in the city's needs and objectives. The first phase (2002-2003) included diagnostics for the transport sector, set tasks for future years and rebuilt five sections of tram track in the city. Under phase II (2004-2008) the tram line to Chełm district was constructed, together with the modernisation of some parts of the network and the purchase of rolling stock suitable for different gradients. In 2007, phase IIIA was launched. The construction phase began in 2007 and finished on schedule in 2012. The total investment costs were €134.3 million. The co-financing decision was taken in 2013, once the project was completed, and further amended in 2015 (the co-financing rate passed from 60 to 80% of eligible costs).

After 4 years of operation, the Gdańsk urban transport project (phase IIIA) is a good example of an infrastructure project which managed to deliver all the expected benefits at the expected time and costs. The project was implemented efficiently, the service is operated as expected and users are overall satisfied with the project. This good project performance is expected to last also in the longer run in light with its integration with the upcoming phases IIIB and IVA of the overall transport project for the city.