Ex post evaluation of major projects supported by the European Regional Development Fund (ERDF) and Cohesion Fund between 2000 and 2013

Call for Tenders N° 2016CE16BAT077
Contract N° 2017CE16BAT029

Final Report

Written by CSIL, Centre for Industrial Studies (Italy) - In partnership with Ramboll Management Consulting A/S (Denmark) - In association with Significance BV (The Netherlands) - TPLAN Consulting (Italy)

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LIST OF ABBREVIATIONS

B/C	Benefit/Cost ratio
CBA	Cost-benefit analysis
DG REGIO	Directorate-General for Regional and Urban Policy
EC	European Commission
EIA	Environmental Impact Assessment
ENPV	Economic Net Present Value
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Funds
ERR	Economic Rate of Return
EU	European Union
EUR	Euro
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
JASPERS	Joint Assistance to Support Projects in European Regions
NPV	Net Present Value
NUTS2	Nomenclature of Territorial Units for Statistics
O&M	Operating & Maintenance
TEN-T	Trans-European transport networks
ToRs	Terms of References
VAT	Value Added Tax
VOC	Vehicle Operating Cost
VOT	Value of Time

ABSTRACT

The objective of this evaluation is to analyse the long term contribution of selected major investment projects to economic development as well as to the quality of life and well-being of citizens, including their effects on the environment. The evaluation addressed five criteria (relevance, coherence, effectiveness, efficiency and EU added value) through a consistent use of retrospective CBA and qualitative analysis.

Findings show that major transport projects can positively contribute to increasing the transport efficiency within EU regions, supporting the shift to cleaner urban mobility and facilitating cross-border transport connections. There are two main critical success factors: a sound forecasting capacity driving the project design and selection process and excellent managerial capacity to keep the project on track. The EC has an important role to play. There is evidence that, more than merely providing funds, the EC can strategically guide the prioritisation and selection process towards projects that maximise EU objectives or are implemented according to well defined quality standards (e.g. environmental measures). In addition, EC services can provide technical assistance to improve the quality at entry of funded projects. While a lot has already been achieved, there is room to expand EU added value in the implementation of major projects.

EXECUTIVE SUMMARY

BACKGROUND

Major projects claim a sizable proportion of Cohesion Policy expenditure, especially in the transport sector: in the period 2007-2013 they represented almost 30% of the total allocation from the European Regional Development Fund (ERDF) and Cohesion Fund (CF) and nearly 49% of major projects were in the transport sector (i.e. 945 major projects were financed over the period 2007-2013, of which 463 were in the transport sector). Unlike non-major projects, and given their financial scale, they are subject to an assessment and a specific decision by the European Commission.

The objective of this ex post evaluation is to analyse the long term contribution of ten major projects in the transport sector, financed in the European Union during the 2000-2006 or 2007-2013 programming periods and co-financed by the ERDF or CF, to economic development and to the quality of life and the well-being of society. This will contribute to the wider effort engaged by DG Regional Policy to undertake ex post evaluation of Cohesion Policy.

Ten major projects were selected from a shortlist of 30 transport investments financed in the above mentioned programming periods. The major projects analysed are in the road, rail and urban transport sectors across nine Member States. They are:

- Road sector:
  - Autobahn A14 (Germany)
  - Rio Antirio Bridge (Greece)
  - M43 Motorway (Hungary)
  - Saulkrasti Bypass (Latvia)
  - West Malaga Bypass (Spain)
- Rail sector:
  - Warsaw (Poland)
  - Žilina (Slovakia)
- Urban transport sector:
  - Le Havre Tramway (France)
  - Naples Metro Line 1 (Italy)
  - Gdańsk Tram (Poland)

Overall, these cases represent more than EUR 3.2 billion of investment including EUR 1.1 billion of co-funding by the ERDF and CF. They were chosen on the basis of a set of selection criteria including strategic relevance, availability and quality of data as well as the willingness of stakeholders to cooperate. In the final selection care was taken to ensure a certain geographical/sectoral coverage. The ultimate goal was to select cases likely to provide meaningful project narratives from which to draw useful policy lessons. The rationale behind the selection was not to identify the most statistically representative projects, but to consider ten illustrative examples of infrastructure projects that can deliver interesting insights on the possible long-term effects of infrastructures and on the causal chain leading to those effects.

METHODOLOGY

A common methodology was developed to evaluate the ten cases. It was built around a retrospective CBA complemented by qualitative analysis. A comprehensive set of parameters and unit values for the most common direct benefits were calculated by the

core team and consistently applied to all the cases. The methodology of CBA follows the DG REGIO Guide 2014, adapted to fit the ex post perspective, and includes a financial analysis, an economic analysis and a risk analysis.

Field visits were carried out for each case study and an extensive interview plan allowed the authors to collect primary data as well as the views and perceptions of a broad range of stakeholders. A total of 245 people were interviewed, mainly face-to-face. In order to ensure that all the voices were heard, the people interviewed included civil servants (EC officials, national ministries, managing authorities), experts (engineers and planners), project managers, policy-makers (mayors, regional and municipal councillors), users' and citizens' associations and journalists. The methodology addressed five evaluation criteria (relevance, coherence, effectiveness, efficiency, EU added value).

FINDINGS

Project relevance and coherence

On average the selected projects scored quite well in terms of relevance and coherence. Most of them were highly relevant as well as coherent: they responded to urgent existing needs and were in line with the priorities at various levels of government. Most projects addressed prevailing transport needs (for example, congestion), while a few of them also addressed broader economic development needs. All ten projects were not designed and implemented in isolation but fit into wider plans, matching EU and national priorities. They were also aligned with other EU and national interventions (e.g. other transport projects or networks, such as the TEN-T). This latter aspect is not surprising given the fact that major projects are formally required to be included within the scope of Operational Programmes and thus expected to contribute to their strategic objectives.

Project effectiveness

The extent to which projects achieved the stated objectives is overall acceptable, but they were never able to perfectly match the initial expectations. This was not due to underperformance during project implementation, but mostly to the fact that they were systematically subject to over-ambitious targets. In other words, policy makers and project promoters were too optimistic in setting their targets about the effects in terms of socio-economic development, urban regeneration and other positive consequences that the implementation of the projects would have triggered on the local or regional context. In many cases, expectations were not realistic both in terms of potential benefits that the project could actually produce and the negative effects that may be also generated as side effects or externalities.

The most effective projects were those successfully responding to clear transport needs (such as heavy congestion) and generating direct transport benefits (such as time savings, vehicle operating cost reductions and reliability of journey time). For most of the projects the time and vehicle operating cost savings were the dominant benefits observed ex post. By making transport costs cheaper, they increase productivity and positively contributed to economic growth. Wider economic benefits may reinforce the case for a project, but they are unlikely to constitute alone a good case in compensating for the absence of substantial direct (transport) impacts.

The effects of the projects on the quality of life and well-being were usually positive, but not as significant as the impacts on travel time and vehicle operating costs. Positive effects were reported most frequently on safety, noise and service quality.

The effects of the projects on environmental sustainability (such as air pollution and climate change) were generally positive, although limited. Distributional effects of the

projects were also observed, with a commonly positive contribution of the project to territorial cohesion and a contribution to social cohesion specific to urban projects.

Overall, the majority of the direct effects observed materialised in the short-term (i.e. within five years of operation), although not always at their full potential. Wider economic effects may take longer and are more likely to be observed in the future. In some cases the economic crisis did affect the performance of the projects resulting in a lower than expected traffic demand. However, the economic crisis as a single exogenous event was never the main determinant of the ex ante/ex post deviations in traffic demand.

Given the current outlook, it is expected that the economic growth effects will change in future years and influence (usually positively) the effectiveness of the projects in the longer-run. This is linked to the fact that wider transport plans are developed in stages and it takes time and several investment projects need to be combined in a synergetic way to achieve the full potential of the long-term effects generated.

Project efficiency

Nine out of ten projects delivered social benefits that exceed the costs, but many projects were not as efficient as originally expected.

During the construction phase, four out of ten projects experienced cost overruns and half of the projects experienced delays (although only one project had a major delay). A number of unpredictable exogenous factors were usually at the root of such delays, but they did not always translate in cost overruns. Effective project management and well-run procurement processes can lead to savings that compensate additional expenditures due to unforeseen works.

Although the finding on cost overrun and delays may seem much more positive as compared to previous evaluation results (European Commission, 2010), care must be paid in terms of timescale and scope of such assessment. While such finding relates to the cost and time estimates made for the construction phase just before the financing decision was taken, the most critical delays are usually occurring during project preparation and design and are not reported by this assessment.

The financial sustainability of the projects was mainly based on public funding, including in cases of revenue-generating projects. Only two of the ten selected projects could cover operation and maintenance (O&M) costs through their own revenues. During project preparation, insufficient attention was paid to the financial sustainability of projects in their post-completion operation.

EU added value

In most of the selected projects, the contribution of the European Union provided added value. The availability of a significant and sometimes critical share of funding ensured the achievement of the observed results that, without the EU support, could possibly be postponed or achieved in a different manner (for example without meeting certain standards). In particular, this held true for the projects implemented in Poland, Slovakia, Hungary and Latvia soon after their EU accession where EU funds provided the necessary financial leverage to improve connections and enhance cohesion, for instance, by bringing national infrastructure up to the standards of the other Member States. Instead, in a couple of projects (implemented in France and Germany) the EU added value in terms of financial contribution was rather limited especially because the EU funding came at the very latest stage of project selection.

EU added value was not limited to financial contribution. Evidence shows that in some cases the EU co-funding was instrumental in positively influencing the design and selection process through compliance with EU requirements (for example in terms of environmental standards) and application procedures. Technical assistance received from the EIB and JASPERS was another source of added value that strengthened the technical and strategic quality of the projects.

Another more strategic and possibly influential role of the EU is in the capacity to influence the planning and priority setting process with a view to accelerating the implementation of certain types of investments which are in line with EU priorities and objectives (for example by contributing to the development of TEN-T projects or supporting the shift to cleaner urban transport). The high score received on average under the relevance criterion, assessing the good alignment of the implemented projects with national and EU strategies, points to an EU added value in terms of strategic direction. This is also confirmed by past evaluations pointing to an engagement of Member States into strategic planning exercises as a result of the procedures for securing EU funds (European Commission, 2016). In fact, the current EU legal basis of major projects requires that they are included in Operational Programmes and are implemented within wider strategic plans, especially sectoral ones. However the evaluation could not look into this aspect in a systematic way when assessing the individual projects since the development of strategies and prioritisation processes, and possible EU influence on them, takes time and it often takes the form of informal interaction with national stakeholders which gets lost with institutional memory.

MECHANISMS AND DETERMINANTS

Observing project performance in a long-term perspective is particularly informative to fully appreciate their behaviours and mechanisms of causal chains. The observed project outcomes were determined by a combination of a number of factors related to the way the project interacted with the context, its technical features, the capacity to predict future trends, the division of roles and responsibilities and the managerial capacity to react to unpredicted events.

Relation with the context

Most of the projects revealed an initial positive relation with the context as they provided appropriate solutions to the population or users' needs and reflected different socio-economic and political factors. However, the temporal dimension is important when evaluating the adequateness of the project in its institutional, cultural, social and economic environment throughout the life-cycle of the project. There is evidence that most of the projects will maintain their good relationship with the context in the long-term, although in a few cases there are future challenges to address.

Selection process

Throughout the case studies the selection process made a positive or slightly positive contribution to project performance with only two negative cases. It mostly followed well established regulatory and administrative frameworks applying to the wider transport and mobility plans in which the projects were included. However, project preparation and implementation may even take a few decades. In some case studies this led to a selection process based on outdated technical and economic analyses. Within wider plans, a transparent and structured prioritisation process for individual projects becomes crucial.

In a number of cases, the selection process was driven more by strategic and technical concerns, with economic and financial considerations playing a minor role, which negatively influenced project performance. This was especially true when the CBA was performed at the very last moment and only in the framework of the request for funding.

Project design

Overall, project design scored well in almost all the selected projects. However, the strategic and the technical dimensions of project design contributed to the final performance in different ways. The conceptual design (i.e. the decision to implement a given project to meet existing needs) lacks the systematic use of options analysis. In contrast, as far as technical design is concerned, evidence from the case studies show that most of the projects were designed with adequate and – in some cases – innovative and pioneering techniques. Only minor problems were reported, which did not affect the overall project performance in a dramatic way.

Forecasting capacity

The forecasting exercise (including data collection and modelling) was one of the weakest aspects of determinants, with only four out of ten projects reporting a positive or very positive score. Optimism bias determined demand overestimation and, to a lesser extent, deficiencies in aspects related to construction or service delivery or underestimation of completion time. The main consequences of inaccurate forecasts were lower effectiveness and problems related to financial sustainability: projects could deliver the expected benefits and may have experienced financial problems. However, weak forecasting capacity was not necessarily linked to negative project performance. Other determinants (e.g. managerial capacity) as well as unexpected favourable external events had the potential to balance the impacts of imprecise forecasting. On the other hand, optimism bias possibly influenced by political pressures rather than technical inaccuracies was generally linked to underperforming socio-economic outcomes.

Governance structure

While the picture of project governance was overall rather positive, there were a few projects with an intermediate or even bad performance. This was the determinant with the highest score fluctuation. There was no clear link between the complexity of the governance structures and the success of this determinant. The two most complex projects both had very different outcomes. Also, there was no clear link between the complexity of the governance structures and the success of the project outcome.

Evidence pointed to two main ingredients for effective governance: a structured arrangement with clear allocation of tasks (especially in terms of funding responsibility) as well as experienced staff on the core project team. Structured governance is especially advisable in projects characterised by a high number of stakeholders as the importance of good cooperation, communication as well as a clear allocation of tasks, especially in terms of funding responsibility, are key.

Managerial capacity

Together with project design and relation with the context, this determinant is among those that contributed in a largely positive way to the overall performance of the projects. Only in one project did managerial capacity have a clearly negative effect on the outcome of the project, while the others were predominantly positive or neutral.

Throughout most case studies unforeseen circumstances were professionally handled by the project management – this was true for internal circumstances such as the need to adapt construction as well as external ones such as the 2008 economic crisis.

Behavioural patterns

The findings of the study in terms of project behaviour throughout its life-cycle confirmed that the reality was much more complex and nuanced than could be reasonably expected ex ante and that success or failure was determined by a composition of project-specific factors and events. However, it appeared that forecasting and managerial capacity were the critical determinants: a solid forecasting capacity ensured a good quality at entry and managerial capacity kept the project on a good track.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Major transport projects under the ERDF and CF can positively contribute to multiple EU objectives of economic growth, quality of life and well-being and, to a lesser extent, environmental sustainability. The most prominent direct economic benefits were related to travel time savings which in turn resulted in productivity gains (due to lower transport costs) and induced effects on regional development. Other direct benefits included increased safety, decreased vehicle operation costs and a positive impact on GHG reduction in projects where a modal shift or more fuel-efficient locomotion was achieved. Indirect effects were less prominent since those goals are not reached by individual projects alone, but they are still often claimed as rational for funding of major projects as a political narrative to raise consensus.

Findings on the determinants show that the quality-at-entry of a project was a relevant condition driving project success. The decision-making process played a major role in this and needed to be based on an accurate demand analysis, an elaborate option analysis early on in the process and a high-quality CBA. One important finding was that when technical analysis, including CBA, was taken seriously and transport considerations drove the selection process, this was beneficial for the project and, in turn, positively affected project performance. However, this was not done systematically.

While good quality-at-entry was an important precondition for project success, good project governance and management capacity were additional crucial factors during the implementation and exploitation phase. An effective governance structure and good managerial capacity make the project more resilient, that is to say more capable to quickly and effectively recover from difficulties encountered during project implementation. Major infrastructure projects have long lifecycles, therefore the capacity to keep the projects on track in an evolving context is a clear source of success.

Nevertheless, the causal chains linking determinants to project performance were diverse and no conclusions could be drawn on general success factors for good project performance. The relationship between the factors and the final project performance (i.e. “project behaviour”) was not “deterministic” as often causation took place in unique ways and often challenges were project-specific.

EU services can support the decision-making process towards quality-at-entry by providing strategic (i.e. definition of priorities and standards) and technical support (i.e. definition of the technical aspects of the project such as demand analysis, risk assessment and aspects related to state aid and public procurement) in order to avoid the risk that the EU becomes a mere fund provider.

Recommendations

The coordinated effort of the EU and Member States to prepare projects aligned to EU strategic priorities and meeting urgent local transport needs following a consistent set of

rules and methodological practices, offers a unique opportunity to carry out an EU wide stocktaking exercise on public investment management and evaluation. It allows the EC services to gain in-depth understanding and knowledge on how EU and national strategies are planned and implemented on the ground. It also motivates Managing Authorities and project promoters to systematically assess the expected net social value of their investment projects and be accountable to the EU taxpayers.

The strategic dialogue in place during the project preparation and selection provides an opportunity to the EC services to influence the way such strategic operations are implemented by the Member States, for example influencing the process of priority setting or suggesting technical improvements to meet certain EU standards related to the infrastructure design or service management. This process of dialogue and technical support produces important lessons that can be easily transferred to other projects and public authorities throughout the EU Member States. As evidenced by this study, this is the most genuine and relevant aspect of the EU added value which should be preserved and further strengthened. In order to improve this system and the interplay between the EC service and the MA, the following specific recommendations are suggested:

- The **preparation of transport master plans including a prioritisation system for the identification of a project pipeline based on a sound transport needs assessment** should be considered among the "enabling conditions[1]" for funding transport infrastructure with EU funds. Capacity building and institutional learning on project preparation and selection can be triggered by the EU assistance by a close dialogue and technical support of dedicated services (such as JASPERS for example) and this opportunity should be better exploited by the MA during the project preparation and selection.
- **Transport needs assessment should be based on robust and updated transport models.** In the appraisals of transport projects there should be more focus on the quality of traffic models underpinning the entire forecasting exercise. To support the MAs, **the EC can promote a coordinated effort** to develop national and regional transport models complying with the current best practice in the field.
- The rationale for including a major transport investment within an Operational Programme should also consider the potential EU added value. This **shall be assessed according to a well-defined framework**, in particular by pointing to the EU priorities and objectives that the project is expected to contribute to or discussing to what extent the selected project could be different in the absence of EU action.
- The EC played a major role in developing and suggesting the use of common tools and methods for economic appraisal of projects, and improvements are evident from this study. **It should therefore keep on promoting harmonisation and the use of common practices in transport project appraisal** beyond what has been already done to avoid the risk of steps back in the direction of harmonisation and share of good practices.
- **Monitoring committees should ensure that a solid investment selection process is in place for structured decision making on major transport projects.** The selection criteria for operations of strategic importance should be based on sound and timely technical and economic analyses, including options analysis and risk assessment.

[1] In the period 2021-2027 "enabling conditions" will replace "ex-ante conditionalities".

- **More specific requirements on financial sustainability should be introduced.** Ex ante appraisal of transport projects should put much more emphasis on the analysis of the long-term financial sustainability after project construction. Since financial sustainability of a project depends on how the project is financed, the financial structure of each project should be carefully looked at in the ex ante appraisal.
- **It should be mandatory to consider at least three different alternative options, including a do-minimum or least cost option, in the ex ante CBA.** The accuracy of the option analysis stage in decision-making should be strengthened. This also implies that option analysis is carried out during the project identification phase rather than during the design phase or even as a retrofitting exercise.
- **The use of CBA results in policy decision making and public debate should be encouraged.** A suggestion to incentivise good quality analysis and to actually use them in the public debate and for policy making would be to systematically publish feasibility studies, CBAs and any other evidence basis underpinning the financing decision. Making available to the wider public, including the press or civil society organisations, the technical studies detailing costs, expected benefits and conditions underpinning their successful achievement can increase transparency and accountability towards the stakeholders and taxpayers and would stress the role of technical assessments within the process.
- **MAs should keep records of the key financial and economic data** (at least investment costs, operation and maintenance costs, traffic demand with appropriate disaggregation of data, financial revenues) **for a sufficiently long period (at least five years would be needed for a meaningful exercise) after project implementation and make them available to the EC services for evaluation purposes.** In case this activity reveals severe deviations from the ex ante forecasts or modified contextual conditions, additional more qualitative information could also be useful to collect. MA should also be aware that their projects could be subject of ex post evaluation implemented by the EC after the programming period and they should be prepared to support such exercises by providing the necessary information basis.
- **Member States should systematically carry out ex post evaluations of major projects.** It would be in the interest of those financing a major transport project to conduct an ex-post evaluation, not only for accountability purposes but also as an important learning process for the development of further projects and improving the decision making system. Ex-post evaluation exposes decision makers, which incentivises them to stick to good governance and be accountable for their decisions.

RÉSUMÉ

CONTEXTE

Les grands projets exigent l'engagement de dépenses considérables au titre de la Politique de cohésion, particulièrement dans le secteur des transports. En effet, au cours de la période 2007-2013, ces dépenses ont représenté près de 30 % de la totalité des fonds alloués par le Fonds européen de développement régional (FEDER) et le Fonds de cohésion (CF), et près de 49 % des grands projets concernaient le secteur des transports (945 grands projets ont été financés au cours de la période 2007-2013, dont 463 dans le secteur des transports). Contrairement aux projets de moindre taille, et au vu de leur ampleur financière, ces projets font l'objet d'une évaluation et d'une décision spécifiques de la Commission européenne.

Cette évaluation ex post a pour but d'analyser la contribution à long terme au développement économique et à la qualité de vie, ainsi qu'au bien-être de la société, de dix grands projets dans le secteur des transports menés dans l'Union européenne pendant les périodes de programmation 2000-2006 ou 2007-2013 et cofinancés par le FEDER ou le CF, et ce dans le cadre de l'effort plus global de la direction générale de la Politique régionale et urbaine en faveur d'une évaluation ex post de la Politique de cohésion.

Dix grands projets ont été choisis dans une liste restreinte de 30 projets d'investissements dans les transports financés au cours des périodes de programmation susmentionnées. Les grands projets analysés concernent les projets de transport routier, ferroviaire et urbain de neuf États membres, à savoir:

- Secteur routier:
  - Autoroute A14 (Allemagne)
  - Pont Rio Antirio (Grèce)
  - Autoroute M43 (Hongrie)
  - Contournement de Saulkrasti (Lettonie)
  - Contournement de Malaga Ouest (Espagne)
- Secteur ferroviaire:
  - Varsovie (Pologne)
  - Žilina (Slovaquie)
- Secteur urbain :
  - Le Havre Tramway (France)
  - Naples Métro Ligne 1 (Italie)
  - Gdańsk Tramway (Pologne)

Au total, ces cas représentent plus de 3,2 milliards d'euros d'investissements (dont 1,1 milliard d'euros cofinancés par le FEDER et le CF), et ont été sélectionnés sur la base de critères tels que l'importance stratégique, la disponibilité et la qualité des données ainsi que la volonté des parties prenantes à coopérer. Une couverture géographique/sectorielle minimale a été assurée lors de la sélection finale. L'objectif final a été de sélectionner des projets susceptibles de fournir des informations détaillées permettant de tirer des enseignements utiles aux politiques publiques. Le raisonnement sous-jacent à cette sélection n'était pas de choisir les projets les plus représentatifs sur le plan statistique mais d'analyser dix cas représentatifs de projets d'infrastructure en mesure de fournir un aperçu éclairant sur les éventuels effets à long terme des infrastructures et sur la chaîne causale menant à ces effets.

METHODOLOGIE

Une méthodologie commune a été élaborée pour évaluer les dix cas se basant sur une analyse coûts-avantages (ACA) rétrospective complétée par une analyse qualitative. Une série complète de paramètres et de valeurs unitaires pour les avantages directs les plus courants ont été calculés par l'équipe principale et appliqués systématiquement à tous les cas. L'analyse coûts-avantages est effectuée selon la méthode du guide 2014 de la DG REGIO, adaptée à la perspective ex post, et comprend une analyse financière, une analyse économique et une analyse des risques.

Des visites sur site ont été effectuées pour chaque étude de cas et un exercice complet de consultation a permis aux auteurs des études de cas de recueillir des données primaires ainsi que les avis et perceptions d'un large éventail d'acteurs. Au total, 245 personnes ont été interrogées, principalement en face-à-face, parmi lesquelles des fonctionnaires (agents de la Commission européenne, des ministères nationaux, des autorités de gestion), des experts (ingénieurs et planificateurs), des chefs de projets, des décideurs politiques (maires, conseillers régionaux et municipaux), des associations d'utilisateurs et de citoyens et des journalistes, afin d'entendre toutes les points de vue. La méthode a pris en compte cinq critères d'évaluation (pertinence, cohérence, efficacité, efficience, valeur ajoutée de l'Union).

RÉSULTATS

Pertinence et cohérence du projet

Les projets sélectionnés ont globalement obtenu de bons résultats en matière de pertinence et de cohérence: ils répondaient aux besoins urgents et aux priorités à différents niveaux des pouvoirs publics. La plupart des projets tenaient compte des besoins existants en matière de transports (par exemple, les embouteillages), d'autres des questions plus générales de développement économique. Les dix projets n'ont pas été élaborés et mis en œuvre de manière isolée mais dans le cadre de plans plus vastes répondant aux priorités européennes et nationales. Ils s'alignaient également sur les autres interventions européennes et nationales (comme le réseau de transport RTE-T) étant donné que les grands projets devaient être inclus formellement dans le champ d'application des programmes opérationnels et par conséquent contribuer à la réalisation de leurs objectifs stratégiques.

Efficacité du projet

La mesure dans laquelle les projets ont atteint les objectifs énoncés est globalement acceptable, mais ils n'ont jamais pu répondre parfaitement aux attentes initiales. L'insuffisance des performances enregistrées aux cours de ces projets n'en constitue pas la cause, qui s'explique principalement par un caractère systématiquement trop ambitieux des objectifs fixés. Autrement dit, les décideurs politiques et les promoteurs des projets ont été trop optimistes quant aux effets en matière de développement socio-économique, de réhabilitation urbaine et autres effets positifs que la mise en œuvre de ces projets était censée produire au niveau local et régional. Dans la plupart des cas, les attentes n'étaient pas réalistes tant pour les avantages que pour les effets négatifs potentiels susceptibles d'être générés comme effets secondaires ou externalités.

Les projets les plus efficaces ont été ceux qui se sont avérés en mesure de résoudre des problèmes précis, tels que les embouteillages importants, et d'apporter des avantages directs en matière de transport (gains de temps, réduction des coûts d'exploitation des véhicules et fiabilité du temps de trajet). Pour la plupart des projets, les gains de temps et la réduction des coûts d'exploitation des véhicules ont été les principaux avantages

observés. En réduisant les coûts de transport, ils augmentent la productivité et contribuent de manière positive à la croissance économique. Les avantages économiques peuvent déterminer la nécessité de mettre en œuvre un certain projet, mais ils ne permettent probablement pas à eux seuls de compenser l'absence d'impacts directs substantiels sur le transport.

Les effets des projets sur la qualité de la vie et le bien-être ont été généralement positifs, mais pas aussi significatifs que sur le temps de trajet et les coûts d'exploitation des véhicules. Des effets positifs ont été signalés plus fréquemment concernant la sécurité, le bruit et la qualité du service.

Les effets des projets sur la viabilité environnementale (pollution de l'air et changement climatique) ont été globalement positifs, quand bien même ils étaient limités. Des effets distributifs ont également été observés avec une contribution positive des projets à la cohésion territoriale et une contribution à la cohésion sociale spécifique aux projets urbains.

Globalement, la majorité des effets directs observés se sont matérialisés à court terme (à savoir dans les cinq ans suivant le début de l'exploitation), mais pas toujours à leur pleine capacité. Les effets économiques majeurs peuvent prendre plus de temps et seront plus probablement visibles dans le futur. Dans certains cas, la crise économique a affecté les performances relatives à ces projets et a entraîné une demande de trafic plus faible que prévue. Cependant, la crise économique en tant qu'événement exogène unique n'a jamais été le facteur déterminant principal des fluctuations ex ante/ex post de la demande de trafic.

Compte tenu des perspectives actuelles, les effets de la croissance économique devraient évoluer ces prochaines années et influencer (généralement de façon positive) l'efficacité des projets à plus long terme. Ceci est lié au fait que les plans globaux d'investissement dans les projets de transport sont élaborés par étapes et prennent du temps; de plus, plusieurs projets d'investissements doivent être mis en œuvre en synergie afin d'exploiter pleinement le potentiel des effets à long terme générés.

Efficience du projet

Neuf projets sur dix ont apporté des avantages sociaux supérieurs aux coûts, mais la plupart des projets n'étaient pas aussi efficients que prévu initialement.

Au cours de la phase de construction, quatre projets sur dix ont enregistré des dépassements de coûts et la moitié des projets ont connu des retards (même si un seul projet présentait un retard majeur). Un certain nombre de facteurs exogènes imprévisibles ont été à l'origine de ces retards, mais ne se sont pas toujours traduits par des dépassements de coûts. Une gestion efficace du projet et des processus d'approvisionnement bien gérés peuvent permettre de réaliser des économies en mesure de compenser les dépenses additionnelles générées par des travaux imprévus.

Même si le constat de dépassement du coût et des retards peut sembler bien plus positif que les précédents résultats d'évaluation (Commission européenne, 2010), il faut accorder une attention particulière au calendrier et à la portée de ces évaluations. Alors que ce constat concerne les estimations de coût et de temps relatives à la phase de construction juste avant que soit prise la décision de financement, les retards les plus critiques surviennent habituellement lors de la préparation et de la conception du projet et ne sont pas signalés par la présente évaluation.

La viabilité financière des projets repose essentiellement sur le financement public, y compris pour les projets générateurs de recettes. Seuls deux projets sur les dix

sélectionnés étaient en mesure de couvrir les coûts d'exploitation et de maintenance avec leurs propres recettes. Lors de la préparation des projets, la viabilité financière de ces derniers n'a pas fait l'objet d'une attention suffisante.

Valeur ajoutée de l'Union

Pour la plupart des projets sélectionnés, la contribution de l'Union européenne a apporté une valeur ajoutée. La disponibilité d'une part importante et parfois cruciale du financement a assuré l'atteinte des résultats observés qui, sans le soutien de l'Union européenne, auraient probablement été retardés ou atteints de toute autre manière (par exemple sans respecter certaines normes). Cela était particulièrement vrai pour les projets réalisés en Pologne, Slovénie, Hongrie et Lettonie juste après leur adhésion à l'Union européenne lorsque les Fonds de l'Union ont fourni l'aide financière nécessaire pour améliorer les liaisons et renforcer la cohésion, par exemple, en conformant l'infrastructure nationale aux normes existantes dans les autres États membres. En revanche, pour deux projets (réalisés en France et en Allemagne), la valeur ajoutée de l'Union concernant la contribution financière était plutôt limitée notamment parce que le financement européen est intervenu à la toute dernière phase de la sélection du projet.

La valeur ajoutée de l'Union ne s'est pas limitée à une contribution financière. Dans certains cas, le cofinancement européen a permis d'influencer positivement le processus de conception et de sélection par le respect des exigences européennes (par exemple en matière de normes environnementales) et les procédures de demandes. L'assistance technique reçue de la part de la BEI et de JASPERS constitue une autre source de valeur ajoutée qui a renforcé la qualité technique et stratégique des projets.

Une autre fonction plus stratégique et éventuellement plus influente de l'Union européenne réside dans sa capacité à influencer le processus de planification et de détermination des priorités en vue d'accélérer la mise en œuvre de certains types d'investissements conformes aux priorités et aux objectifs de l'Union (par exemple, en contribuant au développement des projets RTE-T ou en favorisant le passage au transport urbain écologique). Les bons résultats obtenus globalement selon le critère de pertinence, en évaluant le bon niveau d'alignement des projets mis en œuvre aux stratégies nationales et européennes, démontrent la valeur ajoutée de l'Union en matière d'orientations stratégiques. Cela est notamment confirmé par les précédentes évaluations indiquant une participation des États membres dans les exercices de planification stratégique à l'issue des procédures d'obtention de fonds de l'Union (Commission européenne, 2016). En effet, la législation européenne actuelle exige d'inclure les grands projets dans le cadre de programmes opérationnels et de les mener dans le cadre de plans stratégiques plus vastes, notamment des plans sectoriels. Cependant, l'évaluation ne pouvait pas tenir compte de cet aspect de manière systématique lors de l'évaluation des projets individuels car le développement des stratégies et des processus de hiérarchisation, et l'influence éventuelle de l'Union européenne sur ceux-ci, prend du temps et prend souvent la forme d'interactions informelles avec les acteurs nationaux qui se perdent avec la mémoire institutionnelle.

MECANISMES ET FACTEURS DETERMINANTS

L'observation des performances des projets dans une perspective à long terme est particulièrement utile pour comprendre correctement leurs comportements et leurs mécanismes de causalité. Les résultats observés ont été déterminés par une combinaison de facteurs liés à la manière dont le projet a interagi avec son contexte, ses caractéristiques techniques, la capacité de prévoir les tendances à l'avenir, le partage des rôles et des responsabilités et la capacité de gestion à réagir aux événements imprévus.

Relations avec l'environnement

La plupart des projets ont affiché une relation positive initiale avec le contexte en apportant des solutions appropriées aux besoins de la population ou des utilisateurs et ont reflété différents facteurs socio-économiques et politiques. Cependant, la dimension temporelle est un critère important lorsqu'on évalue l'adéquation d'un projet à son contexte institutionnel, culturel, social et économique tout au long du cycle de vie du projet. Il semble évident que la plupart des projets maintiendront une bonne cohérence avec leur contexte à long terme, même s'il faudra dans certains cas relever quelques défis à l'avenir.

Processus de sélection

Tout au long des études de cas le processus de sélection a contribué de manière positive ou légèrement positive aux performances du projet, à l'exception de deux cas négatifs. Le processus de sélection a suivi en grande partie les cadres réglementaires et administratifs largement utilisés s'appliquant aux plans de transport et de mobilité plus vastes dans lesquels les projets étaient inclus. Cependant, la préparation et la mise en œuvre des projets peuvent parfois prendre quelques décennies. Dans certaines études de cas, cela a conduit à un processus de sélection basé sur des analyses techniques et économiques obsolètes. En ce qui concerne les plans plus généraux, un processus de hiérarchisation transparent et structuré pour les projets individuels devient essentiel.

Dans un certain nombre de cas, le processus de sélection s'est davantage fondé sur des préoccupations stratégiques et techniques (les considérations économiques et financières jouant un rôle mineur) qui ont compromis les performances du projet. Cela est d'autant plus vrai si l'analyse coûts-avantages est réalisée au tout dernier moment et uniquement dans le cadre d'une demande de financement.

Conception de projets

De façon générale, la conception de projets a obtenu de bons résultats pour presque tous les projets sélectionnés. Cependant, les aspects stratégiques et techniques de la conception de projets ont contribué aux performances finales de différentes manières. Au stade du plan conceptuel (décision de mettre en oeuvre un projet donné pour répondre aux besoins existants), il manque une utilisation systématique de la méthode de l'analyse des options alternatives. En revanche, en ce qui concerne la conception technique, les résultats des études de cas indiquent que la plupart des projets ont été conçus avec des techniques adéquates et parfois innovantes et à l'avant-garde. Seuls des problèmes mineurs, n'ayant eu aucune incidence significative sur la performance globale du projet, ont été signalés.

Capacité de prévision

L'exercice de prévision (y compris la collecte des données et la modélisation) a été l'un des facteurs déterminants les plus faibles, avec seulement quatre projets sur dix affichant un résultat positif ou très positif. Le biais d'optimisme a entraîné une surestimation de la demande et, dans une moindre mesure, des lacunes pour les aspects liés à la construction ou à la prestation de services, ou une sous-estimation du délai de réalisation. Les prévisions inexactes ont entraîné principalement une moindre efficacité et des problèmes liés à la viabilité financière: les projets ont été en mesure d'apporter les avantages attendus et ont pu subir des problèmes financiers. Cependant, la faible capacité de prévision n'est pas nécessairement liée à une performance négative du projet. D'autres facteurs déterminants (par exemple, la capacité de gestion) ainsi que des événements externes favorables inattendus ont permis de compenser les effets d'une prévision imprécise. D'autre part, l'inclination à l'optimisme, éventuellement soumise à

des pressions politiques plutôt qu'à des imprécisions techniques, était généralement liée aux résultats socio-économiques peu performants.

Structure de la gouvernance

Alors que l'image de la gouvernance de projet était globalement positive, certains projets ont réalisé des performances moyennes ou faibles. Ce facteur déterminant a affiché les plus hautes fluctuations. Il n'y avait aucun lien clair entre la complexité des structures de gouvernance et le succès de ce facteur déterminant. Les deux projets les plus complexes ont donné des résultats très différents. En outre, il n'y avait aucun lien clair entre la complexité des structures de gouvernance et la réussite du projet.

Une gouvernance efficace exigeait deux conditions essentielles : une organisation bien structurée avec une distribution claire des tâches (notamment en matière de responsabilité de financement) et une équipe expérimentée pour l'équipe de base du projet. Une gouvernance structurée est notamment conseillée pour les projets exigeant un nombre élevé de parties prenantes car une coopération et une communication de bonne qualité ainsi qu'une distribution claire des tâches (notamment en ce qui concerne la responsabilité du financement) sont essentielles.

Capacité managériale

Avec la conception de projet et la relation avec l'environnement, ce facteur déterminant figure parmi ceux ayant contribué de manière largement positive à la performance globale des projets. La capacité managériale n'a eu d'effet négatif sur l'issue du projet que pour un seul projet, les autres ayant affiché des effets principalement positifs ou neutres.

Tout au long des études de cas les circonstances imprévues ont été traitées professionnellement par la direction de projet. Cela est particulièrement vrai pour les circonstances internes telles que la nécessité d'adapter la construction, et pour les circonstances externes telles que la crise économique de 2008.

Modèles comportementaux

Les conclusions de l'étude en matière de comportement du projet tout au long de son cycle de vie ont confirmé que la réalité était bien plus complexe et nuancée que raisonnablement prévu ex ante et que la réussite ou l'échec était déterminé par un ensemble de facteurs et d'événements spécifiques au projet. Cependant, les capacités de prévision et de gestion se sont avérées être les facteurs déterminants essentiels: une capacité de prévision solide permet d'assurer dès le départ la qualité du projet et la capacité managériale de maintenir le projet sur la bonne voie.

CONCLUSIONS ET RECOMMANDATIONS

Conclusions

Les grands projets de transport, financés par le FEDER et le CF, peuvent contribuer positivement à la réalisation de nombreux objectifs de l'Union européenne tels que la croissance économique, la qualité de la vie et le bien-être et, dans une moindre mesure, la viabilité environnementale. Les avantages économiques directs les plus connus sont liés à la réduction du temps de trajet qui en retour a permis de réaliser des gains de productivité (dus à la baisse des coûts de transport) et de contribuer au développement régional. Les autres avantages directs sont l'amélioration de la sécurité, la diminution des coûts d'exploitation des véhicules et une incidence positive sur la réduction du GHG pour les projets pour lesquels le transfert modal ou une motricité plus efficace énergétiquement a été réalisé(e). Les effets indirects sont moins connus car ces objectifs

ne sont pas atteints par des projets individuels seuls, mais ils demeurent tout de même invoqués comme motif du financement des grands projets et au sein des discours politiques dans le but de créer un consensus.

Les conclusions concernant les facteurs déterminants indiquent que la qualité à l'entrée d'un projet est une condition essentielle à la réussite de ce projet. Le processus de prise de décision joue un rôle majeur et doit se baser sur une analyse précise de la demande, une analyse élaborée des options en amont du processus et une analyse coûts-avantages de haute qualité. Il a été démontré en particulier que lorsque l'analyse technique, notamment l'analyse coûts-avantages, a été prise au sérieux et que les considérations relatives au transport ont déterminé le processus de sélection, cela a été bénéfique pour le projet et a eu une incidence positive sur les performances. Cependant, cela n'a pas été systématiquement le cas.

Tandis qu'une bonne qualité à l'entrée est une condition préalable essentielle à la réussite du projet, une bonne gouvernance et capacité de gestion sont également essentielles lors de la phase de mise en œuvre et d'exploitation. Une structure de gouvernance efficace et une bonne capacité managériale rendent le projet plus résilient, c'est à dire davantage en mesure de surmonter rapidement et efficacement les difficultés rencontrées au cours de la réalisation du projet. Les grands projets d'infrastructure ont de longs cycles de vie, par conséquent la capacité de maintenir les projets sur la bonne voie dans un environnement en évolution est une source de succès évidente.

Néanmoins, les chaînes causales reliant les facteurs déterminants aux performances du projet étaient de nature diverse et aucune conclusion n'a pu être tirée quant aux facteurs de réussite généraux garantissant une bonne performance du projet. La relation entre les facteurs et la performance finale du projet (le «comportement du projet») n'était pas «déterministe» car bien souvent la causalité s'établissait de manière unique et les défis étaient spécifiques au projet.

Les services européens peuvent soutenir le processus de prise de décision quant à la qualité à l'entrée en fournissant une assistance stratégique (définition des priorités et des normes) et technique (définition des aspects techniques du projet tels que l'analyse de la demande, l'évaluation des risques et les aspects liés à l'aide et la commande publique) afin d'éviter le risque que l'Union européenne ne devienne qu'un simple bailleur de fonds.

Recommandations

L'effort coordonné de l'Union européenne et des Etats membres pour élaborer des projets conformes aux priorités stratégiques de l'Union et répondant aux besoins urgents de transport local selon une série de règles cohérentes et de pratiques méthodologiques, offre une occasion unique de réaliser une opération de bilan à l'échelle européenne sur la gestion et l'évaluation des investissements publics. Les services de la Commission européenne ont ainsi la possibilité d'acquérir une compréhension et une connaissance approfondie sur la manière dont les stratégies européennes et nationales sont planifiées et mises en place sur le terrain. Les autorités de gestion et les promoteurs de gestion peuvent également évaluer systématiquement la valeur sociale nette attendue de leurs projets d'investissement et être responsables à l'égard des contribuables européens.

Le dialogue stratégique en place lors de la préparation et de la sélection du projet permet aux services de la Commission européenne d'influencer les modalités d'exécution de ces opérations stratégiques par les Etats membres, par exemple en influençant le processus d'établissement des priorités ou en suggérant des améliorations techniques afin de se conformer aux normes européennes en matière de conception des infrastructures ou de gestion des services. Ce processus de dialogue et cette assistance technique génèrent

des enseignements qui peuvent être aisément appliqués à d'autres projets et organismes publics dans tous les Etats membres de l'Union. Selon la présente étude, ce point représente l'aspect le plus authentique et pertinent de la valeur ajoutée de l'Union et devrait être préservé et renforcé. Afin d'améliorer ce système et l'interaction entre les services de la Commission européenne et l'organisme de gestion, les recommandations spécifiques suivantes sont proposées:

- **La préparation de plans directeurs en matière de transport, incluant un système de hiérarchisation pour l'identification d'une réserve de projets basée sur une évaluation approfondie des besoins de transport** devrait figurer parmi les «conditions favorables[2] » d'un financement de l'infrastructure de transport avec des fonds européens. Les capacités et l'apprentissage institutionnel sur la préparation et la sélection de projets peuvent être renforcés par le biais d'une assistance européenne ainsi que par un dialogue étroit et l'assistance technique des services dédiés (JASPERS par exemple) et cette opportunité devrait être mieux exploitée par l'Autorité de gestion lors de la phase de préparation et de sélection du projet.
- **L'évaluation des besoins de transport devrait se baser sur des modèles de transport robustes et actualisés.** Lors de l'évaluation des projets de transport, il serait nécessaire de mettre davantage l'accent sur la qualité des modèles de trafic soutenant l'exercice de prévision dans son ensemble. Pour soutenir les autorités de gestion, **la Commission européenne peut promouvoir un effort coordonné** afin de développer des modèles de transport nationaux et régionaux conformes à la meilleure pratique du secteur.
- Le raisonnement en faveur d'un investissement de transport majeur dans le cadre d'un programme opérationnel devrait également tenir compte de la possible valeur ajoutée de l'Union. Cela **doit être évalué dans un cadre bien défini**, en indiquant notamment les priorités et les objectifs de l'Union à suivre ou en évaluant dans quelle mesure le projet sélectionné serait différent en l'absence d'intervention de l'Union européenne.
- La Commission européenne a joué un rôle majeur en développant et en suggérant l'utilisation d'outils et méthodes communes pour l'évaluation économique des projets, et la présente étude met en évidence des améliorations évidentes. **Par conséquent, il est nécessaire de continuer à promouvoir une certaine harmonisation et l'utilisation de pratiques communes dans le cadre de l'évaluation des projets de transport** bien au-delà de ce qui a déjà été réalisé afin d'éviter tout risque de retours en arrière par rapport à l'harmonisation et au partage des bonnes pratiques.
- **Les comités de suivi doivent s'assurer qu'un processus de sélection des investissements robuste est en place en vue d'un processus de décision structuré sur les grands projets de transport.** Les critères de sélection pour les interventions d'une importance stratégique doivent se baser sur des analyses techniques et économiques solides et appropriées, prévoyant une analyse des options et une évaluation des risques.
- **Des exigences plus spécifiques concernant la viabilité financière devraient être introduites.** L'évaluation ex ante des projets de transport devrait mettre davantage l'accent sur l'analyse de la viabilité financière à long terme après la construction du projet. Etant donné que la viabilité financière d'un projet

[2] Pendant la période 2021-2027 les "conditions favorables" remplaceront les "conditionnalités ex-ante".

dépend de la manière dont il est financé, la structure financière de chaque projet devrait être soigneusement étudiée lors de l'évaluation préalable.

- **Il devrait être obligatoire de considérer au moins trois options différentes, y compris une «alternative minimum» ou option à moindre coût, lors de l'analyse coûts-avantages préalable.** L'exactitude de l'analyse de l'option pour la prise de décision doit être améliorée. Cela exige également que l'analyse de l'option soit effectuée au cours de la phase d'identification du projet plutôt qu'au cours de la phase de conception voire même comme un exercice de réajustement.
- **L'utilisation des résultats de l'analyse coûts-avantages dans la prise de décision en matière de politique et de débat public doit être encouragée.** Il est conseillé, pour des analyses de bonne qualité et leur utilisation dans le cadre du débat public et de l'élaboration des politiques, de publier systématiquement les études de faisabilité, les analyses coûts-avantages et tout autre élément à la base de la décision de financement. Divulguer les informations relatives aux coûts détaillés des études techniques, aux avantages attendus et aux conditions sous-tendant leur réussite à un plus large public incluant la presse et la société civile peut améliorer la transparence et la responsabilité à l'égard des parties prenantes et des contribuables et souligner le rôle des évaluations techniques dans le cadre de ce processus.
- **Les autorités de gestion doivent conserver les données financières et économiques clés** (au moins les coûts d'investissement, et les coûts d'exploitation et de maintenance, la demande de trafic avec une désagrégation appropriée des données, les revenus financiers) **pendant une période suffisamment longue (au moins cinq ans pour un exercice adéquat) après l'exécution du projet et les rendre accessibles aux services de la Commission européenne pour les besoins d'évaluation.** Si cette activité révèle des écarts importants par rapport aux prévisions ou des conditions contextuelles différentes, il convient de recueillir des informations supplémentaires plus qualitatives. Les autorités de gestion doivent également savoir que leurs projets pourraient faire l'objet d'une évaluation ex post de la Commission européenne après la période de programmation et qu'elles doivent pouvoir étayer ces exercices en fournissant la base d'informations nécessaire.
- **Les Etats membres doivent systématiquement effectuer des évaluations ex post des grands projets.** Il est de l'intérêt de tout organisme finançant un projet de transport majeur d'effectuer une évaluation ex post, non seulement dans une optique de responsabilité mais aussi dans le cadre d'un processus d'apprentissage nécessaire au développement de nouveaux projets et d'amélioration du système de prise de décision. Une évaluation ex post expose les décideurs et les encourage à respecter les normes de bonne gouvernance et à assumer la responsabilité de leurs décisions.

ZUSAMMENFASSUNG

HINTERGRUND

Großprojekte stellen einen erheblichen Anteil der Ausgaben der Kohäsionspolitik, insbesondere im Verkehrssektor: im Zeitraum 2007-2013 machten sie fast 30% der Gesamtmittel aus dem Europäischen Fonds für regionale Entwicklung (EFRE) und dem Kohäsionsfonds (KF) aus und fast 49% der Großprojekte entfielen auf den Verkehrssektor (d.h. im Zeitraum 2007-2013 wurden 945 Großprojekte finanziert, davon 463 im Verkehrssektor). Im Gegensatz zu Nicht-Großprojekten und wegen ihres finanziellen Umfangs sind sie Gegenstand einer Bewertung und einer spezifischen Entscheidung der Europäischen Kommission.

Ziel dieser Ex-post-Evaluierung ist es, den langfristigen Beitrag von zehn Großprojekten im Verkehrssektor, die in der Europäischen Union während der Programmzeiträume 2000-2006 oder 2007-2013 durchgeführt und vom EFRE oder KF kofinanziert wurden, im Hinblick auf die wirtschaftliche Entwicklung und auf die Lebensqualität und das Wohlergehen der Gesellschaft zu analysieren. Dies wird zu der weitergehenden Bemühung der GD Regionalpolitik beitragen, die Ex-post-Evaluierung der Kohäsionspolitik durchzuführen.

Aus einer Vorauswahl von 30 Verkehrsinvestitionen wurden zehn Großprojekte ausgewählt, die in den oben genannten Programmzeiträumen finanziert wurden. Die untersuchten Großprojekte betreffen den Straßen-, Schienen- und Nahverkehrssektor in neun Mitgliedstaaten. Diese umfassen:

- Straßensektor:
  - Autobahn A14 (Deutschland)
  - Rio Antirio Brücke (Griechenland)
  - Autobahn M43 (Ungarn)
  - Umgehungsstraße Saulkrasti (Lettland)
    Umgehungsstraße West Malaga (Spanien)
- Eisenbahnsektor:
  - Warschau (Polen)
  - Žilina (Slowakei)
- Nahverkehrssektor:
  - Le Havre (Frankreich)
  - Neapel Metro Linie 1 (Italien)
  - Gdańsk Straßenbahn (Polen)

Insgesamt umfassten diese Fälle Investitionen von mehr als 3,2 Mrd. EUR, einschließlich der 1,1 Mrd. Euro, die durch den EFRE und den KF kofinanziert wurden. Sie wurden anhand einer Reihe von Auswahlkriterien, wie der strategischen Relevanz, der Verfügbarkeit und Qualität von Daten sowie der Kooperationsbereitschaft der Beteiligten ausgewählt. Bei der endgültigen Auswahl wurde darauf geachtet, dass eine gewisse geografische/sektorale Abdeckung gewährleistet war. Das letztendliche Ziel war es, Fälle auszuwählen, die wahrscheinlich aussagekräftige Projektberichte liefern, aus denen nützliche politische Lehren gezogen werden können. Der Grundgedanke bei der Auswahl war, nicht die statistisch repräsentativsten Projekte zu identifizieren, sondern zehn anschauliche Beispiele von Infrastrukturprojekten zu betrachten, die interessante Einblicke in mögliche langfristige Auswirkungen von Infrastrukturen liefern können sowie der Kausalkette, die zu diesen Effekten führen.

METHODIK

Für die Bewertung der zehn Fälle wurde eine einheitliche Methodik entwickelt. Diese baute auf einer ex-post Kosten-Nutzen-Analyse (KNA) auf, die durch qualitative Analysen ergänzt wurde. Vom Projektteam wurde ein umfassender Satz von Parametern und Einheitswerten für die häufigsten direkten Nutzen berechnet und konsequent auf alle Fälle angewendet. Die Methodik der KNA folgte dem Leitfaden der GD REGIO 2014, der auf die Ex-post-Perspektive zugeschnitten wurde und eine Finanzanalyse, eine Wirtschaftsanalyse und eine Risikoanalyse umfasst.

Für jede Fallstudie wurden Besuche vor Ort durchgeführt, und ein ausführlicher Interviewplan ermöglichte es den Autoren, Primärdaten sowie Ansichten und Wahrnehmungen eines breiten Spektrums von Interessenvertretern zu sammeln. Insgesamt wurden 245 Personen befragt, meistens in Vor-Ort Gesprächen. Um sicherzustellen, dass alle Stimmen gehört werden, umfassten die befragten Personen Beamte (Beamte der Europäischen Kommission, nationale Ministerien, Verwaltungsbehörden), Experten (Ingenieure und Planer), Projektmanager, politische Entscheidungsträger (Bürgermeister, Regional- und Gemeinderäte), Verbraucher- und Bürgerverbände sowie Journalisten. Die Methodik umfasste fünf Bewertungskriterien (Relevanz, Kohärenz, Effektivität, Effizienz, EU-Mehrwert).

ERGEBNISSE

Projektrelevanz und Kohärenz

Generell haben die ausgewählten Projekte hinsichtlich der Relevanz und Kohärenz relativ positiv abgeschnitten. Die meisten von ihnen waren höchst relevant und kohärent: Sie reagierten auf dringende bestehende Bedürfnisse und stimmten mit den Prioritäten verschiedener Regierungsebenen überein. Die meisten Projekte befassten sich mit den vorherrschenden Verkehrsbedürfnissen (z. B. Verkehrsstaus), während einige von ihnen auch auf weitergefasste wirtschaftliche Entwicklungsbedürfnisse eingingen. Keines der zehn Projekte wurde isoliert konzipiert und umgesetzt, sondern alle fügten sich in umfassendere Pläne ein, die mit den Prioritäten der EU und der Mitgliedstaaten abgestimmt waren. Sie wurden auch mit anderen EU und nationalen Interventionen (z. B. anderen Verkehrsprojekten oder -netzen wie dem TEN-V) abgestimmt. Dieser letzte Aspekt ist nicht überraschend, da Großprojekte formell in die operationellen Programme einbezogen werden und somit zu deren strategischem Ziel beitragen sollen.

Projektwirksamkeit

Insgesamt ist das Ausmaß der Erfüllung der Zielvorgaben der Projekte akzeptabel, allerdings konnten sie die ursprünglichen Erwartungen nie vollständig erfüllen. Dies war nicht auf eine unzureichende Leistung während der Projektumsetzung zurückzuführen, sondern vor allem auf die Tatsache, dass sie systematisch zu ehrgeizige Ziele umfassten. Anders gesagt, waren die politischen Entscheidungsträger und Projektträger zu optimistisch bei der Festlegung ihrer Ziele zur sozioökonomischen Entwicklung, Stadterneuerung und anderer positiver Auswirkungen, die die Umsetzung der Projekte im lokalen oder regionalen Kontext hätten auslösen können. In vielen Fällen waren die Erwartungen nicht realistisch, weder hinsichtlich des potenziellen Nutzens, den das Projekt tatsächlich erbringen konnte, noch hinsichtlich der negativen Auswirkungen, die möglicherweise auch als Nebenwirkungen oder externe Effekte generiert wurden.

Die effektivsten Projekte waren diejenigen, die erfolgreich auf klare Verkehrsbedürfnisse (wie Verkehrsstaus) reagierten und direkte Transportvorteile (wie Zeitersparnis, Reduzierung der Fahrzeugbetriebskosten und Zuverlässigkeit der Fahrzeiten) brachten.

Bei den meisten Projekten waren die Zeit- und Betriebskosteneinsparungen die vorherrschenden Vorteile, die ex-post beobachtet wurden. Indem sie Transportkosten verringerten, erhöhen sie die Produktivität und trugen positiv zum Wirtschaftswachstum bei. Weiterreichende wirtschaftliche Vorteile können das Projekt stärken, aber sie sind wahrscheinlich nicht allein dafür geeignet, das Fehlen erheblicher direkter (Verkehrs-) Auswirkungen auszugleichen.

Die Auswirkungen der Projekte in Bezug auf Lebensqualität und allgemeines Wohlbefinden waren normalerweise positiv, aber nicht so bedeutsam wie die Auswirkungen auf Fahrzeiten und Fahrzeugbetriebskosten. Positive Effekte wurden meistens in Bezug auf Sicherheit, Lärm und Servicequalität festgestellt.

Die Wirkung der Projekte auf die ökologische Nachhaltigkeit (wie Luftverschmutzung und Klimawandel) waren insgesamt positiv, allerdings in begrenztem Maße. Bei den Projekten wurden auch Verteilungseffekte beobachtet, die einen positiven Beitrag des Projekts zum territorialen und zum sozialen Zusammenhalt, insbesondere bei städtischen Projekten, leisteten.

Insgesamt hat sich die Mehrzahl der beobachteten direkten Effekte kurzfristig (d.h. innerhalb von fünf Jahren nach der Umsetzung) manifestiert, wenn auch nicht immer in vollem Umfang. Weitergehende wirtschaftliche Auswirkungen können länger dauern und werden wahrscheinlich in der Zukunft beobachtet werden. In einigen Fällen hatte die Wirtschaftskrise Auswirkungen auf die Projektergebnisse, was zu einer geringeren als der erwarteten Verkehrsnachfrage führte. Die Wirtschaftskrise als einzelnes exogenes Ereignis war jedoch nie die Hauptursache für die Ex-ante- / Ex-Post-Abweichungen der Verkehrsnachfrage.

Angesichts der derzeitigen Prognosen wird erwartet, dass sich die wirtschaftlichen Wachstumseffekte in den kommenden Jahren verändern werden und die Effektivität der Projekte langfristig (in der Regel positiv) beeinflussen wird. Dies hängt damit zusammen, dass größere Verkehrspläne in Etappen entwickelt werden und Zeit brauchen. Eine Reihe von Investitionsprojekten müssen synergetisch miteinander kombiniert werden, um das volle Potenzial der generierten Langzeiteffekte auszuschöpfen.

Projekteffizienz

Neun von zehn Projekten brachten soziale Nutzen, die über den Kosten lagen, aber viele Projekte waren nicht so effizient wie ursprünglich erwartet.

Während der Bauphase kam es bei vier von zehn Projekten zu Kostenüberschreitungen und bei der Hälfte der Projekte kam es zu Verzögerungen (obwohl nur ein Projekt eine größere Verzögerung hatte). Die Ursache für solche Verzögerungen waren dabei eine Reihe von unvorhersehbaren exogenen Faktoren, aber sie führten nicht immer zu Kostenüberschreitungen. Effektives Projektmanagement und gut geführte Beschaffungsprozesse können zu Einsparungen führen, die die Mehrkosten unvorhergesehener Arbeiten kompensieren.

Obwohl die Ergebnisse zu den Kostenüberschreitungen und Verzögerungen im Vergleich zu früheren Evaluierungsergebnissen (Europäische Kommission, 2010) viel positiver erscheinen mögen, muss auf den zeitlichen Rahmen und den Umfang dieser Bewertung geachtet werden. Während sich diese Ergebnisse auf die Kosten- und Zeitschätzungen für die Bauphase beziehen, die kurz vor der Finanzierungsentscheidung getroffen wurden, treten die kritischsten Verzögerungen in der Regel während der Projektvorbereitung und -gestaltung auf und werden in dieser Evaluierung nicht beschrieben.

Die finanzielle Tragfähigkeit der Projekte wurde hauptsächlich durch öffentliche Quersubventionierung gewährleistet, auch bei den einnahmeschaffenden Projekten. Nur zwei der zehn ausgewählten Projekte konnten Betriebs- und Wartungskosten (B&W) durch eigene Einnahmen decken. Während der Projektvorbereitung wurde nicht genügend auf die finanzielle Tragfähigkeit der Projekte nach ihrer Inbetriebnahme geachtet.

EU-Mehrwert

Bei den meisten der ausgewählten Projekte brachte die Beteiligung der Europäischen Union einen Mehrwert. Die Verfügbarkeit eines signifikanten und manchmal wesentlichen Finanzierungsanteils gewährleistete das Erreichen der beobachteten Ergebnisse, die ohne die EU-Unterstützung möglicherweise aufgeschoben oder nur auf andere Weise erreicht werden konnten (beispielsweise ohne bestimmte Standards zu erfüllen). Dies gilt insbesondere für die Projekte in Polen, der Slowakei, Ungarn und Lettland kurz nach ihrem EU-Beitritt, bei denen die EU-Mittel die notwendige finanzielle Hebelwirkung lieferten, um die Verbindungen zu verbessern und den Zusammenhalt zu stärken, indem beispielsweise die nationale Infrastruktur auf den Standard der anderen Mitgliedstaaten gehoben wurde. Bei einigen (in Frankreich und Deutschland durchgeführten) Projekten war der EU-Mehrwert in Bezug auf den Finanzbeitrag dagegen eher begrenzt, insbesondere weil die EU-Finanzierung erst spät während der letzten Phase der Projektauswahl geleistet wurde.

Der EU-Mehrwert war nicht auf finanzielle Zuwendungen beschränkt. Es gibt Belege dafür, dass die EU-Kofinanzierung in einigen Fällen dabei behilflich war, den Gestaltungs- und Auswahlprozess durch Einhaltung der EU-Anforderungen (z. B. hinsichtlich der Umweltstandards) und Antragsverfahren positiv zu beeinflussen. Einen weiteren Mehrwert brachte die von der EIB und JASPERS geleistete technische Unterstützung, die die technische und strategische Qualität der Projekte stärkte.

Eine andere, eher strategische und möglicherweise einflussreichere Rolle der EU besteht in der Fähigkeit, den Planungs- und Prioritätensetzungsprozess zu beeinflussen, mit dem Ziel, die Umsetzung bestimmter Investitionsarten, die den Prioritäten und Zielen der EU entsprechen (z.B. durch den Beitrag zur Entwicklung von TEN-V-Projekten oder der Unterstützung zum Umstieg auf einen umweltfreundlicheren städtischen Nahverkehr) zu beschleunigen. Die durchschnittlich hohe erreichte Punktzahl beim Kriterium Relevanz, welches die gute Abstimmung der durchgeführten Projekte mit nationalen und EU-Strategien bewertet, weist auf einen EU-Mehrwert in Bezug auf die strategische Ausrichtung hin. Dies wird auch durch frühere Evaluierungen bestätigt, die auf die Bemühungen der Mitgliedsstaaten zu strategischen Planungen hinweisen, als Ergebnis der Verfahren zur Genehmigung von EU-Finanzmitteln (Europäische Kommission, 2016). Die derzeitige EU-Rechtsgrundlage für Großprojekte erfordert nämlich, dass diese in operationelle Programme einbezogen werden und im Rahmen umfassender strategischer und insbesondere sektoraler Pläne umgesetzt werden. Die Evaluierung konnte diesen Aspekt bei der Bewertung der einzelnen Projekte jedoch nicht systematisch untersuchen, da die Entwicklung von Strategien und Priorisierungsprozessen, und der mögliche Einfluss der EU auf diese, Zeit benötigt und oft in Form informeller Interaktion mit nationalen Interessengruppen erfolgt, die mit dem institutionellen Gedächtnis verloren gehen.

MECHANISMEN UND DETERMINANTEN

Die Betrachtung der Projektergebnisse in einer langfristigen Perspektive ist besonders aussagekräftig, um ihre Eigenschaften und die Mechanismen von Kausalketten vollständig zu würdigen. Die beobachteten Projektergebnisse wurden durch eine

Kombination mehrerer Faktoren bestimmt, die mit der Interaktion des Projekts mit den Rahmenbedingungen zusammenhängen, seinen technischen Merkmalen, der Fähigkeit zur Vorhersage zukünftiger Trends, der Rollenverteilung und Verantwortlichkeiten und der Fähigkeit des Managements, auf unvorhergesehene Ereignisse zu reagieren.

Beziehung zum Kontext

Die meisten Projekte zeigten vorerst eine positive Beziehung zum Kontext, da sie passende Lösungen für die Bedürfnisse der Bevölkerung oder Nutzer bereitstellten und verschiedene sozioökonomische und politische Faktoren widerspiegelten. Die zeitliche Dimension ist jedoch wichtig für die Bewertung der Angemessenheit des Projektes in seinem institutionellen, kulturellen, sozialen und wirtschaftlichen Umfeld während seines gesamten Lebenszyklus. Es zeigt sich, dass die meisten Projekte langfristig ihre guten Beziehungen zum Kontext beibehalten werden, wenn auch in einigen wenigen Fällen zukünftige Herausforderungen bewältigt werden müssen.

Auswahlverfahren

In fast allen Fallstudien leistete das Auswahlverfahren einen positiven oder leicht positiven Beitrag zur Projektleistung, mit nur zwei negativen Fällen. Die Verfahren folgten weitgehend den gut etablierten regulatorischen und administrativen Rahmenbedingungen von umfassenderen Verkehrs- und Mobilitätsplänen, in die die Projekte integriert waren. Allerdings kann die Projektvorbereitung und -umsetzung auch einige Jahrzehnte dauern. In einigen Fallstudien führte dies zu einem Auswahlverfahren, das auf veralteten technischen und wirtschaftlichen Analysen basierte. Innerhalb größerer Pläne ist ein transparenter und strukturierter Priorisierungsprozess für einzelne Projekte entscheidend.

In einigen Fällen wurde der Auswahlprozess mehr von strategischen und technischen Aspekten bestimmt, während wirtschaftliche und finanzielle Erwägungen eine untergeordnete Rolle spielten, was sich negativ auf die Projektleistung auswirkte. Dies war vor allem der Fall, wenn die KNA im allerletzten Moment und nur im Rahmen des Finanzierungsantrags durchgeführt wurde.

Projektdesign

Insgesamt schnitt das Projektdesign in fast allen ausgewählten Projekten gut ab. Die strategischen und technischen Dimensionen des Projektdesigns trugen jedoch auf unterschiedliche Weise zum endgültigen Ergebnis bei. Dem konzeptionellen Entwurf (d. h. die Entscheidung, ein bestimmtes Projekt zu implementieren, um bestehende Bedürfnisse zu erfüllen) mangelt es an der systematischen Verwendung als Optionsanalyse. Im Gegensatz dazu zeigen die Ergebnisse der Fallstudien, was das technische Design betrifft, dass die meisten Projekte mit angemessenen und in einigen Fällen innovativen und zukunftsweisenden Techniken konzipiert wurden. Es wurden nur kleinere Probleme genannt, die die Gesamtleistung des Projekts nicht dramatisch beeinflussten.

Prognosekapazität

Die Prognosekapazität (einschließlich der Datenerhebung und -modellierung) war einer der schwächsten Aspekte der Determinanten, bei der nur vier von zehn Projekten ein positives oder sehr positives Ergebnis erzielten. Der Hang zum Optimismus (oder „optimism bias“) hatte teilweise die Überschätzung der Nachfrage und, in geringerem Maße, Mängel in Bereichen der Konstruktion oder Servicebereitstellung oder die Unterschätzung der Fertigstellungszeit zur Folge. Die wichtigsten Folgen der ungenauen Prognosen waren eine geringere Effektivität und Probleme im Zusammenhang mit der finanziellen Tragfähigkeit: Projekte könnten den erwarteten Nutzen bringen und trotzdem finanzielle Probleme mit sich bringen. Die schwache Prognosekapazität war jedoch nicht

zwangsläufig mit negativen Projektergebnissen verbunden. Andere Determinanten (z. B. Managementfähigkeit) sowie unerwartet günstige externe Ereignisse hatten das Potenzial, die Folgen ungenauer Prognosen auszugleichen. Auf der anderen Seite war die optimistische Voreingenommenheit, die möglicherweise durch politischen Druck und weniger durch technische Ungenauigkeiten beeinflusst wurde, im Allgemeinen mit unterdurchschnittlichen sozioökonomischen Ergebnissen verbunden.

Governance-Struktur

Während das Bild der Projektsteuerung (project governance) insgesamt eher positiv war, gab es einige Projekte mit einer mittelmäßigen oder sogar schlechten Leistung. Die Governance-Struktur ist die Determinante mit der höchsten Punktefluktuation. Es gab keinen eindeutigen Zusammenhang zwischen der Komplexität der Governance-Strukturen und dem Erfolg dieser Determinante. Zum Beispiel zeigten die zwei komplexesten Projekte sehr unterschiedliche Ergebnisse. Außerdem gab es keinen eindeutigen Zusammenhang zwischen der Komplexität der Governance-Strukturen und dem Erfolg des Projektergebnisses.

Die Belege aus den Fallstudien deuteten auf zwei Bestandteile einer effektiven Project Governance hin: eine strukturierte Absprache mit klarer Aufgabenverteilung (besonders hinsichtlich der Finanzierungsverantwortung) sowie erfahrene Mitarbeiter im Kernprojektteam. Eine strukturierte Absprache ist besonders in Projekten mit einer hohen Anzahl von Beteiligten sinnvoll, da die Bedeutung einer guten Zusammenarbeit, Kommunikation sowie einer klaren Aufgabenverteilung, besonders hinsichtlich der Finanzierungsverantwortung, von zentraler Bedeutung sind.

Managementkapazität

Diese Determinante gehört, zusammen mit dem Projektdesign und der Beziehung zum Kontext, zu denjenigen, die einen großen positiven Beitrag zur Gesamtleistung der Projekte leisteten. Nur in einem Projekt wirkte sich die Managementkapazität deutlich negativ auf das Projektergebnis aus, während die anderen überwiegend positiv oder neutral waren.

In den meisten Fallstudien wurden unvorhergesehene Umstände vom Projektmanagement professionell gehandhabt - dies galt sowohl für interne Faktoren, wie die Notwendigkeit, die Konstruktion anzupassen, als auch für externe, wie die Wirtschaftskrise von 2008.

Verhaltensmuster

Im Hinblick auf das Projektverhalten während seines Lebenszyklus bestätigten die Ergebnisse der Studie, dass die Realität viel komplexer und nuancierter war, als dies im Voraus zu erwartet war und dass Erfolg oder Misserfolg durch eine Zusammensetzung von projektspezifischen Faktoren und Ereignissen bestimmt wurde. Es zeigte sich jedoch, dass Prognosen und Managementkapazitäten die entscheidenden Determinanten waren: Eine solide Prognosekapazität sorgte für eine gute Eingangsqualität und die Managementkapazität hielten das Projekt auf Erfolgskurs.

SCHLUSSFOLGERUNGEN UND EMPFEHLUNGEN

Schlussfolgerungen

Größere Verkehrsprojekte im Rahmen des EFRE und KF können positiv auf mehrere EU-Ziele des Wirtschaftswachstums, der Lebensqualität und des Wohlergehens und in geringerem Maße auch zur ökologischen Nachhaltigkeit beitragen. Die herausragendsten direkten wirtschaftlichen Vorteile waren verbunden mit Reisezeiteinsparungen, die wiederum zu Produktivitätsgewinnen (aufgrund geringerer Transportkosten) und

induzierten Auswirkungen auf die regionale Entwicklung führten. Weitere direkte Vorteile waren eine erhöhte Sicherheit, geringere Fahrzeugbetriebskosten und eine positive Wirkung bei dem Ausstoß von Treibhausgasen bei den Projekten, in denen eine Verkehrsverlagerung oder eine treibstoffeffizientere Fortbewegung erreicht wurde. Indirekte Effekte waren weniger ausgeprägt, da diese Ziele nicht alleine durch einzelne Projekte erreicht werden, aber sie werden oft in Projektberichten als Finanzierungsgrund von Großprojekten herangezogen, um politischen Konsens zu erreichen.

Die Ergebnisse zu den bestimmenden Determinanten zeigen, dass die Eingangsqualität eines Projekts eine relevante Voraussetzung für den Projekterfolg war. Der Entscheidungsprozess spielte dabei eine wichtige Rolle und sollte auf einer genauen Bedarfsanalyse, einer sorgfältigen Optionsanalyse zu einem frühen Zeitpunkt im Prozess und einer qualitativ hochwertigen Kosten-Nutzen-Analyse (KNA) basieren.

Ein wichtiges Ergebnis war, dass es für die Projekte von Vorteil war, wenn die technische Analyse, einschließlich der KNA, ernst genommen wurde und Verkehrsaspekte den Auswahlprozess mitbestimmten. Dies wirkte sich wiederum positiv auf die Projektleistung aus. Allerdings wurde dies nicht systematisch durchgeführt.

Während eine gute Eingangsqualität eine wichtige Voraussetzung für den Projekterfolg war, waren eine gute Projektsteuerung und Managementkapazität maßgebliche Faktoren während der Umsetzungs- und Betriebsphase. Eine effektive Governancestruktur und gute Managementkapazität machen das Projekt widerstandsfähiger, das heißt, es ist im Stande, sich schnell und effektiv von auftretenden Schwierigkeiten während der Projektdurchführung zu erholen. Große Infrastrukturprojekte haben lange Lebenszyklen, daher ist die Fähigkeit, die Projekte in einem sich entwickelnden Kontext auf Kurs zu halten, eine klare Erfolgsquelle.

Dennoch waren die Kausalketten, die die Determinanten mit der Projektleistung verbanden, unterschiedlich und es konnten keine Rückschlüsse auf allgemeine Erfolgsfaktoren für eine gute Projektleistung gezogen werden. Die Beziehung zwischen den Faktoren und der endgültigen Projektleistung (d. h. dem "Projektverhalten") war nicht "deterministisch", da die Ursachen oft auf besondere Weise entstanden und die Herausforderungen oft projektspezifisch waren.

Die EU kann den Entscheidungsprozess durch Bereitstellung strategischer (d.h. Festlegung von Prioritäten und Standards) und technischer Unterstützung (d.h. Festlegung der technischen Aspekte des Projekts wie der Bedarfsanalyse, Risikobewertung und Aspekte im Zusammenhang mit staatlicher Beihilfe und öffentlichen Aufträgen) unterstützen und somit hohe Eingangsqualität gewährleisten, um das Risiko zu vermeiden, dass die EU zu einem reinen Finanzanbieter wird.

Empfehlungen

Die koordinierten Bemühungen der EU und der Mitgliedstaaten, Projekte nach den strategischen Prioritäten der EU auszurichten und dringenden lokalen Verkehrsbedürfnissen mittels einem einheitlichen Regelwerk und methodologischer Verfahren gerecht zu werden, bieten eine einzigartige Gelegenheit zur Durchführung einer EU-weiten Bestandsaufnahme der öffentlichen Verwaltung und Evaluierung von Investitionen. Es ermöglicht den EK-Dienststellen, ein umfassenderes Verständnis und Wissen darüber zu gewinnen, wie EU- und nationale Strategien vor Ort geplant und umgesetzt werden. Es motiviert auch die Verwaltungsbehörden und Projektträger, den erwarteten sozialen Nettowert ihrer Investitionsprojekte systematisch zu bewerten und gegenüber den EU-Steuerzahlern Rechenschaft abzulegen.

Der strategische Dialog, der bei der Projektvorbereitung und -auswahl stattfindet, bietet den EK-Dienststellen die Möglichkeit, Einfluss auf die Art und Weise zu nehmen, wie solche strategischen Maßnahmen von den Mitgliedstaaten umgesetzt werden, zum Beispiel bei der Festlegung von Prioritäten oder bei technischen Verbesserungen zur Erfüllung bestimmter EU-Normen in der Infrastrukturplanung oder der Serviceverwaltung. Dieser Prozess des Dialogs und der technischen Unterstützung liefert wichtige Erkenntnisse, die sich leicht auf andere Projekte und Behörden in den EU-Mitgliedstaaten übertragen lassen. Wie aus dieser Studie hervorgeht, ist dies der maßgeblichste und relevanteste Aspekt des EU-Mehrwerts, der erhalten und weiter gestärkt werden sollte. Um dieses System und das Zusammenspiel zwischen der EK-Dienststelle und der VB zu verbessern, werden folgende spezifische Empfehlungen gemacht:

- **Die Erstellung von Verkehrs-Masterplänen, einschließlich eines Priorisierungssystems zur Identifizierung einer Projektpipeline, die auf Grundlage einer soliden Verkehrs-Bedarfsanalyse basiert, sollte in den "Anspruchsvoraussetzungen"[3] für die Finanzierung von Verkehrsinfrastrukturen mit EU-Mitteln aufgenommen werden**. Mit der Unterstützung der EU können Kapazitätsaufbau und institutionelles Lernen zur Projektvorbereitung und -auswahl entstehen, z.B. anhand durch einen engen Dialog mit und der technischen Unterstützung von einschlägigen Diensten (wie beispielsweise JASPERS). Diese Möglichkeit sollte von der VB während der Projektvorbereitung und -auswahl besser genutzt werden.
- **Die Analyse der Verkehrsbedürfnisse sollte auf robusten und aktuellen Verkehrsmodellen basieren**. Bei der Bewertung von Verkehrsprojekten sollte mehr Wert auf die Qualität der Verkehrsmodelle gelegt werden, die der Gesamtprognose zugrunde liegen. Zur Unterstützung der Verwaltungsbehörden kann die EK koordinierte Bemühungen zur Entwicklung nationaler und regionaler Verkehrsmodelle fördern, die den derzeitigen Guten Praktiken in diesem Bereich entsprechen.
- **Die Entscheidung, eine größere Verkehrsinvestition in ein Operationelles Programm miteinzubeziehen, sollte auch den potenziellen EU-Mehrwert berücksichtigen**. Dies sollte nach einem genau festgelegten Rahmen geprüft werden, insbesondere in dem auf die Prioritäten und Ziele der EU, zu denen das Projekt beitragen soll, hingewiesen wird oder in dem diskutiert wird, wie das ausgewählte Projekt ohne EU-Maßnahme aussehen würde.
- **Die EK spielte eine wichtige Rolle bei der Entwicklung und Empfehlung der Verwendung gemeinsamer Instrumente und Methoden zur wirtschaftlichen Bewertung von Projekten, und Verbesserungen sind in dieser Studie ersichtlich**. Sie sollte daher weiterhin die Harmonisierung und der Einsatz gemeinsamer Praktiken bei der Bewertung von Verkehrsprojekten fördern, die über das bisher Getane hinausgehen, um das Risiko eines Rückschritts von Harmonisierung und Austauschs guter Praktiken zu vermeiden.
- **Begleitausschüsse sollten bei größeren Verkehrsprojekten sicherstellen, dass ein solides Auswahlverfahren für die strukturierte Entscheidungsfindung vorhanden ist**. Die Auswahlkriterien für Vorhaben mit strategischer Bedeutung sollten auf fundierten und fristgerechten technischen und

[3] Im Programmzeitraum 2021-2027 werden die "Anspruchsvoraussetzungen " die "Ex-ante-Konditionalitäten" ersetzen.

wirtschaftlichen Analysen beruhen, einschließlich der Optionenanalyse und der Risikobewertung.

- **Es sollten spezifischere Anforderungen an die finanzielle Tragfähigkeit eingeführt werden**. Bei der ex-ante-Bewertung von Verkehrsprojekten sollte die Analyse der langfristigen finanziellen Tragfähigkeit nach dem Bauvorhaben stärker in den Vordergrund gerückt werden. Da die finanzielle Tragfähigkeit eines Projekts davon abhängt, wie das Projekt finanziert wird, sollte die finanzielle Struktur jedes Projekts in der ex-ante-Bewertung sorgfältig geprüft werden.
- **In der ex-ante-KNA sollten mindestens drei verschiedene alternative Optionen berücksichtigt werden**, einschließlich einer geringsten Einsatz- („dominium“) oder geringsten-Kostenaufwand-Option. Die Genauigkeit der Optionsanalyse-Phase bei der Entscheidungsfindung sollte gestärkt werden. Dies bedeutet auch, dass die Optionenanalyse bereits während der Projekt-Identifizierungsphase und nicht erst in der Entwurfsphase oder im Nachhinein durchgeführt wird.
- **Die Verwendung von KNA Ergebnissen bei politischen Entscheidungsprozessen und öffentlichen Debatten sollte gefördert werden.** Ein Vorschlag, um Anreize für eine qualitativ hochwertige Analyse zu schaffen und sie in der öffentlichen Debatte und für die Politikgestaltung zu nutzen, wäre die systematische Veröffentlichung von Machbarkeitsstudien, KNA und anderen Datengrundlagen, die der Finanzierungsentscheidung zugrunde liegen. Die Bereitstellung technischer Studien für die breite Öffentlichkeit, einschließlich der Presse oder zivilgesellschaftlicher Organisationen, mit detaillierten Angaben zu Kosten, erwarteten Vorteilen und Bedingungen für eine erfolgreiche Durchführung, kann die Transparenz und Rechenschaftspflicht gegenüber den Interessengruppen und Steuerzahlern erhöhen und die Aufgabe der technischen Bewertungen innerhalb des Prozesses betonen.
- **Die VB sollten die wichtigsten finanziellen und wirtschaftlichen Daten** (zumindest die Investitionskosten, Betriebs- und Wartungskosten, Verkehrsnachfrage mit angemessener Aufschlüsselung der Daten, Finanzeinnahmen) **für einen ausreichend langen Zeitraum** (mindestens fünf Jahre wären für eine aussagekräftige Anwendung erforderlich) **nach der Durchführung des Projekts speichern und sie den EK-Diensten zu Evaluierungszwecken zur Verfügung stellen.** Falls bei dieser Aktivität schwerwiegende Abweichungen von den ex-ante-Prognosen oder veränderte Rahmenbedingungen festgestellt werden, können ebenfalls zusätzliche qualitative Informationen nützlich sein. Die VBs sollten darüber informiert werden, dass ihre Projekte nach der Programmperiode von der Kommission einer Ex-post-Evaluierung unterzogen werden können und sie sollten bereit sein, solche Aufgaben durch Bereitstellung der erforderlichen Informationsgrundlagen zu unterstützen.
- **Die Mitgliedstaaten sollten systematisch ex-post-Evaluierungen von Großprojekten durchführen.** Es wäre im Interesse derjenigen, die ein größeres Verkehrsprojekt finanzieren, eine ex-post-Bewertung durchzuführen, nicht nur aus Gründen der Rechenschaftspflicht, sondern auch als wichtiger Lernprozess für die Entwicklung weiterer Projekte und zur Verbesserung des Entscheidungsfindungssystems. Die ex-post-Evaluierung schafft Öffentlichkeit für Entscheidungsträger, was sie dazu motiviert, sich an gute Regierungsführung zu halten und sich für ihre Entscheidungen verantwortlich zu fühlen.

1 METHODOLOGY

1.1 CONCEPTUAL FRAMEWORK

The objective of this ex post evaluation is to analyse the long term contribution of 10 projects in the transport sector implemented during the 2000-2006 or 2007-2013 programming periods in the European Union and co-financed by the ERDF or CF. In particular, the goal is to assess the long term contribution of major projects to the economic development, the quality of life and well-being of citizens, including also effects for the environment. A shortlist of 30 major projects financed in the above mentioned programming periods which are particularly relevant to the scope of this research was included in the Terms of Reference. Amongst these 30 projects, 10 have been selected for an in-depth analysis in the methodological framework described in this section.

The Conceptual Framework adopted in this study has been developed in line with the Better Regulation Guidelines to answer a list of evaluation questions included in the ToRs and further specified and organised in accordance with the study team's understanding. **The methodology developed to answer the evaluation questions consists of ex-post Cost Benefit Analysis complemented by qualitative techniques** (project site visits, interviews with stakeholders, press articles reviews, etc.), **combined in such a way as to produce a project history**.

The methodological framework has been designed by the Core Team on the basis of an extensive review of the relevant theoretical and empirical literature. From a long list of bibliographical references (see Annex 1 of the First Interim Report) the evaluation team has identified and shortlisted the most relevant and interesting papers and reviewed these. The literature that was shortlisted is summarised on a paper-by paper basis and reported in Annex 2 of the First Interim Report. The methodological framework has then been uniformly applied to all the 10 selected case studies. This homogenous approach allows to draw comparisons between different case studies and to gather common policy lessons.

The adopted methodology consists of four building blocks:

1) Mapping the effects
2) Measuring the effects
3) Understanding the effects
4) Synthesis and conclusions

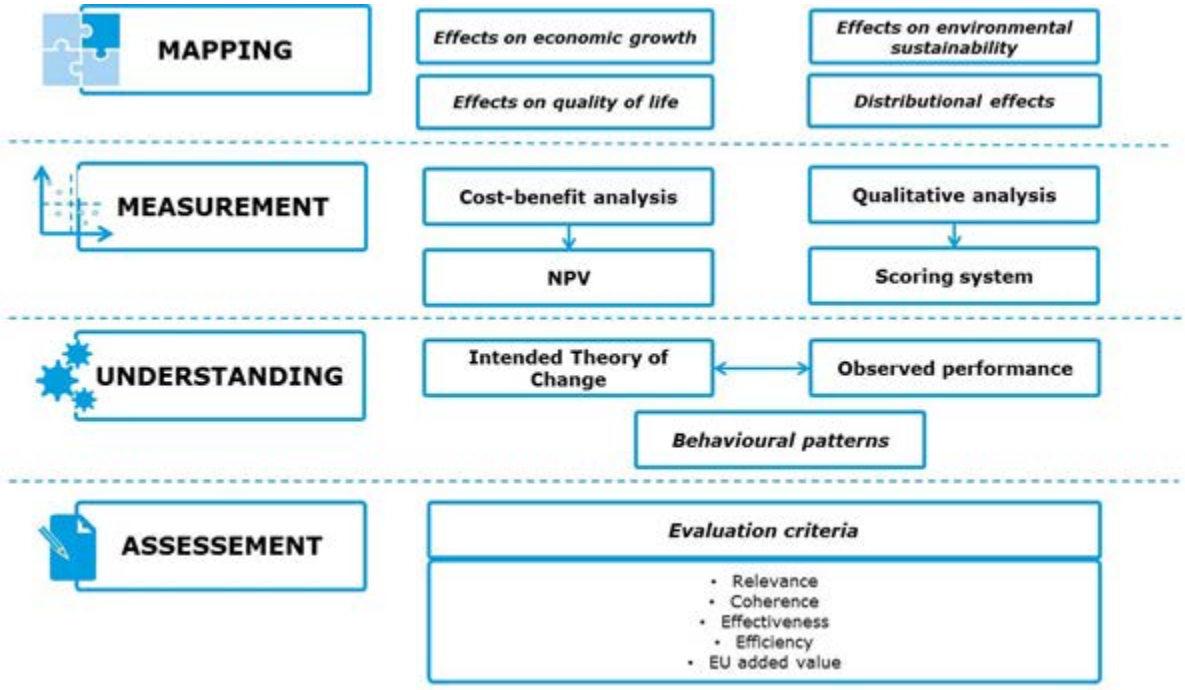
The first step is to **map the effects**. In principle, transport infrastructures can deliver a variety of long- and short-term effects. These need to be properly identified and their temporal dynamics and causal chains investigated. This responds to the "what" dimension of analysis and also discusses the timeframe of effects (the "When" dimension).

The second building block aims at **measuring the relevant effects**. This is done by a hybrid methodology including retrospective CBA and qualitative assessment. As far as possible effects are quantified and monetary values are attached to them for inclusion into a CBA model. When this is not possible a qualitative assessment is carried out to describe the effects. A scoring system then allows building a consistent metric of the effects.

After having duly identified and measured the different categories of effects, the third building block aims at **reasoning on elements which have determined the observed causal chain of effects to take place**. This relates to the "How" dimension. Finally, **qualitative and quantitative findings are integrated in a narrative way** in order to

assess each project according to the key evaluation criteria suggested in the ToR. Figure 1 below represents a schematised conceptual framework. The description of each building block will be provided in what follows.

Figure 1. Conceptual Framework



Source: Authors

1.1.1 Mapping the effects

Transport infrastructures contribute to the Cohesion Policy objectives by making free movement of people and goods throughout the Union more efficient, safer, reliable and socially and environmentally sustainable. In line with the ToR and the relevant literature, four broad categories of effects can be attributed to transport infrastructure projects:

- Effects on economic growth;
- Effects related to quality of life and wellbeing;
- Effects related to environmental sustainability;
- Effects related to distributional issues.

The first building block is aimed at identifying through a comprehensive literature review a well-defined list of potential effects and a common understanding of their nature. To enumerate the effects of a transport project, we had referred mainly to Mackie et al. (2014)[4]. Each of the above categories entails a shortlist of common direct effects, plus potential ancillary effects. These are briefly discussed below, while a more detailed description is available in Annex I.

Effects on economic growth

Investment in infrastructures contributes to economic growth through productivity effects. In the specific case of transport, most of the effects are related to **reductions in production costs, increases in accessibility and attractiveness of**

[4] Mackie et al. (2014) compared the project appraisal stems of several countries such as the Netherlands (Romijn and Renes Dutch Guidelines 2014), the United Kingdom (Department of Transport, 2016), Sweden, Germany, the U.S., New Zeland and Australia.

the region. In addition, an efficient transport system is a significant factor for international competitiveness as it attracts investment and trade. There are different groups of agents upon which economic effects may accrue (users, producers, and managers/providers of the infrastructure project).

The above-mentioned effects on economic growth might be captured by a number of measurable indicators. The most typical direct ones are:

- Travel time;
- Vehicle operating costs (VOCs);
- Reliability of journey time;
- Income for the service provider (producer surplus).

In addition, two main additional effects are identified:

- Wider economic impacts[5];
- Institutional learning.

Finally, transport infrastructure may contribute to economic growth with their potential impact on employment, particularly in terms of additional jobs directly attributable to the project. In the CBA, employment effects are captured by applying the shadow wage conversion factor to labour costs. If the shadow wage is below the market wage, it implicitly includes an employment benefit in the form of a social cost lower than the financial cost.

Effects related to quality of life and wellbeing

In line with Dasgupta (2001) and Stiglitz et al. (2009), the concepts of quality of life and societal wellbeing – which are considered as synonymous for the purpose of this study – refer to the factors **affecting social development and satisfaction as well as the perception of users and the society in general.** Effects on quality of life can be either positive or negative. For instance, a project can improve road safety by expanding an existent road while simultaneously having a negative impact on amenity and negatively influencing the perception of inhabitants. The most common direct effects of transport projects on quality of life are the following:

- Leisure travel time;
- Safety (accident savings);
- Security;
- Noise.

Furthermore, the following additional effects are identified:

- Crowding (only for public transport);
- Service quality (mainly for public transport);
- Aesthetic value;
- Urban renewal.

Effects related to environmental sustainability

The concept of environmental sustainability relates to **ensuring the needs of the present generation without compromising the environmental conditions of future generations** (Lee et. al, 2005). Transport infrastructure affects environmental sustainability in two opposite ways. On one hand, the expansion of transport infrastructures is negatively correlated with environmental sustainability as it may generate more polluting emissions and depletion of natural resources. On the other hand,

[5] See Chen and Vickerman, 2017.

more efficient solutions provided by improved transport infrastructure may help to address environmental issues.

Main effects of transport infrastructure will be in the form of:

- climate change (GHG emissions);
- local air pollution.

These externalities are included in the CBA according to the standard methodologies. Additional effects might be related to:

- Biodiversity;
- water pollution.

Effects related to distribution impacts

Distributional impacts relate to two main different concepts: Social cohesion and territorial cohesion. the former – which is defined as the allocation of the main benefits over income and social groups – can be positively or negatively affected by transport projects. For example, lowering the cost of transport may alleviate social inequality. The opposite may also apply (for instance with the introduction of a tolled road). Instead, territorial cohesion encompasses the allocation of the main benefits over central (core) and peripheral areas. By connecting different regions, transport infrastructures are likely to have positive effects on territorial cohesion as they address territorial gaps. Yet, their effect can also be negative as peripheral regions might be more exposed to competition (De Rus, 1995). Distributional effects are usually not included in the transport project appraisal. Following Martens et al. (2012), the approach taken in this ex-post evaluation is to assess access levels across areas, modes, and population groups.

Time and spatial scale of effects

Different effects need a different timeframe to materialise. This part of the analysis responds to the **"when" dimension**. It relates to the point in the project's lifetime at which the effects materialise for the first time (short-term dimension) and stabilise (medium- and long-term dimension). For instance, some direct benefits (such as reduction in travel cost, effects on air quality, noise and safety) fully materialise more or less in the first five years after project completion. Other effects, for instance on markets other than transportation and on the natural environment, may take more time to materialise. Thus, the temporal dynamics of each category of effects in case studies was assessed on scale ranging from mixed effect to very positive effect[6] in the short term (1-5 years), the long run (6-10 years), and future years. By doing so, it is possible to assess the intensity and the trend of a given effect throughout the project life-cycle.

Beside a distinction on the timescale of the effects, **different spatial scale levels** have been identified. Indeed, the effects of a major project also have a geographical scope involving broader or smaller areas. In general, project effects had been divided into:

- **Local effects** which concern the specific implementation area.
- **Regional effects** concerning the project impact on a broader area at a regional or metropolitan scale.
- **National effects** entailing impact with a nation-wide scope, which also depend on the size of the country.
- **Cross-border effects** which – by definition – concern more than one country and are likely to occur for projects affecting international corridors.

[6] The scale is sign-based ranging as follow: +/- = mixed effect, + = slight positive effect, ++= positive effect, +++= very positive effect.

1.1.2 Measuring the Effects

Quantitative and qualitative assessment

After an exhaustive overview of the existing evaluation techniques to assess long-term effects[7] of major projects, cost-benefit analysis has been selected as the most suitable for the following reasons:

- CBA is **the most suitable quantitative method** to investigate the details required to isolate the impact of an individual project.
- CBA is a reliable tool to express project benefits and externalities in **monetary terms.**
- Being founded in welfare economics, CBA **measures all impacts in terms of welfare changes.** This makes it possible not only to rank projects, but also to reach conclusions about their social desirability.

Given these considerations, CBA complemented by a qualitative analysis is the methodological option adopted for the present evaluation.

This approach allows taking into account the variety of effects which determines the long-term contribution of each project to socio-economic welfare. On one hand, the CBA approach allows to measure in the same unit (money) and then to aggregate the different effects produced by the projects (and balancing, for example, negative with positive effects). On the other hand, qualitative analysis is a helpful complementary tool when a proper monetization of effects is not suitable. More specifically, in terms of their measurement level, the effects can be distinguished into:

A. **Effects that by their nature are already in monetary units** (e.g. out-of-pocket transport cost savings). These can therefore be easily included in a cost-benefit analysis (CBA).

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 pollution)[8]. These effects can also be included in the CBA.

C. **Effects that can be quantified, but not in money units, for which there are no reasonably reliable conversion factors to money**. We have not tried to include such effects in the CBA, but discussed them in a qualitative way together with the overall outcome of the CBA.

D. **Effects that are difficult to measure in quantitative (cardinal) terms, but do lend themselves for ordinal measurement** (a ranking of the impact of different projects on such a criterion can be provided, such as very good, good, neutral, bad, very bad). These effects will be discussed in qualitative terms.

E. **Effects that might occur but that are subject to a high degree of uncertainty:** these will be treated as part of the risks/scenario analysis that will be included in the CBA.

[7] Other techniques are: macro-economic simulation models, input/output models, multi criteria analysis, cost-effectiveness analysis (CEA). For further details see: First Intermediate Report pages 17-20.

[8] 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

F. **Effects that might occur but that we cannot even express in an ordinal (ranking) manner:** they are residual effects that can be mentioned in the qualitative description of the case study report.

G. **All effects in A and B have been included in the CBA and they are the most significant share of long-terms effects.** Then, the outcome of CBA is complemented by evidence from C and D, while E and F are used for descriptive purposes. Structure and features of ex-post CBA

While the overall methodological reference for CBA is the DG REGIO Guide[9], **the Core Team had to slightly adjust it in order to take into account the mid-term perspective of the assessment**. Each of the case studies follows a common CBA approach described in this section.

As said, the selected projects have been operating for at least 5 years. This led to two main implications:

1. **The ex-post CBA can be 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.
2. As the CBA is carried out during the life time of the project, it has been necessary to adopt a **hybrid methodology which shares ex ante and ex-post perspectives** (i.e. backwards and onwards values).

More specifically, the intermediate perspective posed challenges to the treatment of key features entering in the CBA, as described in Table 1 below.

Table 1. Features of the ex-post CBA

Features	Definition
Time Horizon	The time horizon 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.
Current and real prices	In line with EC guidelines, the CBA is carried out at constant prices (2017). From an ex-post perspective, this means that past values (before 2017) are adjusted and converted into Euro at 2017 prices by using the yearly average percentage variation of consumer prices provided by the International Monetary Fund. As for data from 2017 onwards, they have been estimated in real terms (no inflation is considered).
Project identification	In line with EC guidelines, the identification of project is based on two criteria 1) self-standing, 2) pertinence. This approach led to the inclusion/exclusion of the following components: • Investment made and completed before project year 'zero' that are not functionally related to the existing infrastructure are treated as sunk costs and are not included in the CBA. • Preparatory works, site arrangements, environmental protection, and land use related costs are included in the CBA as they are necessary for the implementation of the project • Operating (as well as extraordinary maintenance) costs are included in the CBA.
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. Even though the ex-post perspective allows taking into account some unpredictable event occurred after the start of the project, this knowledge is ignored in the definition of

[9] European Commission (2014). Guide to Cost-Benefit Analysis of Investment Projects. Economic appraisal tool for Cohesion Policy 2014-2020, European Commission, DG Regio, Brussels.

	the counterfactual scenario (but not in the estimation of future values for both scenarios)[10].
Forecasting in 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	The Social discount rate (SDR) 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[11]. 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.
Standard Conversion Factor (SCF)	The SCF is used to adjust the cost of all inputs entering in the financial analysis for which a specific conversion factor is not available. Normally, the SCF is used only for correcting the financial prices of minor (non-tradable) inputs. 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.

Source: Authors

The suggested values for critical parameters (such as SDR, shadow prices/wages and unit values of economic benefits) and methodologies for their calculation are drawn from international literature (e.g. international European guides and cross-countries academic studies) and are included in Annex III of the First Intermediate Report (volume I). The provision of a set of harmonised data by the core team to case studies' authors **ensured methodological consistency and rigour**.

As a final remark on the ex-post CBA, it should be stressed that the main aim of this study is not verifying the ex ante CBA and/or discovering ex-post deviations from ex ante CBA but rather to analyse the long-term contribution of 10 transport projects. For this reason the methodology expanded beyond the mere comparison of the performance predicted by the ex ante appraisal with the one observed ex-post addressing the understanding of the reasons behind such deviations in a dynamic perspective. Understanding the dynamics of projects' performance is in fact the core goal of this study.

Qualitative analysis

Findings from the CBA are completed by qualitative analysis. The adopted qualitative techniques are documentary analysis, desk research, and interviews with stakeholders. 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.

[10] In other terms, the selection of the counterfactual should discard the effect of unpredictable event occurred after the ex-ante phase.

[11] See Annex II First Intermediate Report.

- Assessing possible alternative options.
- Collecting evidence on non-quantifiable effects and factors influencing project performance.

Effects investigated in qualitative terms are 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), see Annex II for the scoring system. The purpose of this scoring system is to intuitively highlight which are the most important effects generated for each case study, regardless the fact that they are measurable or not.

1.1.3 Understanding the effects

The third building block of the methodological approach entails **reasoning on the elements**, both external and internal to the project, **which have determined the observed causal chain of effects and influenced the observed project performance.**

Taking inspiration from the literature on the success and failure of projects, and particularly on costs overruns and demand shortfalls, and on the basis of the empirical evidence presented in European Commission (2012) **six stylised determinants** of project outcomes and their development over time have been identified:

- **Relation with the context** which includes considerations on the institutional, social and economic environment into which the project is inserted.
- **Selection process** which refers to the institutional and legislative framework that regulates how public investment decisions are taken.
- **Project design,** which refers to the technical capacity (including engineering and financial expertise) to properly design the infrastructure project.
- **Forecasting capacity** representing the possibility and capacity to predict future trends and forecast the demand level and technical challenges[12].
- **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.

It is worth noticing that these six stylised determinants **are highly interrelated and they may mutually reinforce or dilute each other**: a very unstable context is likely to obstruct the forecasting capacity; bad incentive mechanisms can negatively affect the project design. 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 represent common stories describing recurring pattern of performances, as well as typical problems that may arise and influence the chronicle of events. The list of stylized patterns – as provided by the First Intermediate Report – is shown in the table below.

[12] Forecasting capacity is related to the quality of data and the forecasting/planning techniques adopted. It also includes the ability of project promoter not to incur in planning fallacy nor optimism bias.

Table 2. Behavioural patterns archetypes

TYPE	DESCRIPTION
Bright star	This pattern is typical of projects where the good predictions made ex ante (both on the cost side and demand side) turn out to be accurate. Proper incentive systems are in place so that the project actually delivers value for money and success. Even in the event of exogenous negative events, the managerial capacity ensures that proper corrective actions are taken and a positive situation is restored.
Rising sun	This pattern is typical of projects which, soon after their implementation, are affected by inadequate demand or inadequate ability to provide expected services because of a combination of low demand forecasting capacity, weak appropriateness to the context, and weak technical capacity to design the infrastructure. However, due to changed circumstances or thanks to responsible management and good governance the project turns around to reap new benefits.
Supernova	This pattern is typical of projects for which the good predictions made ex ante (both on the cost and demand side) turn out to be accurate. However, due to changed circumstances or because of weak management capacity and/or governance the project eventually turns out to be unsuccessful.
Shooting star	This pattern is typical of projects starting from an intermediate situation and resulting in a failure. This outcome can be explained by a low forecasting capacity affected by optimism bias which yields a cost overrun. Then during project implementation, because of low managerial capacity and/or poor governance (also due to distorted incentives) corrective actions are not implemented, this leading to project failure. The situation is exacerbated if unexpected negative events materialise during the project implementation.
Black-hole	This pattern is typical of projects that since the beginning of their life fail to deliver net benefits. This is a result of a combination of ex ante bad factors (i.e. low technical capacity for demand forecasting, optimism bias, inappropriateness to the local context and bad incentives affecting both the selection process and the project governance) and careless management during the project implementation or bad project governance (e.g. unclear division of responsibilities, bad incentive schemes).

Source: Authors

These stylised patterns had been designed to be as comprehensive as possible. However, variation **on these patterns** emerged throughout the case studies analysis as a sort of **crossover or adjustment of the five original patterns**. Further details on these new patterns will be provided in chapter 4.

1.1.4 Final Assessment

Qualitative and quantitative findings are integrated in a narrative way, in order to develop ten project 'histories' and to isolate and depict the main aspects behind the project's long-term performance. A final assessment on each project is then conveyed in the case studies with an assessment structured along a set of evaluation criteria, as suggested in the ToR. Evaluation criteria are the following (see Annex III for a more in-depth description of criteria and scoring system):

- **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?).

1.2 SELECTION AND IMPLEMENTATION OF THE 10 CASE STUDIES

1.2.1 Review and selection of the case studies

The ten case studies were selected out of a list of 30 ERDF and CF projects on the basis of a review and a selection process briefly recalled here (full details are presented in the First Interim Report, Volume 2):

- **Projects review**. A preliminary screening of project documents has been carried out to determine whether a project was in a condition to be evaluated or not, i.e. whether its evaluation was justifiable, feasible and likely to provide useful information within the timeframe, resource constraints and operational objectives of the present study. This activity relied on: 1) **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; 2) **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; and 3) a **web/desk research** of the information and data publicly available (including project web-sites, press articles, reports and studies). The outcome of this activity was the production of a summary sheet for each of the 30 projects with a brief description of the key features of the investment.
- **Evaluability scoring.** The project review was complemented by an evaluability scoring system which aimed at guiding in an objective and consistent way the selection of case studies. In particular, the project evaluability has been assessed according to the 3 following broad criteria, each one with a different weight to express its relative importance in the project selection: 1) **strategic relevance for the evaluation purposes** (weighting 40%), i.e. the extent to which the project can contribute to answering the evaluation questions identified in the ToRs and in the conceptual framework; 2) **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 is already available, relevant and appropriate to the scope and purposes of the evaluation and of good quality; 3) **availability and willingness to cooperate by stakeholders and availability of information towards a project tailored theory of change analysis** (weighting 30%).
- **Projects ranking and selection**. The scoring allowed for ranking the projects and identified the most promising ones for each sub-sector, out of which the ten most suitable projects have been identified by adopting further selection criteria, including coverage of Member States, balance between sub-sectors, financing period, type of projects (new construction, upgrading, modernisation) and type of financing.

The result of the selection is a list of projects which constitute a purposeful set considering the ultimate scope of this study, which is not to pick-up the most statistically representative projects, but to consider 10 illustrative examples of infrastructure projects, that can provide a panorama of experiences suitable for developing interesting project narratives and drawing policy lessons. The project scores are included in Annex IV.

1.2.2 Implementation of the case studies

The operationalisation of the **methodology was implemented through** a self-contained toolkit (including detailed guidelines and a template for drafting the case

studies) prepared by the Core Team to guide the case studies' authors and the national correspondents in their work**.** In particular, the guidelines for case studies provide helpful suggestions on the **sources to be used for the quantitative and qualitative analysis** as well as the structure and the style of the case studies draft.

The qualitative-quantitative approach required national correspondents to use several sources of information. As a general rule, preference has been given to **official sources**, but independent reports, press articles, and perceptions and opinions of stakeholders proved to be a significant additional source of information. Concerning the data used in CBA, they are generally provided by:

- **Project documentation** prepared before the project implementation (such as feasibility studies, application forms, financing decisions, blueprints…).
- **Project managers/promoters** who usually have access to relevant project data (financial costs, number of users, timeframes);
- **Local stakeholders,** for instance environmental agencies for the quantification of emissions or other public authorities;
- **Independent evaluation studies**, if available;
- **Forecasting exercise by authors** based on observed data and supported by local stakeholders/managers;
- **Values included in Annex III** of the First Intermediate Report for the critical parameters in the CBA.

Field missions and in particular direct interviews[13] **have played an essential part in the assessment**. The Core Team recommended case study authors to carry out at least 20 interviews to relevant stakeholders. A total of 245 people have been interviewed. The list is highly diversified, including **civil servants** (national ministries and EC officials, managing authorities), **experts** (engineers and planners), policy makers (mayors, regional and municipal councillors), **users and citizens association, and journalists**. These interviewees were particularly helpful to grasp an overall perception of project effects and to understand its history. Moreover, **field missions enabled authors to observe in person each of the case study projects.**

Once qualitative and quantitative information was gathered, case studies' authors were asked to put together the evidence as to form a unique story. Each case study is considered as a self-standing document. The Core Team recommended authors to use a narrative drafting style stressing the importance of the storyline flowing through the text. In order to guarantee consistency, the Core Team developed a common case study template to be followed by case studies' authors.

1.3 WRAP UP SEMINAR AND CONCLUSIONS

A stakeholder seminar was an integral part of the methodology and aimed at discussing the preliminary evidence stemming from the ten case studies. The seminar was held on the 23th of March 2018 in Brussels and it was attended by 48 people, including policy makers, academic experts and local stakeholders. The main themes discussed in the seminar were:

- The drivers of the financing decision for major transport projects: technical and political considerations;
- EU Added Value of major transport projects financed by the ERDF:

[13] Interviewees were not structured by the Core Team and each case study author freely decided which topic to address with specific interviewees.

- Governance and financial sustainability.

In what follows the main conclusions stemming from the seminar are summarised.

- **Issues related to CBA**: several participants pointed out that CBAs rely on traffic models whose reliability depends on the underpinning assumptions and replicability. An example that was brought up was that a demand forecast for a transport project may be made on a single or duo-modal basis which does not reflect the inter-dependencies of all modal types; also, it almost always ignores potential future modal developments such as self-driving cars. Thus, there was consensus that there should be more focus on the quality of traffic models underpinning the CBA. As a matter of fact, CBA is only as good as the models feeding into it. In particular, it was stressed that local models cannot be used to forecast data to be used in the CBAs of projects with international relevance.
- **CBA Methodology improvements**: there was consensus that the CBAs carried out for EU Major Projects have improved over the last decade and that the standardization of CBA methodology across the EU allows for greater comparison between projects. It was argued that the frontiers of CBA can now be expanded to include benefits that currently are not included in most CBAs such as for example the travel time reliability, i.e. the reduced variation in journey times. Therefore, there is a need for experts to work out the technical advice on how to deal with the technical advancements in order to ensure coherence of methodologies and approaches adopted across the EU28
- **Strategic priorities and CBA**: CBA cannot be overloaded with considerations which expand far beyond its role. For example, CBA cannot be blamed for limitations that are linked to the projects themselves. CBA should be used as a technical tool to evaluate projects and discuss the results in the political debate. An important finding is that when CBA is taken seriously this is good for the project and the selection process
- **EU added value definition**: the discussion highlighted the difficulty of defining the concept of EU added value. According to the Better Regulation Guidelines the EU added value concept refers to changes which can be reasonably attributed to the EU intervention, over and above what could reasonably have been expected from national actions by the Member States (i.e. subsidiarity principle). However, this definition is perceived by many participants as too narrow. It was argued that EU added value can be decomposed into three dimensions: a) decisive support to implement the project, b) EU-wide effects of the project and c) future EU support to guarantee project success. From the beneficiary point of view, EU support materializes both in terms of finance provision and technical assistance on the project implementation.
- **Financing decision and EU added value**: the results of the study show that – in some cases – EU financial support was essential for project implementation while – in other cases- the projects would have taken place regardless of EU financial support. It was argued that the financing decision is clear if both EU support is necessary for a project to be initiated and the EU-wide effects of the project are high, and vice versa. However, it becomes more unclear if EU support is not necessary, but EU-wide effects are large, or if EU support is necessary, but the EU-wide effects are low.
- **Financing structure**: the decision on how the project will be financed is essential to guarantee financial sustainability. In turn, 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. Therefore, the most suitable financing structure, which ensures the minimisation of the financial burden of the project, should be carefully discussed in the project selection process on a case by case basis. Whatever the financing structure, disclosure of information is key to ensure transparency.

- **Financial sustainability**: several participants argued that the EIB and the European Commission services currently focus too little on financial sustainability in the operating phase when assessing the project ex ante. A life-cycle approach should rather be adopted.
- **Value of ex-post evaluation**: the ex-post evaluation is a useful tool as it incentivises decision makers to ensure good governance and to have a liability towards their decisions. Furthermore, it adds an extra-layer of transparency on the outcome of the project. Hence, there was consensus among the panellists that ex-post evaluation of projects should be done more systematically. In particular, evaluation is viewed as beneficial for Managing Authorities in order to build internal capacity to carry out ex-post evaluation of projects and to improve the project selection process.

2 OVERVIEW OF THE SELECTED PROJECS

The selected 10 case studies are listed in Table 3 below.

Table 3. List of selected projects

PROJECT	COUNTRY	SUB-SECTOR	EC FUND	PERIOD
Autobahn A14	DE	Road	ERDF	2007-2013
Rio Antirio Bridge	GR	Road	ERDF	2000-2006
M43 Motorway	HU	Road	Cohesion Fund	2007-2013
Saulkrasti Bypass	LV	Road	ISPA (Cohesion Fund)	2000-2006
Malaga Bypass	ES	Road	ERDF	2007-2013
Warsaw Line 8 modernisation and airport connection	PL	Rail	Cohesion Fund	2007-2013
Modernisation of rail track in Žilina	SK	Rail	Cohesion Fund	2007-2013
Tramway in Le Havre	FR	Urban transport	ERDF	2007-2013
Naples Metro Line 1	IT	Urban transport	ERDF	2000-2006
Gdańsk Tram	PL	Urban transport	Cohesion Fund	2007-2013

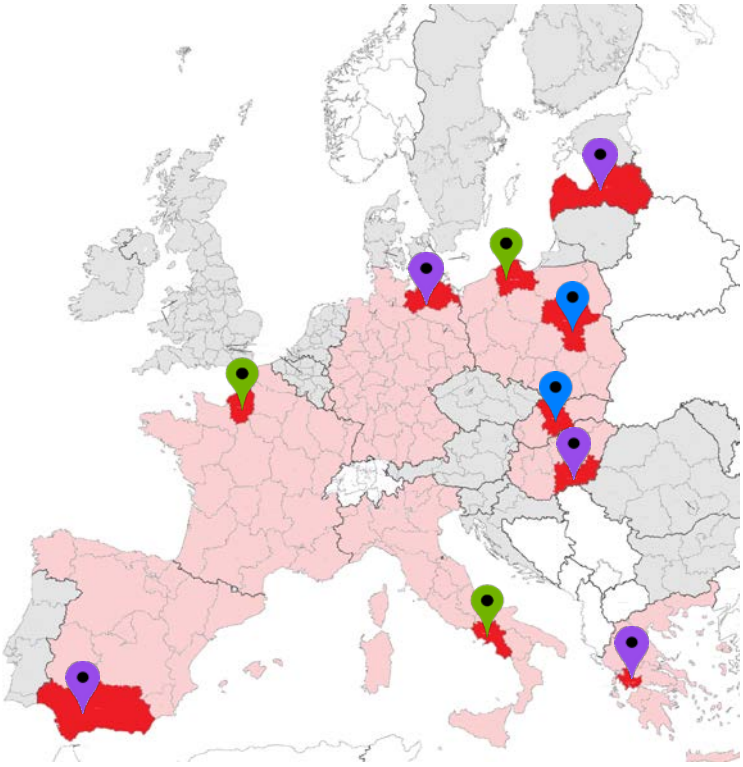
Source: Authors

This list is balanced across sectors, countries, and programming periods. In particular, it includes:

- **Five road projects** (two motorways, two bypasses and a bridge). The proposed case studies include furthermore an example of a cross-border road (in Hungary) and a PPP project (in Greece).
- **Two railway projects**. One is the **modernisation** of a railway line in Slovakia; the other one concerns both the modernisation of the train line n. 8 in Poland and the **construction of a new link interconnection** to the Warsaw Airport.
- **Three urban transport projects**, including the construction of an entirely new tram line in Le Havre and two extension or rehabilitation of an existing network/infrastructure (Naples and Gdańsk);
- Concerning the programming periods, three out of ten projects were financed under the period 2000-2006, the others in 2007-2013.
- As for geographical coverage the ten cases are localised in **nine different countries**. A good coverage of Western (ES, FR, DE, IT) and Eastern European countries (LV, PL, SK, HU) is also ensured.
- The ten selected projects cover different **typologies of regions in terms of economic development**. Six projects are located in Cohesion Countries (GR, LV, PL, HU and SK), the remaining four are located in Western Europe.

Figure 2. Location of the ten selected projects

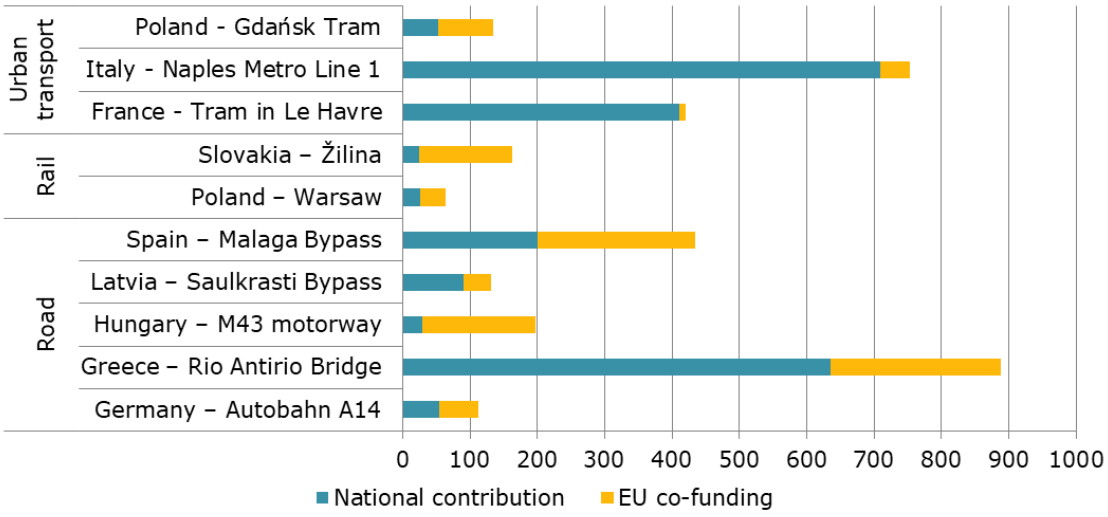
- **Road**
  - Germany –Autobahn A14
  - Greece – Rio Antirio Bridge
  - Hungary – M43 motorway
  - Latvia – Saulkrasti Bypass
  - Spain – Malaga Bypass
- **Rail**
  - Poland – Warsaw Airport connection
  - Slovakia – Railway Žilina
- **Urban transport**
  - France – Le Havre Tramway
  - Italy – Naples Metro Line 1
  - Poland – Gdańsk Tram



Source: Authors

- With respect to investment costs and funds coverage, **there is a wide range of project sizes** (see figure below) and magnitude of the **EU funding**.

Figure 3. EC co-funding and national contribution*



*Note: * in this graph the national contribution includes all the sources provided by various national entities to finance the project. Source: Authors*

In Annex V the ten selected projects are briefly presented.

3 PROJECT PERFORMANCE

In this chapter the performance of the ten projects is discussed according to the five evaluation criteria presented in Chapter 1 (i.e. relevance, coherence, effectiveness, efficiency and EU added value).

3.1 PROJECT RELEVANCE

Project relevance is a twofold concept. On the one hand, it relates to the extent to which the **project was in line with existing needs**. On the other, relevance is also intended as the project's **consistency with priorities established in the field at various levels (local / regional, national and EU).**

Table 4 below summarizes the result of this assessment in each of the 10 selected case studies.

Table 4. Scores for project performance (from 1 to 5)[14]

Sector	Case study	Score	Motivation
Road	Germany – Autobahn A14	2	The project relevance was undermined by **slow socio-economic growth** and **demographic decline** in the region, which resulted in limited demand. The project was in line with the broader national priority of better connecting East and West Germany.
	Greece – Rio Antirio Bridge	5	The project was highly relevant to the context as it **responded to a clear transport need**, i.e. connecting the two sides of the Gulf of Corinth**.** The project is located in a strategic area that connects several transport networks. It was highly consistent with National and European transport priorities.
	Hungary – M43 Motorway	5	**The project aimed to respond to relevant local needs**, that is, the elimination of one of the existing bottlenecks in the TEN-T corridor No. 4 and the improvement of the international accessibility of the country.
	Latvia – Saulkrasti Bypass	5	The project was highly relevant to the local needs given **the severe congestion of the main road through the town serving both local and long-distance traffic.** The project was included in a list of broad interventions carried out before Latvia joined the EU.
	Spain – Malaga Bypass	5	The project responded to the **urgent need to free up the highly congested old bypass.** It was included in several transport policy documents representing a National and Regional Priority.
Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	5	The project responded to the dual need to **modernise the public transport network** and **improve the capacity of the airport connections**. These needs were also included in the Warsaw Metropolitan City strategy.
	Slovakia – Žilina Railway Modernisation	5	The project was in line with the need **to modernise the railway system** in order to develop this section of the TEN-T core network in compliance with EU standards. Also, the project was in line with the EU priority to remove existing bottlenecks in rail corridors.

[14] The scores range from 1 to 5, as follows:
1= Since the beginning the project was not in line with the development needs and the priorities established at various levels; 2= Since the beginning the project was not in line with the development needs, but was in line with the priorities established at various levels; 3= At the beginning the project was not in line with the development needs and the priorities established at various levels, but over the years it was able to cope with changing needs; 4= At the beginning the project was in line with the development needs and the priorities established at various levels, but it was not able to cope with changing needs; 5= The project was, and over the years remained, fully in line with the development needs and the priorities established at various levels.

Sector	Case study	Score	Motivation
Urban transport	France - Le Havre tramway	2	The project aimed to provide low-income travellers with an improved means of transport and access to the city centre, various services and recreational facilities. However, it did not take fully into account that the existing situation did not pose significant problems of congestion or bottlenecks.
	Italy - Naples Metro Line 1	5	The project was relevant to the context as it **addressed long-lasting problems of mobility and congestion in the City of Naples**. The project was aligned with a broader transport policy adopted by the Regional and the Municipal Governments.
	Poland - Gdańsk Tram	5	The project was relevant in the context in which it was implemented, as it aimed to expand public transport in Gdańsk in response to **the rapid demographic and socio-economic growth of the city**.

Source: Authors

A key finding of the study is that **the relevance of the project is high when the main driver of the project is the aim to tackle well-identified and urgent transport needs** (see table below). In some cases, however, considerations more closely related to broader socio-economic development and urban regeneration needs were also part of the motivation for project implementation. In such cases, the relevance of the project is less strong because in the projects analysed the broader effects do not reinforce large transport effects.

Table 5. Relevance score per project

Sub-sector	Case study	Clear transport needs (congestion; safety; obsolescence ...)	Political will to maximise broad effects related to economic development and quality of life
Road	Germany – Autobahn A14	🔴	🟢
	Greece – Rio Antirio Bridge	🟢	⚪
	Hungary – M43 Motorway	🟡	⚪
	Latvia – Saulkrasti Bypass	🟢	⚪
	Spain – Malaga Bypass	🟢	🟡
Rail	Poland – Warsaw	🟡	⚪
	Slovakia – Žilina	🟢	⚪
Urban transport	France - Le Havre Tram	🔴	🟢
	Italy - Naples Metro Line 1	🟢	🟡
	Poland - Gdańsk Tram	🟢	⚪

Legend: 🔴 = No; 🟢 = Yes; 🟡 = To some extent; ⚪ = Not relevant;

3.1.1 Meeting urgent and long-lasting transport needs

The major finding emerging from the ten case studies is that the vast majority of projects aimed at solving well-identified existing development needs. In some cases, these needs were particularly **severe and urgent** calling for **immediate interventions.** For instance, in ***Malaga*** before project implementation the only way to by-pass the city, avoiding the city centre, was by means of an existing 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 served more than 180,000 vehicles per day and was nearing its full capacity. A similar case is the implementation of the ***Saulkrasti Bypass*** in Latvia. Before project implementation the existing road (a two-lane carriageway with a speed limit of 50 km/h) was the only route

crossing the full length of the town serving local traffic, public transport, as well as international and transit traffic. As a result, Saulkrasti town was one of the main bottlenecks of the Via Baltica Route in Latvia. In both cases, moving long-distance traffic away from urban centres was key not only in reducing the travel time of vehicles, but also in improving the quality of life of the local population in terms of reduced pollution and noise. In both cases, the projects implemented were well in line with development needs in the context in which they were implemented.

In other cases, **the project responded to long-lasting mobility issues.** Unlike the cases described above, these interventions were not imposed by a no-longer-sustainable situation, but rather by enduring structural deficit. For instance, the ***Rio Antirio Bridge*** was originally envisioned more than 100 years before as a direct connection between the Peloponnese and the Greek mainland, which 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 region- but also nationwide. Local policymakers had always recognised the need for an intervention, but the project was perennially delayed for technical reasons. Similar considerations apply to the ***Metro line 1 in Naples*** where traffic congestion caused levels of air pollution that were often above the legally admissible thresholds and measures to completely stop the circulation of vehicles often taken. The Rio Antirio and the Metro in Naples were specifically designed to respond to such long-lasting and documented needs.

In the case of urban transport projects **a common mobility need of expanding cities was to reduce congestion by offering rail-based public transport alternatives to individual or collective road-based transport.** Both Polish cases addressed this need, albeit in different ways. In ***Gdańsk*** the rapid economic growth and city expansion towards the outskirt led to an increase in the motorisation index and congestion in the city. The tramway expansion – included in GKPM Phase IIIA – aimed to reduce road traffic by providing an alternative efficient public transport solution. The same applies to the ***Warsaw line to the airport***. While the connection to the airport was already secured by bus and car/taxis, during peak hours the reliability of the journey was significantly low. Taking advantage of the foreseen rail modernisation in the region, the connection to the airport was developed as a response to the mobility need to improve reliability and sustainable urban transport.

3.1.2 Coping with evolving needs

A proper analysis of needs should be a starting point for any project implementation. This analysis must, however, be timely, since development needs evolve over time. Some case studies showed **that project relevance was highly influenced by timing and perspectives**. For instance, the ***A14 Motorway*** section between Schwerin-Nord and Jesendorf was originally planned in the early 1990s in order to complete the A14 highway corridor in Northern Germany. The closure of the gap in the existing infrastructure network and the need to sustain the socio-economic growth in the region after German reunification were perceived as relevant needs. However, when the new section eventually opened in 2009, most of the original needs had evolved in the meantime and to some extent faded due to slow socio-economic development and demographic decline. Although the final relevance assessment of the project is positive, the analysis shows that the highway is now running slightly under capacity and perhaps a different project alternative would have been more appropriate. **This example shows that, since needs**

are likely to change over time, projects may decrease and even lose their relevance.

3.1.3 Different perspectives of needs

A more critical situation is when the project's relevance depends on geographical/institutional perspectives. This is the case when frictions between local and broader needs occur. In ***Slovakia*** the modernisation of the railway line between Žilina and Krásno was part of the development of the Rhine-Danube and Baltic-Adriatic core network corridors. While the section is very relevant at EU level, being close to the borders with the Czech Republic and Poland, the local demand for railway services was expected to be limited due to its location in a scarcely populated area, thus limiting the possible local benefits. Instead, the ***Hungarian case*** shows that the construction of the M43 motorway towards the Romanian border, while contributing to the closure of the existing gap in the TEN-T corridor and improving the international accessibility of the region, also improved the quality of life of residents in the towns of Mako and Szeged as traffic does not now pass through the settlements, but outside the populated areas.

3.1.4 Broader development needs

In some cases the decision to implement the project was influenced by considerations related to **the wish to generate economic development by creating positive framework conditions and to 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. This is, for example, the case of the ***A14 Motorway***: German reunification played a decisive role in fast-tracking the project, because it was meant to **improve the connectivity and hence contribute to the wider socio-economic development of a former German Democratic Republic (GDR) region**. This investment would, therefore, also send a clear signal that the Federal Republic of Germany was willing to invest in the development of GDR regions. This support eventually led to the project being classified as an urgent need in national transport master plans. Likewise, in ***Le Havre***, the project was framed by the political desire of the then-mayor **to transform the image of the city as modern and attractive following the declining socio-economic trends of the 1980s**, and to align with current practices in urban transport in France towards the implementation of tramway systems as a modern and sustainable mode of transport. However, at the time of the implementation of the project, congestion and traffic were not critical in the city of Le Havre. Rather than being primarily designed to address urban mobility issues, the new tramway aimed to transform the image of the city. This latter example suggests that, in the absence of clear transport needs, the broad considerations in terms of economic development can be rhetorically and instrumentally attributed to projects with high political support and visibility. Conversely, there are cases where wider effects can reasonably be expected from projects with a clear transport need as well as a significant magnitude. This is, for instance, the case of the ***Rio Antirio Bridge***, a mega-project significantly altering the transport system in the region. To a lesser extent, the same ambitions were part of the motivations behind the implementation of the ***New Bypass in Malaga*** and the ***Naples Metro Line***. In the latter case, besides the need to cope with a congested city, **the intention to promote a broader urban regeneration strategy also by means of the Metro Line** was among the identified needs addressed by the project. The decision to include, as part of the work, interventions aimed at regenerating the surface public spaces near the metro stations, as well as the choice of creating *Art*

Stations i.e. built according to high architectural and aesthetical criteria including contemporary works of art both inside and outside the stations, was part of this wider strategy.

3.1.5 Alignment with national and/or EU priorities

It is important to recall that all major projects were included into an Operational Programme and, for this reason, expected to contribute to its strategic objectives. Moreover, they were always part of wider strategic sectoral plans aimed at achieving strategic transport objectives on the territory. Strategic alignment to national and EU objectives is therefore a condition that major projects must fulfil to access EU funds. This aspect has been further strengthened in the period 2014-2020 with the introduction of ex-ante conditionalities specifically addressing this point.

The analysis of the ten projects confirms that the majority of the case study projects were developed as a part of a larger network and thus they were part of wider local, regional, national or even international development plans. For example, the ***Metro in Naples*** had been part of the local 1997 urban transport plan and was also at the heart of a sustainable mobility and territorial development strategy at the regional level. The ***Malaga Bypass*** was given high priority by the Ministry of Infrastructure, which in 2005 included it in the national Strategic Plan for Infrastructure and Transport. The railway project in ***Slovakia*** was already included in an ambitious programme for the modernisation of the trunk railway network of the Czech and Slovak Republics before the accession of Slovakia to the European Union, and the programme was defined during the 1990s thanks to the involvement of the Delegation of the European Union. The ***Saulkrasti Bypass*** forms part of a multi-stage scheme to rehabilitate and upgrade the Latvian section of the Via Baltica Route, which was a priority not only at national, but also at EU Level. Actually, the project is in line with both the First (1996–2000) and the Second (2001-2006) Investment Programmes for the Via Baltica prepared on the basis of the Memorandum of Understanding on the Development of the Via Baltica signed by the Transport Ministers of the Baltic countries and the European Commission.

All the major projects examined matched priorities established either at the national or the EU level. In particular:

- Albeit to varying degrees, **all the selected projects have a specific European relevance. Six projects** (Saulkrasti Bypass; Rio Antirio Bridge; A14 in Germany; Railway modernisation in Žilina; M43 in Hungary; and the railway Line 8 in Poland)[15] are **part of the TEN-T network**. The three **urban transport projects are located in cities situated along the TEN-T network**. The Malaga bypass is part of the E-15 European network.
- **Road and railway projects tend to 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. The Saulkrasti Bypass and Žilina Railway Modernisation were included in national schemes. On the other hand, Naples Metro Line 1 was relevant to the 1997 Urban Transport Plan while the Gdańsk tram was included in the GPKM urban development programme.

[15] Only the last mile is part of the TEN-T

Including projects in wider transport or development plans, rather than implementing them in isolation, is a factor positively influencing their relevance. In fact, the needs assessment and the alignment of the project with such needs reflects a structured planning process, usually including a demand analysis with traffic models, a prioritisation process and the identification of feasible alternatives (more details about the selection process are discussed in Chapter 4 on the mechanisms and determinants of project performance). At the same time, strategic alignment can also be intended in a rather formalistic way. For example, it should be mentioned that strategic objectives described in Operational Programmes as well as sectoral strategies are generally so broad in nature and scope that there is wide room for Managing Authorities to claim that individual projects fulfil or contribute towards them. This can also be done with an ex-post rationalisation, as retrospective financing demonstrates (see below on this specific point).

3.2 PROJECT COHERENCE

Project coherence can be distinguished as **internal and external**. The former refers to the consistency between project components/features and the stated project objectives. The latter concerns project alignment and synergies with other national or EU interventions carried out in the same region or sector. The table below summarises the final assessment of project coherence.

Table 6. Coherence score per project (from 1 to 5)[16]

Sector	Case study	Score	Motivation
Road	Germany – Autobahn A14	5	The project is consistent with the overall strategy of closing the infrastructure gap between East and West Germany. Specifically, the project is coherent with the motorways A24 and A20.
	Greece – Rio Antirio Bridge	5	The bridge is coherent with the overall general strategic objectives of the national and European policies on transport and mobility. It is functionally well integrated with the operation of the main national and European strategic road network. It is also coherent with other interventions carried out for the Athens 2004 Olympic Games.
	Hungary – M43 Motorway	4	The objectives of the project fit in with the national development priorities as well as the EU priority to improve cross-border accessibility towards Romania.
	Latvia – Saulkrasti Bypass	5	The project is coherent with an overall national scheme to rehabilitate and upgrade the Via Baltica route on the main state road A1 between Riga and the Estonian border, which was, and still is, the busiest route in the country. It is also coherent with the need to divert traffic from towns to less densely populated areas.
	Spain – Malaga Bypass	5	The project is coherent with other interventions carried out in the same sector in Spain aimed at improved mobility. On the other hand, other local infrastructures may be needed to fully exploit the project's potential.

[16] The scores range from 1 to 5, as follows:
1= Not at all consistent
2= Poorly consistent
3= Partially consistent
4= Almost fully consistent
5= Fully consistent

Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	5	The project is coherent with the set of interventions included in the modernisation of the Warsaw Metropolitan Area. Moreover, the project is consistent with other infrastructural interventions carried out in view of EURO 2012
	Slovakia – Žilina Railway Modernisation	5	The project itself is a part of a wider intervention concerning railway modernisation. It is logically coherent with the broader European and national plans for the development of the TEN-T network.
Urban transport	France - Le Havre tramway	3	The project is coherent with national and EU objectives to promote a modal shift to more sustainable transport services. This aim, however, did not take sufficiently into account that the city in fact encouraged and still encourages car travel due to low congestion and availability of free or cheap parking (in areas where a fee does apply).
	Italy - Naples Metro Line 1	5	The project is coherent with other transport investment projects aimed at creating synergies among existing local transport modes and between local mobility infrastructures and national ones (i.e. high-speed railway network).
	Poland - Gdańsk Tram	5	The project is the third phase of a broader urban transport programme (GPKM) and is fully consistent with previous phases. In addition, the project is coherent with other interventions carried out in view of EURO 2012.

Source: Authors

Coherence is strictly correlated with relevance: findings show that coherence is high when the relevance is also high.

As far as internal coherence is concerned, **the project components are generally in line with the stated objectives for all the selected case studies.** In most cases the project features, and especially the selected alternative, was the most appropriate to address the identified need(s). Some degree of incoherence is found for the ***German motorway***, for which a slightly different road alignment could have better responded to the need to close the gap between the two motorway sections. However, the urgency in implementing an already delayed plan made it difficult to reconsider the original design and the project was implemented according to the probably sub-optimal technical option. ***Le Havre Tramway*** is another example of a not-so-coherent project, as described below.

As far as external coherence is concerned, **most of the projects are coherent with other interventions at various levels (EU, national, regional, local) in the transport sector**. This holds for projects with a clear national interest that are included in a National Operational Programme. For instance, the ***Žilina Railway*** modernisation and the ***Saulkrasti Bypass*** are coherent, respectively, with the broader strategy of rehabilitation of Slovakian railway system and the upgrading of the Latvian section of the Via Baltica and the broader state road network, as part of the TEN-T corridors. This is also true for urban transport projects such as ***Gdańsk Tram*** and ***Naples Metro***, which were implemented alongside other relevant interventions, both in the transport and in urban development sectors and included in Regional Operational Programmes. Both of them show significant coherence with previous phases of urban transport plans.

However, while coherence with broader priorities at EU or national level is generally ensured, such as encouraging modal shift or modernising the national transport system, **it is more difficult to guarantee coherence with more specific and context-related policies and interventions.** The case of ***Le Havre*** is significant in this respect: the objective to support the modal shift from car and bus was not in line with the existing

parking and mobility systems in the city, which rather provide an incentive for the use of private cars. Another particular case is the ***Malaga Bypass***. This was implemented by the Ministry of Infrastructure to improve the road service conditions for long-distance transport in the Malaga area, but it also aimed to provide a better connection to the city outskirts, including logistic and industrial zones. The coherence with regional and local interventions aimed at supporting the second objective was not particularly strong, while the project remained rather in line with national priorities of removing long-distance traffic from the city of Malaga.

The case studies show that mega-events such as the Olympic Games and the UEFA Tournaments trigger the realisation of transport projects. Supporting evidence is found in both ***Polish cases*** where the EURO 2012 became an opportunity to improve infrastructures. It also holds for the ***Rio Antirio Bridge*** – inaugurated a week before the Athens 2004 Olympic Games – whose first users were Olympic torchbearers. The pressure and political visibility of such events were beneficial in achieving a timely implementation of the project.

3.3 PROJECT EFFECTIVENESS

Project effectiveness assesses **to what extent a project has achieved the stated objectives and delivered the expected effects**. The expected long-term effects of transport projects span different dimensions: economic growth, quality of life, environmental sustainability and distributional issues. Measurable effects were included in the CBA while non-measurable effects were assessed through a qualitative analysis. This section is organised as follows: first, an overview of overall project effectiveness and main messages related to it are provided. Then, each category of effects is analysed bearing in mind the distinction between measurable and non-measurable effects. Finally, the timescale and nature of the effects are illustrated.

Before discussing the findings on project effectiveness it is worth remembering that the purpose of the present evaluation was not to compare ex ante and ex post CBAs for a number of reasons. First, the results of these assessments are not easily comparable, because even if they rely on the same broad principles and draw from established CBA methodology, there are often important differences between how they are calculated ex ante. The main differences may be in terms of:

- **Scope**: in the case of Naples, for example, the ex ante CBA did not include the tunnel excavation which was instead included in the ex post in accordance with the principle of the appropriate unit of analysis (the electrification of the line is functionally linked to the tunnel construction in order to deliver the expected benefits). In the Malaga case a significant change in the scope of the project was made after the submission of the ex ante CBA.
- **Parameters and unit values**: in an ex post perspective both forward and backward parameters were quantified by the core team according to EU benchmarks and consistently adopted throughout all the cases, in the ex ante phase the CBA relied mostly on national parameters not updated to today's values.
- **Methodological approach**: while in an ex post perspective the types of benefits included in the CBA were direct transport benefits, mainly time-savings and VOCs, in the ex ante CBA (for example, for the German motorway and the French tramway) significant benefits were included in terms of wider and socio-economic effects (including employment).

Deviation between ex ante forecasts and ex post data are by far the most interesting aspect of the ex post assessment because it verifies to what extent the ex ante predictions were realistic and sound. However, it is not always easy to isolate such an effect from the others mentioned here.

Second, pure ex ante/ex post comparisons are more telling from the technical and methodological points of view, regarding how to perform the CBA, than from the point of view of policy learning from project implementation.

Notwithstanding these caveats, and without attempting a one-on-one comparison, it is still worth mentioning that overall **the information basis included in the ex ante CBA and underpinning the project decisions was far more optimistic than the one resulting from the ex post assessment.** A generally more prudent and conservative approach in feasibility studies seems advisable, due to both the methodological choices and the actual deviations between ex ante/ex post performances.

3.3.1 Overview of project effectiveness

Table 6 shows the final assessment for each project's effectiveness together with the underlying motivation. Then sections 3.3.2 to 3.3.5 discuss the project's effectiveness under each of the four dimensions (economic growth, quality of life, environmental sustainability and distributional issues).

Table 7. Effectiveness score per project (from 1 to 5)[17]

Sector	Case study	Score	Motivation
Road	Germany – Autobahn A14	2	Despite a positive CBA, the project failed to fully deliver its expected effects mainly due to the low contribution to local economic development.
	Greece – Rio Antirio Bridge	4	The project achieved its stated objectives of reducing travel time between Peloponnese and the mainland. Although less documented, it also generated wider economic impacts on the region.
	Hungary – M43 Motorway	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.
	Latvia – Saulkrasti Bypass	4	The project achieved its main objectives of improving safety, reducing travel time, separating long and short distance traffic, diverting long-distance flows from more densely populated areas.
	Spain – Malaga Bypass	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 intervention and poor coordination between local authorities limited the project's wider economic effects.

[17] 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 in line with the foreseen time schedule. It turned out to be the best option among all feasible alternatives.
It is worth noting that in view of better reflecting the findings in terms of effectiveness stemming from the ten case studies analysed the interpretation of scores of this evaluation criterion has been slightly changed with respect to the scale presented in the First Intermediate Report.

Rail	Poland – Warsaw Line 8 modernisation and airport connection	4	The project achieved its objective to provide a reliable and comfortable alternative to buses and private vehicles to reach Warsaw airport.
	Slovakia – Žilina	3	The project achieved its objectives associated with the modernisation of the section in terms of infrastructure parameters. On the other hand, the modal shift effect is also attributable to factors exogenous to the project.
Urban transport	France - Le Havre Tramway	2	The expected transport benefits were not fully achieved as demand was below the forecasted level. Also, the project did not achieve its objective to bring about urban renewal.
	Italy - Naples Metro Line 1	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 is poor and needs to be improved in terms of frequency and reliability.
	Poland - Gdańsk Tram	4	The project achieved its objectives by reducing travel costs and increasing safety.

Source: Authors

Based on the table above, some general considerations can be made.

First, on average the **projects under assessment recorded positive results as they generally reached their stated objectives**. At the same time, it should be stressed that effectiveness is the criterion for which, on average, projects score the lowest (together with EU added value). No projects achieved the maximum score for effectiveness and, **while achieving most of the stated objectives, the vast majority of projects did not fully accomplish them.** Based on the evidence gathered ex-post, this limitation in the degree of achievement does not seem to be related to major problems in the implementation of the projects: none of them suffered major functional problems. To some extent this may be rather due to the fact that some effects may have not yet stabilised or suffer from a general postponement of the actual full materialisation of some intended effects. For example, the ***Naples Metro Line*** may have a positive upturn in the future when the necessary new rolling stock is purchased and the additional sections of the metro line are opened. However, in most of the cases, this underperformance in effectiveness rather suggests **widespread and systematic over ambition in target setting**. The impression is that the implemented projects were overburdened by expectations in many different directions, not only in terms of transport development. In other words, policy makers and project promoters were too optimistic in setting their targets about the effects in terms of socio-economic development, urban regeneration and other positive consequences that the implementation of the projects would have triggered on the local or regional context. In many cases, expectations were not realistic both in terms of potential benefits that the project could actually produce and the negative effects that may be also generated as side effects or externalities.

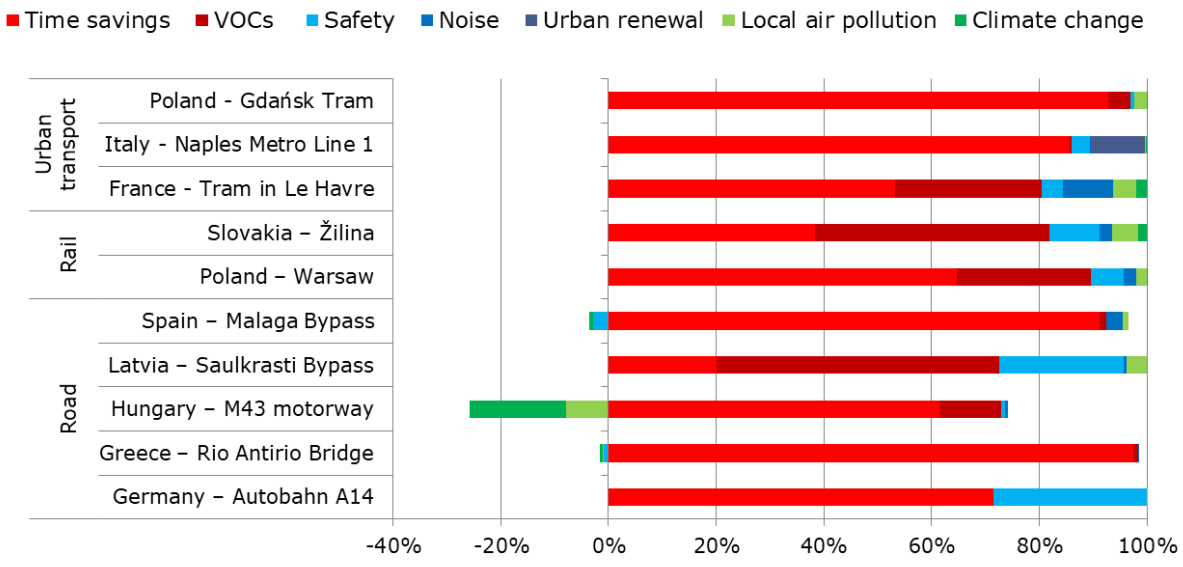
Second, the most effective projects were those responding to a clear transport need and providing significant transport benefits (especially in terms of travel time and cost reductions). Underperforming projects were those in which the key objectives of the project included wider effects as regards urban renewal or socio-economic development in the catchment areas. A significant contribution to wider effects can only be presumed (though not measured) for the ***Rio Antirio bridge,*** a mega-project significantly altering the transport system in the region. For other projects the ex ante expectations of wider effects were possibly not really justified given the nature of the intervention. This is the case of the ***German Motorway*** and the ***French Tramway***. To a minor extent this also applies to the ***Metro Line in Naples*** and the ***M43 in Hungary***,

where clearly defined transport objectives were central to the financing decision and the overall project concept, while objectives related to wider effects played an ancillary role. Again, the ***Malaga case*** shows that, while perfectly fulfilling the objective of saving time, a lower performance is recorded when looking at the capacity to support wider socio-economic development in the area, which would require additional and synergetic interventions by local authorities, and not only in the field of transport.

Third, findings clearly show that **cost-benefit analysis generally proved to be a suitable tool to describe the dominant aspects of project effectiveness.** Most projects' long-term effects were measurable and suitable for evaluation through a CBA.[18] Non-measurable effects, though identified and discussed, usually played a minor role in the overall long-term effects so that their assessment did not affect the CBA results. One exception is the ***German case***, where, with a positive CBA result, the final score for effectiveness is negative. This is due to the fact that the main objectives of the project were not strictly linked to clear transport needs, but rather to broader economic and political considerations in reunified Germany.

A notable example of long-term effects not included in the ex post CBA is that of wider effects, in particular socio-economic development or urban regeneration impacts expected to be triggered by the projects implemented. Study findings indicate they were usually minor effects of the projects (with the exception of the Rio Antirio and, to a lesser extent, Hungary M43 motorway) and this was not due to lack of data or apposite tools to appropriately include them into the CBA, but to the absence of solid evidence about such effects being linked and attributable to the projects studied within the period considered. Instead, lack of data was the main reason for not including reliability of journey time in the CBA, although it is in principle a quantifiable and valuable effect. For prudential reasons and due to the difficulty in obtaining reliable data, this effect was always discussed only in qualitative terms, even if it was a relevant aspect of project effectiveness. Other relevant, but not decisive, qualitative effects are institutional learning and social and territorial cohesion (see section 3.3.2).

Figure 4. CBA results – importance of effects (%)



Source: Authors

[18] The suitability relates both to the technical appropriateness and feasibility in terms of data availability.

Finally, related to the points above, as Figure 3 shows, **the main measurable benefits were those concerning travel cost:** travel time or vehicle operating costs (VOCs) are consistently higher than any other benefits for each project. In some cases, safety-related benefits were significant. Environmental externalities are marginal or – in the case of M43 – represent a significant economic cost. This finding is in line with the overall assessment of effectiveness pointing to the central role of direct transport benefits in long-term project effectiveness.

3.3.2 Economic growth effects

Six types of economic growth effects were identified. Case study authors were asked to evaluate them on a scale from -5 to +5, where the strength of the score reflects the weight that each effect carries in the final judgment of the project. The table below shows the score per project.

All the projects have positive effects in terms of economic growth. However, the nature and intensity of these economic effects vary significantly.

Table 8. Economic growth effects – score (from -5 to +5)[19]

Case study	Travel time	Vehicle operating costs	Reliability of journey time	Income for the service provider	Wider economic impacts	Inst. and Tech. learning
Germany – Autobahn A14	4	0	1	2	2	2
Greece – Rio Antirio Bridge	5	3	5	n.r.	2	5
Hungary – M43 motorway	5	3	4	3	2	4
Latvia – Saulkrasti Bypass	4	5	5	n.r.	n.r.	2
Spain – Malaga Bypass	5	2	2	n.r.	2	1
Poland – Warsaw Line 8 Modernisation and Airport Connection	4	3	5	n.r.	1	n.r.
Slovakia – Žilina Railway modernisation	4	4	5	n.r.	1	n.r.

[19] Note: the strength scores reflect the weight that each effect carries in the final judgment of the project.
In particular:
-5 = the effect was responsible for the negative performance of the project;
-4 = the effect provided a negative contribution to the overall performance of the project;
-3 = the effect contributed in a negative way to the performance, but was outweighed by other positive effects;
-2 = the effect had a slightly negative contribution to the project performance;
-1 = the effect was negative, but almost negligible within the overall project performance;
0 = the effect had no impact on the project performance;
+1= the effect was positive, but almost negligible within the overall project performance;
+2 = the effect made a slightly positive contribution to project performance;
+3 = the effect contributed in a positive way to the performance, but was outweighed by other positive effects;
+4 = the effect provided a positive contribution to the overall performance of the project;
+5 = the effect was responsible for the positive performance of the project;
n.r. = the effect was not relevant for the specific project;
No data = The effect was potentially relevant, but no evidence on impacts was available. This should only be used for relatively unimportant effects whose inclusion would not dramatically affect the overall assessment.

France - Le Havre tramway	4	4	3	0	0	4
Italy - Naples Metro Line 1	5	2	2	n.r.	No data	5
Poland - Gdańsk Tram	5	4	2	n.r.	2	2

Source: Authors

Travel time is the most influential effect in road and urban transport projects: in no case is travel time considered as a negligible effect. Reducing travel time was a primary objective for most of the selected projects and the relative high score (ranging from 4 to 5) shows that overall projects were effective in delivering it. In some cases, **travel time savings alone 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 CBA and **matched the ex ante expectations.** Users of the ***Rio Antirio Bridge*** now enjoy on average 40 minutes time savings compared to the ferry ride. The construction of the ***New West Malaga*** bypass led to significant travel time savings not only for its users, but also for those who still travel on the old bypass. Thanks to reduced congestion, vehicles using the old bypass in peak hours save, on average, 14 minutes, which is remarkable for an 11.4 km section of road. This case shows how transport projects can deliver significant benefits not only to their direct users, but also to other transport network users by relieving traffic congestion. The ***Gdańsk tramway*** users gained significant time savings as they shifted from congested road traffic to a tram system ensuring a frequent and reliable service.

In some other cases the reduction in travel time was not significant enough or could be diluted by other effects, thus hampering the overall positive performance of the project. The ***Le Havre Tramway*** delivered time savings (albeit a modest 1.5 minutes on average), but this hardly changes overall mobility in the city, especially considering that congestion was not a major problem previously. The inadequate service offered by the ***Naples Metro*** marred the 30 minutes average time saving as poor frequency and reliability discourage the use of public transport.

Reduction in Vehicle Operating Cost (VOCs) is the second significant effect in some of the projects, although in general with a more limited impact on project effectiveness compared to travel time. The ***Saulkrasti Bypass*** is the only project where VOCs is the dominant positive effect, even more than travel time saving. Before the implementation of the project, the poor state of the old road and the frequent congestion resulted in faster tyre and brake deterioration due to sudden decelerations. The case study's authors have estimated that 52% of total benefits arise from savings in VOCs for both light and heavy vehicles using the Saulkrasti Bypass as well as those remaining on the old road. Time saving is less significant in this case since it is relevant for vehicles using the bypass, but not for those remaining on the old road where the speed has remained 50 km/h.

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 as the modernised railway runs parallel to an old State road, which negatively affects VOCs. The ***Warsaw project*** granted VOCs benefits mainly to passengers, but also to people having to accompany departing passengers before project implementation.

Reliability of journey time is a crucial positive effect for urban transport when the project is effectively tackling severe congestion problems. This is particularly

evident in the case of the ***Warsaw project***. Before the implementation of the rail link to Chopin airport, the travel time from the city centre to the airport varied from 90 minutes in the peak hours to 15 minutes under normal traffic conditions. The new railway connection – every 30 minutes – provides a much more reliable service. In the case of the ***Le Havre Tramway***, the project provided a reliable journey time, but the effect on project performance was limited since congestion was rare before project implementation. Improved reliability was, in principle, one of the main expected effects of the ***Naples Metro Line 1*** project. While nowadays the metro can be considered a more reliable transport mode than private cars or buses, the journey reliability is negatively influenced by the current lack of trains, which often causes delays and long waiting times for the metro users. In ***Gdańsk*** the fact that 90% of tram tracks are separated from the road – which is also a result of the modernisation of the tramway lines – significantly increases the reliability of the tramway service.

Increased reliability is also important for road projects, especially for the ***Rio Antirio Bridge*** as ferryboat travel times were often subject to adverse weather conditions that caused delays of hours, sometimes days. Moreover, in road transport, **eliminating congestion has positive impacts not only on average travel times, but also on reliability.** The Saulkrasti and the Malaga bypasses are clear examples of this finding. In particular, by removing traffic from the old bypass, the New West Malaga Bypass increased, amongst other things, the reliability of the journey time to the airport as congestion became rarer.

Other effects considered under the category “economic growth” (i.e. income for the service provider; wider economic effects; institutional and technical learning) were on average **rather marginal**.

Wider economic effects tend to fall below expectations. In the M43 and A14 road projects, wider economic effects were among the major drivers of project implementation. In both cases, **the projects deliver slightly positive wider economic effects, but far below the expectations**. The ***M43*** fell short of inducing any substantial economic growth in the region and traffic demand remains below expectations; the ***A14*** showed that the project was unable or unsuited to achieve the wider objective of contributing to the socio-economic development of the region. This finding suggests that if the main priority underpinning the project is linked to achieving wider effects, without a clear relationship with transport needs, there is a high risk of not being effective.

Institutional learning is particularly significant in four cases: *Rio Antirio Bridge*, the *Naples Metro Line 1*, the *M43 motorway in Hungary* and *Le Havre tramway*. In Greece the Rio Antirio bridge, together with two other pioneering PPP initiatives in the transport sector (i.e. the Athens Eleftherios Venizelos International Airport and Attiki Odos), contributed to changes to policy and practice within the Greek administration in the way public works are assigned and carried out, which later proved to be very useful for other large-scale projects. The Transport Plan of Naples, including the section of the metro under study, was based on an innovative approach to planning and designing transport systems, currently acknowledged as a successful experience. It was based on a dynamic decision-making process where stakeholder engagement and the management of trade-offs were crucial. Thus, the institutional learning effect relies on having managed a complex and multi-agent decision-making process. Hungary experienced a different effect inasmuch as institutional learning took place at the municipal level, and public officials reported that they had obtained important knowledge about the processes of land expropriation, project management and decision-making in development plans. The

project also contributed to the better preparation of other major EU-financed projects. A similar institutional learning effect also occurred during the planning of the Le Havre tramway where the City of Le Havre and the project manager were able to gain experience and professionalise their practices in terms of managing public consultation processes, organising land acquisitions, conducting tendering procedures and streamlining decision-making processes.

Technical learning effects are observed in particularly complex projects. In these cases, the technical knowledge acquired during the construction and the management of the project can be considered beneficial. This is particularly evident in the ***Rio Antirio Bridge***, which is widely recognised as an **engineering masterpiece,** and in the construction of the examined section of ***Naples Metro Line 1***, which required deep excavation in hostile environments. A similar, but smaller, learning-by-doing effect is also present in the ***Malaga Bypass***, which included the construction one of the viaduct's largest sill plates in recent years.

3.3.3 Effects on quality of life and well-being

Effects on the quality of life and well-being refer to the factors affecting social development, the level of social satisfaction, and the perceptions of users and the general population. The table below shows the weight of these effects on the project's overall judgement.

Table 9. Effects on quality of life and well-being (from -5 to +5)[20]

Case study	Safety	Security	Noise	Crowding	Service quality	Aesthetic value	Urban renewal
Germany – Autobahn A14	3	n.r.	0	n.r.	1	n.r.	n.r.
Greece – Rio Antirio Bridge	-1	n.r.	-1	n.r.	5	n.r.	n.r.
Hungary – M43 Motorway	1	n.r.	3	n.r.	2	n.r.	n.r.
Latvia – Saulkrasti Bypass	4	n.r.	3	n.r.	3	n.r.	n.r.
Spain – Malaga Bypass	-2	n.r.	2	n.r.	n.r	n.r.	n.r.
Poland – Warsaw Line 8 Modernisation and Airport Connection	1	2	2	n.r.	2	n.r.	n.r.
Slovakia – Žilina	2	2	2	n.r.	4	n.r.	n.r.
France - Le Havre	3	0	3	3	5	3	3
Italy - Naples Metro Line 1	3	4	1	-1	-4	3	4
Poland - Gdańsk Tram	3	2	1	n.r.	3	n.r.	n.r.

Source: Authors

The table shows some interesting general findings.

[20] See the scoring system for economic growth effects

On average effects on quality of life and well-being contributed positively to project performance. However, their **impact is more limited** than the economic growth effects, almost never attaining the highest scores. Only noise and safety effects were quantified and included in the CBA, but their weight on total benefits is, in most cases, marginal. Second, **in a few cases effects on quality of life are negative.** This is the case for safety, but also for noise and service quality. However, positive effects occur much more frequently and are often stronger.

Project impact on safety (intended as the change in the number of accidents) is arguably the most significant of the quality of life effects. This effect was included in the CBA for all projects and – in some cases – it carried a remarkable weight on overall project results. This is particularly evident when the new project has a higher safety standard than the existing infrastructures. For instance, one of the major objectives of the ***Saulkrasti Bypass*** was to increase safety by moving long-distance traffic, especially trucks, outside the city centre and improving the technical conditions of the surface of the old road. In the first year of operation of the Saulkrasti bypass, the number of accidents on the old road decreased from 14 to 8. This effect was captured by the CBA as safety made up 23% of the total benefits. A similar effect also occurred thanks to the construction of the ***A14 Autobahn***. Being a motorway, the A14 has a four-lane and direction-separated design that guarantees greater safety than secondary roads. The same applies to the ***M43 motorway*** in Hungary that diverted traffic from urban settlements, thus reducing the risk of accidents.

The construction of new road infrastructure may have a slightly negative effect on safety (in terms of accidents). **This may be caused by increased traffic in the future travelling at a higher average speed.** For instance, the ***Malaga Bypass*** slightly reduced accidents on the old-bypass as the road became less congested. On the other hand, induced traffic using the new bypass and a higher average speed (often above the legal limit) are likely to cause more severe accidents.[21] As emerged from the CBA, this latter effect outweighs the former resulting in a slight economic cost in terms of safety. A marginal, albeit not insignificant, negative safety effect is also found in the ***Rio Antirio Bridge*** analysis. In this case, the negative safety effect (quantified in the CBA as -0.6% of total benefits) is caused by induced traffic: by generating higher traffic, the Rio Antirio Bridge makes accidents more likely simply because there are more vehicles.

Finally, **projects encouraging a modal shift (such as railway and urban transport) have a positive effect on safety.** Even though the decrease in road accidents in the areas was not fully attributable to the projects themselves, a rather clear correlation emerged in all the selected cases.

By definition, security effects are relevant only for railway and urban transport projects (See First Intermediate Report Vol. I). As a general rule, **this effect is quite marginal and it has never been included in the CBA.** In the ***Naples Metro Line 1*** project monitoring and control systems of the areas inside and outside the stations increased the users' perception of security in a city with high rates of reported petty crime against passengers. In the two railway projects, security measures were implemented in order to minimise risks for users. The modernisation of the railway in ***Žilina*** was accompanied by the replacement of obsolete signalling and communication equipment with automated services. Conversely, in the case of the modernisation of the

[21] Evidence of correlation between traffic features (vehicles, speed and congestion) and accidents is provided by Marchesini and Weijermars (2010) which proved that congestion decreases the risk of fatalities and severe injuries and increases the risk of minor injuries.

Warsaw Line 8, accessibility problems at the Warsaw Służewiec station were noticed: in the peak hours, the station is used by a significant number of passengers who leave the station by crossing the railway lines to avoid exit queues. While variants to solve this issue are currently under discussion, the project managers installed safety barriers as well as "no passage" signs in order to protect users' safety.

Noise related effects are relevant for all the selected projects and they were always included in the CBA. However, **their weight on the projects' overall performances 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. The CBA is a suitable tool to grasp welfare benefits deriving from this shift as the monetised social cost of noise externalities varies according to the size of the population in the area. 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 one crosses the city centre. A very similar effect is also found in the ***Saulkrasti Bypass*** and in the ***M43*** between Makó and Szeged.

The reduction in noise externalities is a rather marginal effect for urban transport and railway projects. In most cases, the reduction in noise was an indirect negligible effect linked to the decreased congestion in the area (this holds for Naples, Gdańsk and Warsaw). In the case of the Le Havre tramway and the new Gdańsk tram loop, some citizens openly complained about the noise created by the project itself. However, the CBA showed that this negative effect was offset by a significant reduction in traffic-jam noise.

The crowding effect is relevant only for one project, namely the ***Le Havre Tramway***. Buses in Le Havre were often over-crowded. Users suggested that the tramway eased crowding thanks to the larger capacity of the vehicles and the increased frequency of the service.

The service quality effect is relevant in many projects and has an influence on the overall performance of the projects in both positive and negative ways. The two opposite cases of Le Havre Tramway and the Naples Metro Line 1 are peculiar in this respect. According to surveys, users of the ***Le Havre Tramway*** were largely satisfied with the service quality of the overall public transport 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 project performance. According to local stakeholders, the current frequency of the metro service is too low and inadequate to satisfy mobility demand in the city of Naples. Due to a substantial lack of trains, frequency in peak hours is significantly lower compared to national and international averages.[22] The low frequency of trains is negatively affecting the perception of users with respect to service quality. The highest score for service quality was reported by the ***Rio Antirio Bridge***, where evident benefits were created by the direct bridge connection replacing the ferry connection that was of a much lower quality in terms of both comfort and frequency.

The effects of aesthetic value and urban renewal were relevant only for the Naples Metro Line 1 and the Le Havre Tramway, which were strictly linked to the local urban development strategy. The *Art Stations* in ***Naples Metro*** along with

[22] The metro service intervals in major European cities range between 2 and 5 minutes. In Naples, trains pass once every 10 minutes.

interventions of urban regeneration in the areas close to the metro stations were perceived as a good chance to address urban decay in deprived areas. This led to a documented increase in real estate value in the stations' catchment areas (i.e. 500 square metres around the station). Case study authors used the hedonic price method to monetise this urban renewal effect by observing percentage changes in real estate prices in the relevant areas. The urban renewal effect amounted to 10% of the total benefits included in the CBA and was the second most significant benefit for this project after travel time savings.

Urban renewal effects were also expected as a consequence of the construction of the ***Le Havre Tramway***. However, it delivered mixed aesthetic value. On the one hand, the project contributed to improving the image of the city through the façade-to-façade restoration of the streets, planting of new trees, and a modern-design tramway. On the other hand, the visual aspect of overhead cabling provided negative effects. The result is that, not only do real estate prices not show any increase, but estate agents reported that noise and vibrations related to tramway circulation may even have had a negative impact on housing values.

Admittedly, this effect may be difficult to assess for a matter of attribution: it is difficult to "isolate" the contribution of specific projects to urban regeneration objectives when they are included in broader urban development strategies. For this purpose, **demanding and technically sophisticated tools need to be put in place to rigorously assess the aesthetic value and urban renewal effect** of a project. For the ***Naples project***, several studies were carried out in order to estimate the willingness-to-pay of citizens making use of contingent valuation methods as well as counterfactual impact assessments for hedonic price measurement.

3.3.4 Effects related to environmental sustainability

Environmental sustainability requires ensuring the needs of present generations without compromising the environmental conditions of future generations. Scores for individual effects are reported in the table below.

Table 10. Environmental sustainability effects – score (from -5 to +5)[23]

Case study	Local air pollution	Climate change	Biodiversity
Germany – Autobahn A14	0	1	no data
Greece – Rio Antirio Bridge	-1	-1	n.r.
Hungary – M43 Motorway	2	-3	no data
Latvia – Saulkrasti Bypass	3	0	n.r.
Spain – Malaga Bypass	1	-1	n.r.
Poland – Warsaw Line 8 Modernisation and Airport Connection	2	1	0
Slovakia – Žilina Railway Modernisation	2	1	n.r.
France - Le Havre Tramway	3	2	n.r.
Italy - Naples Metro Line 1	1	1	n.r.
Poland - Gdańsk Tram	2	1	n.r.

Source: Authors

The findings of the study indicate that projects only have marginal effects on environmental sustainability: projects neither deliver significant environmental

[23] See the scoring system for economic growth effects

benefits nor do they cause severe environmental externalities. However, there are interesting sectoral trends:

- **Road projects 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 the traffic outside inhabited areas.
- **Railway and urban transport projects did 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 non-relevant and, in a few cases, only marginal.**

Local air pollution and climate change are the most significant environmental effects and they have been consistently included in each of the ten CBAs. Local air pollution concerns the change in the emissions of pollutants (such as $PM_{2.5}$, NO_X, NMVOC and SO_2) while climate change concerns the emissions of Greenhouse Gases (GHG). It is worth remembering that while GHG emissions have a global impact, air pollutant emissions have local impact and thus their effects are limited to the project's surroundings.

Transport projects are likely to generate both positive and negative environmental externalities. The positive ones derive from shifting traffic to less populated areas or encouraging modal shift to more eco-friendly means of transportation. **The traffic shift from populated areas (such as city centres) 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 city centre to a suburban area. A similar effect was recorded for the ***Malaga Bypass*** even though it had a relatively smaller impact. The CBAs captured this positive effect as the shadow price of air pollutants is significantly higher in urban areas than in sub-urban areas.[24] On the other hand, **the modal shift promoted by urban transport and railway projects only brings limited positive effects on local air pollution**. Such projects have a positive effect on local air pollution, but their impact is relatively marginal amounting to a maximum of 4.7% of total benefits, for example, in the Le Havre Tramway case. Negative effects on local air quality may instead be caused by induced traffic, as in the case of the Rio Antirio Bridge and M43 Motorway.

Effects on climate change are even less significant than those on air pollution. Shifting traffic away from inhabited areas does not have any effect on climate change. In addition, **the positive effects on GHG emissions linked to the reduction in travel time are typically offset by negative effects related to the traffic generated.** This explains why GHG effects are either neutral or negative for road projects. This is particularly evident in the ***M43 Motorway*** where the induced traffic and higher average speeds led to an increase in GHG emissions, i.e. GHG externalities were quantified at -EUR 238.5 million, which was a significant social cost for the project. Projects encouraging modal shift (urban transport and railway) deliver marginal positive effects on climate change.

Biodiversity effects were marginal or irrelevant in the ten 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.

[24] See First Intermediate Report (Vol. I) Annex III, page 85.

This was the case for all of the urban transport projects. In some cases, environmental measures were incorporated into the project in order to minimise negative impacts. For example, the construction of the ***A14 Autobahn*** raised concern amongst environmentalists as the road crosses natural habitats for migratory birds and amphibians. Thus, amphibian tunnels were built in order to mitigate potential negative effects. A similar case occurred in the construction of the ***M43 Motorway*** that occupies about 1.7 million square metres of natural habitat. The environmental countermeasures included five game crossings (ecoducts) and consequently the EIA concluded that the project does not significantly affect biodiversity. In both cases, the lack of data did not allow a reliable assessment of the biodiversity effects on environmental sustainability, but they were in any case considered marginal or nil.

3.3.5 Distributional effects

As described in Section 1, transport projects may have impacts on both social and territorial cohesion. These effects are not usually included in project appraisal and the methodology laid down in the First Intermediate Report (Vol. I) suggests their qualitative analysis. **While relevant for most of the ten selected cases, distributional effects do not generally have a significant impact on overall project performance.**

Table 11. Distributional effects – score (from -5 to +5)[25]

Case study	Social Cohesion	Territorial Cohesion
Germany – Autobahn A14	0	1
Greece – Rio Antirio Bridge	3	3
Hungary – M43 Motorway	1	0
Latvia – Saulkrasti Bypass	n.r.	3
Spain – Malaga Bypass	n.r.	2
Poland – Warsaw Line 8 Modernisation and Airport Connection	1	1
Slovakia – Žilina	1	1
France - Le Havre	4	0
Italy - Naples Metro Line 1	5	5
Poland - Gdańsk Tram	3	4

Source: Authors

Urban public transport projects have a positive effect on social cohesion. In the case of the ***Le Havre Tramway***, the effect essentially materialised by ensuring a better connection to the city centre for the suburban areas where most of the low income population is located. The ***Naples Metro Line 1*** and the ***Gdańsk tram*** increased social cohesion by providing a more accessible service to elderly and disabled users, either by equipping the metro line with elevators or escalators or replacing old trams with new low-floor rolling stock. This is also relevant for 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. Social cohesion effects were remarkable in ***the Rio Antirio project,*** where, according to research carried out by the Observatory in Patras (POADEP), besides delivering overall positive effects on economic development, it caused greater benefits in less developed and socially excluded areas (example Aitoloakarnania) rather than in urbanised and richer areas (example

[25] See footnote page 41.

Achaia). In the case of the ***M43 Motorway***, effects on social cohesion are mixed: the new infrastructure will improve overall accessibility, but services on existing local road No. 43 will gradually disappear. The balance of these two events will result in marginal positive social cohesion effects attributable to the project.

All types of transport sectors make a positive contribution to territorial cohesion. These effects were particularly significant for the Rio Antirio Bridge, the Naples Metro Line 1 and the Gdańsk Tram. In Greece, the construction of the ***Rio Antirio Bridge,*** which connects the two sides of the Gulf of Corinth, opened up a whole new set of trade and travel opportunities from mainland Greece into the otherwise remote Peloponnese. In the ***Naples case***, the project connects the hilly area of the city to the historic city centre improving the previously scarce penetration of the metro in the city. In ***Gdańsk***, the expansion of the network towards the suburbs represented a considerable improvement in connectivity and territorial cohesion as it contributed to reducing the unequal distribution of resources and opportunities among districts. Similarly, the ***Saulkrasti Bypass*** contributed significantly towards the development of more accessible and connected populated areas in the northern part of Latvia and towards connecting the Baltic States. In some cases, **territorial cohesion effects were less than expected**. ***Le Havre Tramway*** was conceived as a tool to accrue territorial cohesion in the urban area. While it did deliver some positive effects within the city centre area, it did not change the transport habits of citizens living on the outskirts who still preferred to use their own cars. The implementation of the ***Malaga Bypass*** positively impacted on territorial cohesion as it serves the northern outskirts, which were previously outside the old-bypass catchment area. However, the lack of infrastructures linking local inner roads to the bypass limited the effect. Small territorial cohesion effects were found also in the ***Warsaw Airport Connection***: as it is integrated into the urban, regional and long-distance railway network, the new connection benefits both residents located in the Warsaw metropolitan area and Masovia region, as well as airport passengers wanting to reach Warsaw by train and coach.

3.3.6 Time scale of the effects

The above-described effects can take different times to materialise and stabilise. Some of them are typically **short-term and others more long-term**. The timing dimension is closely related to the causal mechanisms through which projects can produce a change, especially in people's behaviour. In theory, **direct transport benefits generally materialise in the short term** (within five years of project completion). On the contrary, **effects on other markets** (goods production, land markets, labour market) usually **take longer to materialise** because they are linked to the relocation of activities (e.g. housing, productive centres) and the change in the pattern of origins and destinations. This was **generally confirmed** by the ten case studies, even though with some nuances.

The main findings are the following:

- On average, **economic growth effects** (especially travel time savings, reduction in vehicle operating costs and noise reduction) **were already visible in the short-term, although not always to their full potential**. In the majority of cases there is an expectation of future changes in such effects (see Table 11).
- Effects on **quality of life as well as on environmental sustainability** (see Tables 12 and 13) **appear to have materialised** to a great extent. Future changes in demand can still influence such effects, but in a more limited way than for economic growth.

- Effects on secondary markets – which have been rather limited up to now – may finally materialise in the long-run. This is particularly true for **"wider economic effects"** which are more likely to be observable in the future. In general, they **may materialise only if additional intervention synergetic with the implemented projects is carried out in the project's catchment area**.

In what follows, the time scales of each category of effects are presented and discussed in more detail.

Economic growth effects

Table 12. Time-scale of economic growth effects

Case study	Short-run (1 - 5 years)	Long-run (6 - 10 years)	Future years
Greece – Rio Antirio Bridge	+++	+++	+++
Slovakia – Žilina Railway modernisation	+	+	+
Italy - Naples Metro Line 1	+	++	+++
Germany – Autobahn A14	+	+	++
Hungary – M43 Motorway	+	+	++
Spain – Malaga Bypass	+++	++	+
Latvia – Saulkrasti Bypass	+++	+++	++
Poland - Gdańsk Tram	+++	+++	++
Poland – Warsaw Line 8 Modernisation and Airport Connection	++	++	+/-
France - Le Havre Tramway	+/-	+	++

Note: + = slightly positive, ++ = positive, +++ = strongly positive, +/- = mixed effect

In most cases, a decrease or increase in the intensity of the effects is expected in future years. This is due to a number of reasons. For instance, the ***Malaga*** and ***Warsaw*** projects brought about significant economic growth effects (especially through travel cost improvements) in the first year of their operations, but they are expected to **dilute in the long-run**. In the Malaga case, this is due to the increasing traffic on the new bypass which will reduce the travel time savings. In the railway connection to the Warsaw Chopin Airport this could be due to the possible opening of a new airport which could cause the closure of the Chopin airport for civil aviation passenger operations. On the other hand, **some cases showed that economic growth related issues have not fully materialised yet.** In the case of the ***A14 Autobahn***, there are reasons to believe that direct benefits in terms of economic growth may materialise once the A14 section between Magdeburg and Schewrin is completed. A similar case may also apply in the ***Hungarian M43,*** which may see higher demand in the future if the Romanian motorway infrastructure across the border is improved. In the ***case of Naples***, direct economic effects (especially travel cost savings) may not have fully stabilised either. This is particularly clear in the case of Naples: despite being completed in 2003, the current lack of trains and the on-going construction of additional segments of Metro Line 1 are strongly limiting the transportation potential that may, however, materialise in the future. The economic growth related effects of the ***Le Havre Tramway*** may be fostered if the City persists in its urban renewal efforts.

Wider effects, if any, are more likely to materialise in the long-run. In general, observed wider economic effects were modest, but in some cases it is possible that they will materialise in the future.

Quality of life effects

Table 13. Time-scale of quality of life and wellbeing effects

Case study	Short-run (1 - 5 years)	Long-run (6 - 10 years)	Future years
Germany – Autobahn A14	++	++	++
Hungary – M43 Motorway	++	++	++
France - Le Havre Tramway	++	++	++
Poland - Gdańsk Tram	++	++	++
Slovakia – Žilina Railway Modernisation	+	+	+
Poland – Warsaw Line 8 Modernisation and Airport Connection	+	+	+
Spain – Malaga Bypass	+/-	+/-	+/-
Italy - Naples Metro Line 1	+/-	+/-	++
Greece – Rio Antirio Bridge	++	++	+++
Latvia – Saulkrasti Bypass	++	+++	++

Note: + = slightly positive, ++ = positive, +++ = strongly positive, +/- = mixed effect

Effects related to the quality of life appear to have stabilised in most of the case studies analysed. The intensity of the effects remains generally stable irrespective of their magnitude. Quality of life effects (such as improved safety in terms of decrease in accidents) fully materialised shortly after the implementation of the project. In some cases, such as the ***Saulkrasti Bypass***, these are rather evident as a sharp decrease in the number of accidents was recorded in the first years of operation. For urban transport projects such as the ***Gdańsk Tram*** and the ***Le Havre Tramway***, quality of life effects had already materialised in the form of more comfortable and modern public transport services, and more pleasant urban environment. This was also true of the ***Warsaw Line 8*** modernisation and airport connection. The only project in which the quality of life effects are not yet stabilised is the ***Naples Line 1 Metro***, for the same reasons applying to economic growth effects.

Environmental sustainability

Table 14. Time-scale of environmental sustainability effects

Case study	Short-run (1 - 5 years)	Long-run (6 - 10 years)	Future years
Slovakia – Žilina Railway Modernisation	+	+	+
Latvia – Saulkrasti Bypass	+	+	+
Germany – Autobahn A14	+	+	+
Greece – Rio Antirio Bridge	+	+	+
Poland – Warsaw Line 8 Modernisation and Airport Connection	+	+	+
France - Le Havre Tramway	+	+	+
Poland - Gdańsk Tram	+	+	+
Hungary – M43 Motorway	+/-	+/-	+/-
Spain – Malaga Bypass	+/-	+/-	+/-
Italy - Naples Metro Line 1	+	++	+++

Note: + = slightly positive, ++ = positive, +++ = strongly positive, +/- = mixed effect

Although relatively small, effects in terms of GHG and local air pollution emissions have already materialised for the ten selected case studies, and in most of them (9 out of 10 projects) **they can be considered as stabilised**. Regardless of their magnitude, their contribution to project performance is **not expected**

to change in the future. The only exception is again the Naples Line 1 Metro, where the current performance of the project is expected to be subject to future significant changes also from the environmental effects point of view.

Distributional effects

Table 15. Time-scale of distributional effects

Case study	Short-run (1 - 5 years)	Long-run (6 - 10 years)	Future years
Hungary – M43 Motorway	+/-	+/-	+/-
Poland – Warsaw Line 8 Modernisation and Airport Connection	+	+	+
Slovakia – Žilina Railway Modernisation	+	+	+
France - Le Havre Tramway	++	++	++
Latvia – Saulkrasti Bypass	++	++	++
Poland - Gdańsk Tram	++	++	++
Italy - Naples Metro Line 1	+++	+++	+++
Germany – Autobahn A14	+	+	++
Spain – Malaga Bypass	+	++	++
Greece – Rio Antirio Bridge	++	++	+++

Note: + = slightly positive, ++ = positive, +++ = strongly positive, +/- = mixed effect

Theoretically, indirect effects such as distributional impacts (territorial and social cohesion) are long-term in nature. However, **in the few cases where distributional impacts were significant, findings point to mixed results in their time-scale**. Territorial and social cohesion had a significant impact on the overall performance of ***Naples Line 1***. Unlike many other project effects, these have already fully materialised and they are not expected to change in the future. Indeed, the new section of the Metro already provides a better transport alternative to people living in the suburbs and overcomes a territorial divide such as the connection between the hilly area and the historical centre. A similar fully materialised distributional impact also occurred in ***Le Havre*** and in ***Gdańsk***. Finally, similarly to effects related to economic growth, distributional impacts (especially in terms of territorial cohesion) are expected to be more significant in the future once complementary projects are completed. For instance, territorial effects are expected to be more significant in ***Malaga*** once the new airport connection is opened. Another example is provided by the Greek case. The recent mid-2017 completion of the Olympia-Odos and Ionia-Odos motorways is expected to further increase the positive result so far achieved by the bridge in terms of territorial cohesion.

3.3.7 Spatial nature of projects

The spatial scale of impacts varies greatly according to the different types of effects.

- **Economic growth effects can extend well beyond the catchment area**. It is interesting to note that, given their important role within the overall mobility of the region, even some urban transport projects had positive impacts spreading beyond the local level. An improved public transport system in ***Gdańsk*** and ***Naples*** had positive effects exceeding the mere urban areas. More expectedly, the ***Malaga Bypass*** had a positive effect on the whole regional road network as it is part of a strategic corridor. In the case of the ***Saulkrasti Bypass***, its expected cross-border effects are fully confirmed. This is because such effects relate not only to direct users, but also to those of the wider network.

On the other hand, quality of life effects are more limited to the catchment area. Such effects accrue only for direct users and the population in proximity of the project. For instance, the reduction in noise externalities is by definition a local phenomenon affecting the local population. Similarly, road safety is experienced by direct users without any effects on the wider network or transport system.

- **Most of the environmental effects have a local scope**, with the exception of GHG emissions.

3.4 PROJECT EFFICIENCY

Project efficiency considers the **relationship between the resources used and the changes generated by the intervention**. The table below shows the final assessment for project efficiency that takes into in consideration how input resources (especially time and costs) were used in order to produce the desired effects.

Table 16. Project Efficiency – Final Assessment Score (from 1 to 5)[26]

Sector	Case study	Score	Motivation
Road	Germany – Autobahn A14	3	Good planning capacity and lower investment costs guaranteed that the **project was efficient overall**. However, the project reported negative differences with ex ante forecasts due to external factors (general economic situation and population decline in the region).
	Greece – Rio Antirio Bridge	5	The project was completed without major delays and according to budget. **No significant differences between the costs and benefits forecasted ex ante** were reported compared to what can be observed ex-post, and the project delivered a positive socio-economic return on investment.
	Hungary – M43 Motorway	3	**Despite inaccuracies** in the demand forecast and the negative impact of the economic crisis, the project turned out **to be cost-effective** delivering more benefits than the resources invested. This was also the result of the absence of significant delays and cost-overruns.
	Latvia – Saulkrasti Bypass	4	The significant benefits in terms of travel cost savings, improved safety and reduction of externalities determined **solid project returns on the invested resources.** These benefits offset the delays and cost-overrun during project implementation.
	Spain – Malaga Bypass	3	Project implementation suffered from some delays and cost overruns (which were partly linked to the decision to build a larger road). However**, the project delivers social returns which outweigh its costs.**
Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	5	Thanks to the good planning capacity and construction supervision, the project's construction was completed in time and within the estimated budget. In addition, the **expected benefits materialised** as forecasted ex ante, and the project delivered a positive socio-economic return on investment.
	Slovakia – Žilina Railway Modernisation	3	Project efficiency was affected by **high investment costs** and the **fragmentation of the modernisation** of the corridors in which this section is located.

[26] 1= Significant negative differences due to endogenous factors
2= Significant negative differences due to exogenous factors
3= Negligible positive/negative differences
4= Nil differences
5= Significant positive differences due to endogenous/exogenous factors

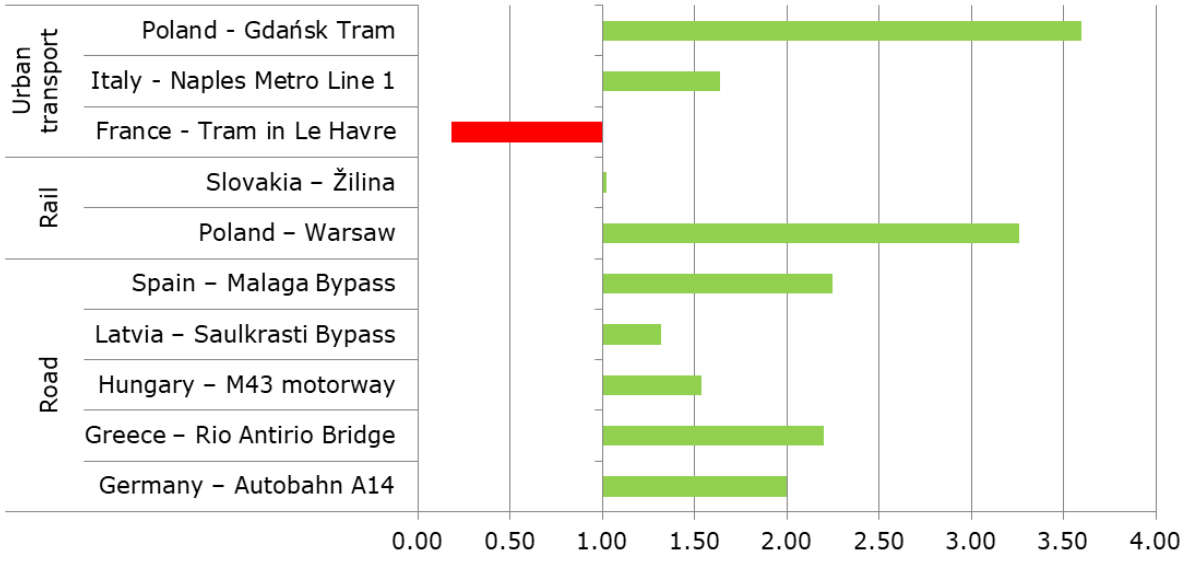
Urban transport	France - Le Havre tramway	1	Significant **cost overruns** occurred during project implementation. In addition, benefits materialised to a **lesser extent than expected**, thus the project is not performing well in terms of efficiency and the socio-economic return is negative.
	Italy - Naples Metro Line 1	3	The project delivers **value for money from the socio-economic perspective**, in the sense of appreciable benefits compared to costs. The distressed financial situation of the service provider may harm project efficiency in the future.
	Poland - Gdańsk Tram	4	The project was delivered in time and within the planned budget. The project delivered **positive socio-economic benefits** thanks to its smooth implementation and efficient use of resources.

Source: Authors

The main findings related to efficiency are the following:

- most of the projects were efficient, delivering social benefits that exceeded the costs. This is well-reported by the CBA results outlined in the figure below, which shows that B/C ratio is more than one for all but one of the selected projects.[27]
- At the same time, most of the projects were not as efficient as expected ex ante: in some cases costs exceeded the ex ante forecasts and benefits were affected by an optimism bias. Some delays were also a cause of less-than-expected efficiency in project implementation.

Figure 5. Selected projects – B/C Ratio



Source: Authors

Project efficiency may be influenced by several factors affecting either the costs or the benefits, or both. The previous chapter already discussed the benefit side, in what follows we better grasp the factors related to costs, both during construction and during project operation.

Efficiency during construction: cost overruns and delays

As extensively discussed in literature, cost overruns and delays in project construction are common in major transport projects.[28] Investment costs often suffer from escalation.

[27] The B/C ratio is defined as the ratio between the total discounted benefits and costs. If it is >1, project benefits exceed costs.

Delays postpone benefits and often result in cost-overruns as well. The table below summarises the assessment of these factors for each of the case studies.

Table 17. Divergences from the schedule and budget – summary.

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.[29] 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*

[28] See for example Flyvbjerg et al. 2003, 2004, 2005; Flyvbjerg, 2007.

[29] According to the project dossier "Due to the age of the project and the departure of several key persons from the main organisations, the exact reasons for cost overshoots could not be well explained by the respondents interviewed for this study."

Half of the selected projects fully respected the project schedule. Different factors affected project timeliness. In most cases, **good managerial and technical capacities** were an essential factor in order to deliver the project on time. However, this may have been supported by other factors. For instance, strong **political will** played a key role in the ***Le Havre tramway***. The project had high visibility among the local population and political commitment was a key driver of its implementation. It was symbolically inaugurated at 12:12 on 12 December 2012 as planned. Political will was also high in the case of **upcoming of mega events** such as EURO 2012 and Athens Olympic Games 2004, which were extra factors encouraging timely completion. In the ***Greek case***, in 2004 a special contract was signed between the Ministry and the concessionaire (Gefyra) to speed up the completion of the work. The bridge was eventually opened for traffic on 12 August 2004, right before the start of the Olympic Games on 13 August 2004. The link was originally expected to be completed by concession agreement on 24 December 2004.

In half of the cases the projects experienced delays, but only in one case was this significant (Malaga, with two years delay). A number of **unpredictable exogenous factors were usually at the basis of such delays,** for example the removal of landmines during the construction of the ***Warsaw*** Airport railway connection or river flooding near the ***Malaga Bypass***. A certain degree of risk is, however, always connected to construction and excavation of major projects and the project manager should be prepared to tackle such risks. Though unpredictable in terms of scope and severity, the discovery of archaeological finds during the ***Naples Metro*** implementation should be understood as a rather common construction risk and this eventuality should be taken into account in project planning.

It is a totally different situation when exogenous impacts are due to a **radical change in the macro-economic and political situation,** like ***Latvia's*** accession to the EU. Although foreseen and planned, the accession process was so unique and its consequences so pervasive and unpredictable that no amount of careful planning could have realistically reflected it in an appropriate way. Still, the project management was so good that it managed to reduce the initial delay of one year into a postponement of only three months.

It is worth noting that delays did not necessarily result in cost-overruns if compensated by savings at the tendering stage. For instance, despite a nine-month delay, the ***Warsaw project*** cost less than the planned budget. This also holds true for the modernisation of the ***railway in Žilina***, where the implementation of additional noise mitigation measures after completion of the work did not cause budget overshooting. The Malaga bypass experienced a combination of cost overruns and delays. However, the difference between the planned budget and final expenditure was mostly due to changes in project design.

Divergences from planned cost

In most of the cases, the **project's final costs were in line with the estimated budget**. In four cases, **final costs were even below budget**.

Procurement processes can play an important role in budget control. For example, in ***Warsaw*** the additional activities and work led to an additional project expenditure of EUR 3 million. However, thanks to savings generated by the procurement procedures at the tendering stage, the final investment cost still amounted to nearly 10% less than the initially planned investment cost. Also in ***Gdańsk*** the additional work led to some additional expenses. However, considering some savings resulting from the

procurement procedures, the final investment cost amounted to nearly 20% less than the planned investment cost. The ***A14 Autobahn*** cost 10% less than budgeted, which is not a common event in German public sector projects. This cost underrun was possible thanks to an effective tendering strategy that was tailored to ensure the participation of local entrepreneurs.

Unforeseen circumstances can lead to large cost overshoots. For instance, the project in ***Le Havre*** was completed in time while at the same time showing a budget overshoot of 26%. This is partly due to some unexpected issues during the construction phase. Actually, one construction worker died during the digging of the tunnel and a fire destroyed an important facility with IT systems that belonged to the construction contractor. At the same time, a part of the construction site required additional investment to stabilise platform foundations where an old main sewer was located. These disturbances incurred additional costs to meet the project's schedule.

In other cases, **effective project management prevented the project from cost-overruns despite the occurrence of unexpected events**. During the construction phase of the ***Warsaw railway airport*** connection, landmines and petroleum derivatives from World War II were discovered in the area of the ruins of Fort Zbarż. Their removal resulted in delays, but did not cause a cost-overrun. Indeed, the project final costs were 10% lower than the expected budget. The implementation of the ***Gdańsk tram*** led to the demolition of an old structure located on the premises of the Wrzeszcz depot. This caused additional costs that were covered by savings resulting from the procurement procedures. In the end, consolidated costs were 20% lower than the estimated budget. The ***Žilina Railway Modernisation*** faced some delays due to the instalment of additional noise barriers and windows in public buildings upon completion of the works, complying with the required standards. However, this additional intervention did not result in a cost-overrun and the project cost 2% less than budgeted. Despite its technical complexity, the ***Rio Antirio Bridge*** was completed on budget.[30] In non-Eurozone countries such as Latvia[31] 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 a cost-savings in EUR (-3.8%) and cost-overrun (+9%) in the local currency. In the Latvian case, the situation was even more complex. As stated, accession to the EU led to two-year delays due to substantial changes in the tendering procedures. Moreover, the country experienced rapid macro-economic growth shortly after its accession to the EU, which resulted in an overall price increase (the consumer price index rose from 2.9% in 2003 to 6.2% in 2004). Finally, as local constructors were paid in LETI (Latvian currency before joining the Eurozone in 2014), costs were partially exposed to fluctuations in exchange rates. These factors led to a significant cost overrun, as the total nominal costs rose from EUR 48 million to EUR 130.5 million. As a matter of fact, the factors underlying the cost-overrun were either unpredictable in the ex ante phase or unavoidable during the construction phase as they were the result of macro-economic changes. The EU co-funding was adjusted from EUR 30.79 million to EUR 40.03 million to respond to cost-increases and neither the cost-overrun nor the delays affected project performance. Only in the case of the ***Malaga Bypass*** **may cost-overruns have been motivated by 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

[30] The financial incentive given by the Greek government to the contractor in order to finish the bridge in advance cannot be considered as a cost-overrun. Indeed, by their very nature, cost-overruns are not planned ex ante.

[31] Latvia joined the Eurozone in 2014 when the project was already operational.

costs compared to the budget. Construction and expropriation costs were 34% and 73% higher, respectively, and it is difficult to assess whether this was mainly due to the change in project design or to an 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 a broader project, **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 (part of the work is not yet completed) and cost overshooting due to technical issues (such as archaeology and complex excavation on the site with layers of groundwater). This increase in cost aggravated the financial situation of the service provider resulting in fewer resources available to ensure service quality.

Projects characterised by cost-overruns and delays may remain efficient (and still have a good B/C ratio) when project 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.

Efficiency during operation: financial sustainability

Financial sustainability assesses the capacity of the project to cover its costs throughout the investment and operating phases. In line with the rationale of EU funding for major projects, none of the ten selected projects was financially profitable: their financial net present values were negative and **they were in need of funding**. The EU grant was decisive in ensuring financial sustainability during the construction phase. In addition to the EU grant, funding for the projects was ensured through different sources. All projects also relied on national contributions or equivalents. For some projects a variety of financial sources were mobilised, e.g. in the ***Le Havre project*** funds were provided by the French state, the Normandy Region and the Département Seine-Maritime as well as the national funding agency for transport infrastructure. In other cases, only one national fund provider was involved. This is the case of ***Malaga***, where only the Ministry of Infrastructure supported the project. The ***Rio Antirio Bridge*** was the only project implemented as a public–private partnership initiative, one of the first in Greece. In the project a private company contributed 7.7% of the project cost.

Three out of ten projects (the Rio Antirio bridge, the Le Havre tramway and the tram in Gdańsk) also received funding from the EIB. In the Rio Antirio Bridge project the EIB was initially not comfortable about providing a long-term loan; however, after a signed public–private partnership concession contract was in place, which according to the EIB addressed risk-sharing in a secure way, the loan was eventually approved.

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

Table 18. Funding structure in the case studies

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

Source: Authors

Most projects generate revenues, but the financial sustainability of the case study projects is based mainly on public funds, also in cases where revenues are significant. The revenues generated by the analysed projects do not usually cover their operational costs and the long-term financial sustainability of the projects is maintained by public funding from local, regional or national resources. The key financial indicators and sources of income are summarised in the table below.

Table 19. Financial indicators and sources of income of the case studies

	Investment Costs		FNPV (C)*	FRR (C)*	FNPV (K)*	FRR (K)*	Revenues from users	Operating cost savings	Revenue Generating
	Nominal	Present (2017)							
Gdańsk Tram (PL)	134.3	177.8	-158.3	-6.9%	-113.0	-10.3%	☑		
Napoli Metro Line 1 (IT)	491.6	1,709.4	-1,608.3	-2.6%	-1,181.0	-1.8%	☑		
Le Havre Light Rail (FR)	420.1	539.7	-581.2	-8.6%	-450.8	-12.1%	☑		
Žilina-Krásno nad Kysucou (SK)	162.1	174.5	-143.4	-2.88%	-38.3	1.06%	☑	☑	☑
Warszawa Chopin Airport Link (PL)	64.0	68.2	-85.2	-14.6%	-36.7	-14.9%	☑		☑
Malaga Bypass (ES)	437.9	467.1	-691.1	-11.0%	-354.3	-10%			
Saulkrasti Bypass (LV)	130.5	183.2	-240.5	-4.6%	-152.9	-3.0%			
Szeged-Makó M43 motorway (HU)	196.8	282.1	-68.7	2.5%	91.8	7.6%	☑		☑
Rio Antirio Bridge (GR)	888.3	1,242.4	-958.5	1.9%	-217.5	3.4%	☑		☑
Autobahn A14 (DE)	110.9	153.5	-165.8	-10.0%	-88.41	-8.1%	☑		

Source: Authors

*Note: * FNPV(C) = Financial Net Present Value of the investment; FRR(C) = Financial Rate of Return on investment; FNPV(K) = Financial Net Present Value of national capital; FRR(C) = Financial Rate of Return on national capital.*

Public funds are necessary for non-tolled roads such as the ***Malaga*** and the ***Saulkrasti bypasses*** where the State budget covers ordinary and extraordinary maintenance throughout the operational phase. **The collection of tolls does not necessarily guarantee financial sustainability**. Tolls collected by the service operators in the ***M43 and A14*** road projects are not sufficient to cover O&M costs. Thus, also in these cases the financial support of the federal State in Germany and the National Development Agency in Hungary is essential to guarantee project solvency. Likewise, the State budget covers the operational losses of the railway modernisation in ***Žilina***. **Only two of the ten selected projects can cover operation and maintenance (O&M) costs through their own revenues.** The ***Rio Antirio Bridge*** does not need external financial support during the operating phase as its sustainability is guaranteed by the operating revenues deriving from the collection of tolls. This holds true also for the railway airport connection in ***Warsaw***: financial sustainability relies on inflows from track access charges covering the yearly operating costs (without depreciation) and the assumed average yearly cost of repairs/renewal.

Financial sustainability is a feasibility condition of the investment decision and ensures the long-term durability of a project. The possible negative consequences linked to financial sustainability issues are particularly visible in the ***Naples Metro***. The service provider (ANM) is currently bankrupt and a financial recovery plan is awaiting the Court's approval. The rejection of the plan embodies a risk not only for the project under evaluation, but also for the whole public transport system in Naples.

As a final remark, it is worth noting that financial sustainability troubles usually arise after construction during the operational phase. However, as pointed out during the seminar with the stakeholders, **during project preparation insufficient attention is paid to the financial sustainability of projects in their post-completion operation, including long-term maintenance**. Evidence from the case studies confirms that the financial structure of the projects is not sufficiently discussed during the project selection process. A major concern of project promoters is often related to the application of the "user pays" principle, since if users have to pay they may be less inclined to use the transport service. The ***Malaga case*** study is an example: during project preparation the option of charging a toll was discussed, but then rejected due to the possible discouraging effect on the demand side.

3.5 EU ADDED VALUE

According to the Better Regulation Guidelines, the EU added value refers to beneficial impacts that can be attributed to EU intervention, over and above what could reasonably have been expected and achieved from the action of Member States. This evaluation criterion aims at assessing if, and to what extent, the implemented projects could have differed in the absence of EU action. More precisely the criterion addresses the following questions: was EU support necessary? Did the project achieve EU-wide effects? Is further EU action required?

Table 20. Project EU added value – Final Assessment Score (from 1 to 5)[32]

Sector	Case study	Score	Comments
Road	Germany – Autobahn A14	1	The project section was considered as urgent in the National Transport Plan and **would have been built even without EU support**. The role of funding is difficult to assess as the **financing decision was approved after the project was already operational**. However, environmental measures were imposed as a consequence of EU funding.
	Greece – Rio Antirio Bridge	5	Without EU support, **the Greek State would not have had the financial, institutional, legal and technical capability to build the Rio Antirio Bridge**. EU technical support in the construction and management phases was important as the Greek State alone did not have the capacity to manage such a large project.
	Hungary – M43 Motorway	4	EU-funding was **crucial** for the project. Formerly, the project had been identified as a top priority, but most probably the motorway **would not have been built without the availability of EU funding**. Besides the funding, the role of the EU was also important during the **planning and the implementation of the project**. The institutional background serving the project was established with EU support and the cooperation between the project management and JASPERS contributed to the successful implementation of the project.
	Latvia – Saulkrasti Bypass	4	The implementation of the project generated **positive effects and impacts, which could not have been achieved without the support from the EU**. The state of Latvia **did not have the financial capacity** to support large-scale socially desirable projects such as the Saulkrasti bypass. The EU support acted as a catalyst to improve internal administrative procedures and capacity, which contributed to streamlining the delivery system.
	Spain – Malaga Bypass	1	There is a **lack of evidence showing any clear EU added value for the Malaga bypass project**. In principle, it is possible to assume that the **availability of EU funds may have produced an additionality effect** on national expenditure for other projects, but this could not be ascertained in the context of the case study.
Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	5	Without the support from the EU **the project would have been delayed and reduced in scope, if implemented at all.** The role of JASPERS can be considered an **additional element of EU added value as** it helped the project beneficiary to **streamline the project design in the completion of the preparatory phase,** leading to a better definition of the risks associated with the construction work.
	Slovakia – Žilina Railway Modernisation	5	Without EU support, **the project would have been limited to the renewal of the existing infrastructure** and no major railway modernisation would have been carried out. As part of the development of the Rhine Danube Corridor the modernisation of the railway lines can contribute to the creation of a Single European Railway Area.

[32] 1 = Nil EU added value, i.e. there is strong evidence showing that the results achieved by the project would have been achieved even without the EU support.
2 = Poor EU added value, i.e. the project would not have been implemented without EU support, however, it did not achieve the intended effects due to unforeseen events.
3 = Modest EU added value, i.e. the project would hardly have been implemented without EU support, however, its effects are still uncertain.
4 = High EU added value, i.e. the project achieved positive effects that would have been hard to achieve without EU support.
5= Very high EU added value, i.e. the project achieved EU-wide effects that could not have been achieved without EU support.

Sector	Case study	Score	Comments
Urban transport	France - Le Havre tramway	3	**The project would probably have been implemented without EU funding** (which was significantly limited and even reduced during project implementation) due to the high political interest from local actors.
	Italy - Naples Metro Line 1	3	The EU added value can be seen in relation to the whole of Metro Line 1: **the EU has supported the Naples municipality in achieving sustainable mobility objectives** since the 1970s, and EU support remains crucial for future development. However, for the section under assessment the role of the EU was rather limited also considering that the financing decision was taken when the project was already under implementation.
	Poland - Gdańsk Tram	4	The implementation of the wider GPKM initiative generated positive effects and impacts **which could not have been achieved without the support of the EU**. As a matter of fact, the City of Gdańsk did not have the financial capacity to support a series of unprofitable, but socially desirable, projects such as GPKM IIIA. Therefore, without EU support the project would have been delayed and reduced in scope. EU support continues to remain crucial in order to pursue the same level of ambition in interventions implemented so far. The role of JASPERS can be considered an additional element of EU added value.

Source: Authors

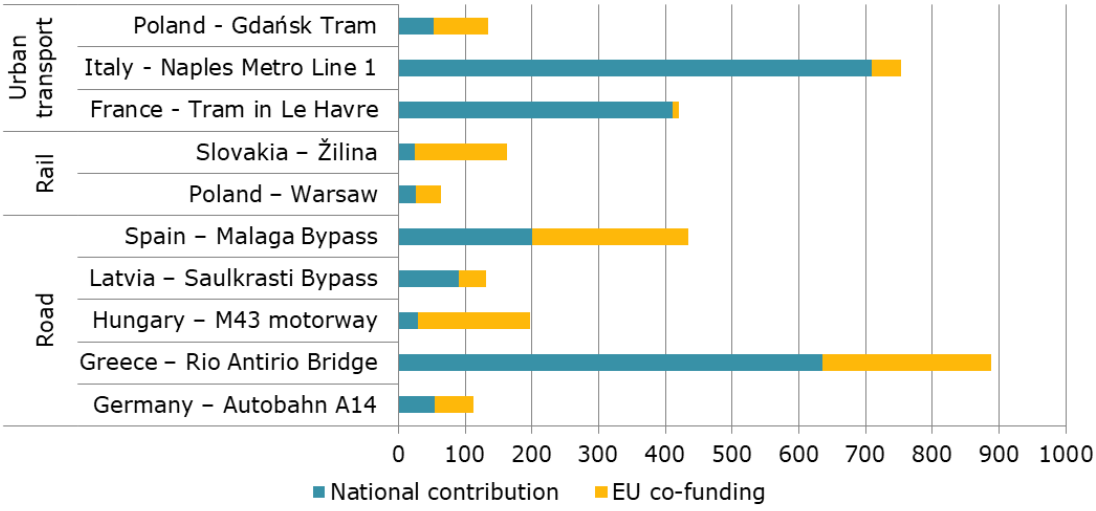
As illustrated in the scoring above, the study confirmed that in most of the cases **the contribution of the European Union was beneficial** to project implementation and ensured the achievement of the observed results which, without the EU support, could possibly have been postponed, not achieved or achieved in a different manner (e.g. without meeting certain standards). However, in four cases the EU added value is rather limited if not negligible. This assessment could underestimate the actual added value of the EU action. As a matter of fact, the findings of the present study highlight that from an evaluation point of view there is a general difficulty in assessing EU added value.

EU added value can materialise according to three main dimensions, which include the extent to which the EU contributed to financing the project (financial support), the extent to which the EU played a role in the definition of priorities and standards (strategic support), and the contribution of the EU in supporting the definition of the technical aspects of the project (technical support). They are discussed in the following sections.

EU as a fund provider

The availability of a significant and critical share of funding in many cases accelerated and made possible project implementation. This first dimension of EU added value is perhaps the least strategic one, but also the most obvious and easy to detect. To give an overview of EU financial support for each project, the figure below shows the respective shares of EU co-financing in the 10 projects.

Figure 6. Level of EU co-funding (EUR 2017, million)



Note: in this graph the national contribution includes all the sources provided by various national entities to finance the project. Source: Authors

As the graph above shows, the weight of the EU grant on the total investment cost ranges from a maximum of 85% (i.e. 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 findings of the case studies clearly show that the amount of the EU grant was decisive for the implementation of the project. **In a number of cases, without EU funding the projects could not have been financed by the Member States alone** and thus their European interest objectives would have not materialised in time or even at all. For example, in the ***Saulkrasti case*** study, the authors noted that the state of Latvia did not have the financial capacity to support socially desirable projects of a size such as the Saulkrasti bypass. Therefore, without EU support the project would not have been implemented. In such cases, the EU in its role of fund provider played an important part in accelerating the materialisation of EU objectives. The same applies to Greece: the ***Rio Antirio Bridge*** was of such a financial scale and complexity that without the financing support of the EU it could not have been implemented.

In some cases, the EU helped to achieve results that would have hardly been possible in the absence of EU support. For instance, in the ***Gdańsk case*** EU co-financing was crucial for the implementation of the Urban Transport programme**.** The City of Gdańsk lacked the necessary financial capacity to implement a socially desirable but unprofitable project, and EU support will likely be essential for the implementation of further phases of the project, thus ensuring the achievement of the general objective of improving the interconnectedness of the local and regional transport network (which is also a priority of the TEN-T Regulation EU 1315/2013 and of the Baltic-Adriatic Corridor work plan).

Other case studies, however, have a more limited added value in terms of fund provision by the EU, since the project would also have been realised without the additional funds from the EU. **The EU added value was low in cases where the political desire for the project was very high and the national and local authorities had the necessary financial resources**. In the cases of both the ***A14 Motorway*** in Germany and the ***Tramway in Le Havre***, the implementation of the projects was likely to have occurred even in the absence of EU financial support. In particular, the findings of the case study on the Le Havre tramway project confirm that due to the high political interest of local actors, the project would have been implemented even without EU funding, which was low and only contributed to its financial sustainability to a limited extent.

Sometimes, EU added value is questionable, as the decision to provide EU financing comes late, or even after a project has been initiated. In a few case studies the project was co-funded at the final stage of construction or even when it was already in its operation phase by applying "retrospective EU assistance".[33] 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. For example, in ***Naples*** the co-financing request was issued by the Managing Authority in August 2003, while the EC's final decision to grant assistance to the project was taken in August 2005, when the project was already operating. Also in ***Malaga*** the application for co-financing was submitted by the Managing Authority when the project was already under construction and the Commission did not make any observations about the project before taking the financing decision.

Although there is no explicit legal provision prohibiting retrospective EU assistance, the Commission does not recommend this practice as it represents a significant risk. For instance, operations retrospectively selected for co-financing may be initiated or carried out without having been expressly linked to the objectives of a programme or to the specific legal requirements linked to EU assistance. For this reason, the Commission has issued rules for the application of retrospective EU assistance.[34] Comparing the cases under assessment in which financing decisions were taken in the final stages of construction with those with prior financing decisions does not show any clear pattern in terms of not being in line with the objectives of a programme or failing to meet the specific legal requirements linked to EU assistance. The role of EU action was limited to the possibility of triggering public investments that would have not materialised otherwise or of influencing the way they were implemented.

Strategic direction and achievement of EU-wide objectives

The share of EU funds out of total investments provides important leverage for project implementation, although it is not the only aspect influencing the EU added value. Beyond fund provision a more strategic and possibly influential role of the EU is its **capacity to influence the strategic framework in which projects are implemented. This relates to ensuring that the planning and selection processes enable the implementation of certain types of investment** (or a certain way of implementing the selected projects) which are in line with EU priorities and objectives. For example, in ***Germany*** EU funding motivated the need to comply with environmental standards, which required mitigation measures for the possible environmental impact of the road construction on some animal species. For the projects implemented in ***Poland***, ***Hungary*** and ***Latvia*** the EU support clearly contributed to bring the national transport network systems converging towards EU standards in terms of technical design and service performance.

The strategic role played by the EU can be assumed in the light of the high scores received by the assessed projects for relevance and coherence. While the case studies could not explore this aspect in detail, possibly the main explanation for such high scores is the fact that the legal basis of major projects requires that they be implemented within the scope of Operational Programmes, thus they are expected to contribute to their strategic objectives, as well as to wider sectoral strategies. The Commission's influential role in defining the most appropriate strategic context in which to implement major projects is, in any case, less visible in a retrospective analysis or difficult to clearly attribute to the EU action and, for this reason, **often underestimated in an assessment exercise**. This is

[33] See http://ec.europa.eu/regional_policy/en/information/publications/cocof-guidance-documents/2012/guidance-note-to-the-cocof-on-treatment-of-retrospective-eu-assistance-during-the-period-2007-2013 for more information

[34] See "Guidance note to the COCOF on treatment of retrospective EU assistance during the period 2007-2013" [COCOF_12-0050-01-EN]

due to the fact that often the discussion and the exchanges of views between the EU services, the Managing Authorities and the project beneficiaries about prioritisation processes or procedures for project design, management and implementation are informal and not reported in official documents and, for this reason, may remain unknown for lack of institutional memory. Also, quite often, support for infrastructure development, especially when it relates to the implementation of wider national or regional transport plan, is spread over more than one programming period and the EU action, while less visible in one specific intervention, is actually in place for the broader strategic process of plan development. This is clear, for example, for the ***Naples Metro Line 1***. Although EU financial support for the section under assessment was granted retrospectively, it should be noted that the project is part of a wider regional transport plan with the general objective of ensuring sustainable mobility in the broader urban area of Naples, for which EU support has been crucial since the 1970s from both a financial and a technical point of view (i.e. programming phase, allocation and use of resources).

When looking at the wider strategic context, however, it should also be mentioned that the strategic objectives of Operational Programmes or sector strategies are often so broad in nature and scope that it is relatively easy for Managing Authorities to claim that projects fit into them. This was also possible in the case of the mentioned retrospective financing, when projects already implemented could be included and aligned with Operational Programmes' objectives. Thus, **while strategic alignment is a positive condition to ensure that project are not implemented in isolation,** but rather designed and prepared taking into account the wider strategic context and the conditions possibly affecting its successful implementation (such as the degree of synergies with other existing or planned interventions, the most appropriate timing for implementation, the institutional procedures necessary to implement it, etc.), **it is also clear that it could imply a rather formalistic compliance**. Ensuring the development and focus of sectoral or regional strategies is, therefore, a necessary but insufficient condition to ensure that the most relevant projects are actually implemented to fulfil the stated strategic objectives (see for example the ***Le Havre tramway***). This can only be ensured by looking at the specific strategic, engineering, financial and economic features of the individual projects, as the findings of this study of effectiveness and efficiency have shown. Through the process of major project selection and financing, the EU has the chance to insist on high implementation standards and can identify and appraise the disparities, gaps and potential for development, the goals to be achieved, the results expected, the quantified targets and the extent to which the EU's priorities have been taken into account in individual operations included in broader strategies. This procedure ensures that major projects actually and substantially contribute to sectoral strategies, Operational Programme objectives and, more generally, the implementation of EU policies and priorities through the co-financing.

Pursuing EU-wide objectives is another clear aspect where EU action adds value to major projects. In order to support the creation 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). The policymaking process for developing objectives, priorities, identifying projects of common interest, guidelines of broad measures for the network and a large number of projects of common interest have all benefited from the financial support of the EU, mainly through programmes supported by the European Regional Development Fund and the Cohesion Fund. Several of the projects under assessment contributed to the implementation of the TEN-T. For example, the ***Saulkrasti Bypass*** is located on the Via Baltica Route, which is part of the TEN-T and the most important highway connecting the Baltic States, the modernisation of the ***Žilina*** railway track is part of the Rhine-Danube and Baltic-Adriatic core network corridors and corresponding Rail Freight Corridors. This latter project is part of the EU goal to create a

Single European Railway Area. As such, it was conceived as a rail modernisation investment with EU-wide objectives and effects. This project would not have been feasible without the support of the ESIF. At the same time, without an EU interest in creating the Single European Railway Area, the project as it has been implemented would not have been motivated purely by national needs. Another example is provided by the ***Warsaw*** project. The construction of the new rail link from ***Warsaw*** Służewiec to Chopin Airport and the modernisation of railway line no. 8, which would not have been realised if solely reliant on the limited national financial capacity, allowed for the achievement of the target included in the new TEN-T policy of incorporating Warsaw Airport into the core railway network by 2030.

Technical support and institutional capacity building

EU added value can materialise during project preparation and the application process itself, in which the interaction with EU services (the EC, but also the EIB and JASPERS) plays a key role. **In a number of cases, compliance with the requirements of the application procedure for the EU co-financing improved the project design**, ensured a better allocation of resources, which had positive effects also during implementation, and helped Member States to improve their capacity to realize large-scale projects. As also pointed out during the seminar, the fact that project promoters are required to provide a series of information in a standardised form, including a CBA following precise guidelines, to ask for EU co-financing in principle allows the Commission to have a broad and precise view of major transport infrastructure development in the Member States. **This generates knowledge** about a great number and variety of major projects and their implementation across Europe, which can feed into improved project selection and management for all Member States, if appropriately capitalised.

In several cases, **JASPERS played an important role** as it ensured the streamlining of the preparatory phase, especially in terms of forecasting capacity, demand analysis, financial sustainability and risk assessment, which turned out to be important elements for the subsequent realisation of the projects. JASPERS was involved in the preparation of the ***Žilina*** project, the ***M43 Motorway*** and the two ***Polish projects***. As part of their review (formalised in a Completion Note), JASPERS experts assessed the feasibility studies, engineering, financial and environmental aspects of the projects. In all four cases, the advice provided by JASPERS was perceived as beneficial by project promoters as it helped them to adjust/correct project development and/or some broader aspects (e.g. the ticketing system or financial sustainability) of the system where the project was implemented. For example, in the ***Gdańsk case***, JASPERS experts helped the beneficiary to streamline the forecasting process by introducing more realistic expectations about demand and suggesting good practices drawing from existing EU projects of a similar nature. Also, a recommendation related to the operation of the service, i.e. the introduction of tariff integration, was made which was seriously taken into account by the city administration to improve the existing ticketing system. Clearly, if JASPERS is involved at a stage when specific investments have already been chosen for development by Member States and the design of each project is relatively fixed, the scope for JASPERS to improve project quality is limited. This is evident in the ***Warsaw project***. JASPERS was involved in the project at its tendering stage and it assessed all the investment aspects, in particular, engineering solutions, layout options and project alternatives, demand, financial and economic analysis as well as environmental issues. JASPERS raised concern was about the location of the train station at Terminal 2. It was not considered to be optimum in terms of proximity. However, due to the advanced stage of the project, such a consideration was not taken into account. The positive role played by JASPERS was also confirmed by beneficiary representatives during the seminar.

Although the role of the EIB was not specifically assessed in the case studies, the information collected points towards a positive assessment of its involvement in the three projects where an EIB loan was used i.e. two urban transport projects (***Le Havre*** and ***Gdańsk***) and one road project (***Rio Antirio bridge***). Actually, the EIB offers the chance for an in-depth scrutiny of the merits of the project from the financial and technical points of view, and financing from the EIB is usually considered to have an encouraging effect for other lenders to provide funding. This was also confirmed by beneficiary representatives during the seminar.

Capacity building and institutional learning due to the EU action are visible in a number of cases. For example, in the ***Saulkrasti case*** study the authors state that, apart from the financial aspects, at the time when the project was selected and implemented EU support acted as a catalyst to improve internal administrative procedures and capacity. The same applies to the ***Gdańsk project***, where EU support had positive spillovers in the programming and implementation phases, since it contributed to improving the administrative procedures and streamlining project delivery. In the case of the ***M43 Motorway*** between Szeged and Mako, the EU played an important role in the setting up of the institutional background and monitoring of the implementation phase. In addition, the study confirmed that EU support served to improve the capacity of the National Development Agency.

Finally, the ***Rio Antirio Bridge*** was a unique project from the technical and organisational points of view, and 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 involvement of the EIB in the project were thus essential, not only to make the project financially feasible, but also in terms of project governance and capacity-building of the Greek authorities in implementing PPPs.

4 MECHANISMS AND DETERMINANTS

This section explains the mechanisms that determined the performance of the projects described in the previous section. It does so by reviewing selected determinants that have been identified as crucial for the understanding of the project behaviours defining the path taken by each project in its life-cycle. After discussing those determinants one by one, the final section discusses the behavioural patterns, i.e. the interrelation between the determinants and the resulting overall 'behaviour' of the projects.

4.1 RELATION WITH THE CONTEXT

The relation with the context concerns the appropriateness of the project to its institutional, cultural, social, and economic environment throughout the life-cycle of the project. It entails the appropriateness to the local context and its capacity to address existing needs. For these reasons, this mechanism is closely connected to project relevance and coherence, which are assessed earlier in this report. However, while project relevance and coherence mainly focus on the projects' alignment with existing needs and policies, the relationship with the context is rather a dynamic dimension. Indeed, it concerns the whole project life-cycle describing how project features and objectives interact with the local context that may change over the years. As the assessment of the project's capacity to respond to existing needs has been already provided, this section mainly focuses on its resilience to the evolving context. Thus, adopting a forward-looking perspective is essential to understand this mechanism.

It is worth mentioning here that some of the projects were in operation for much longer that others (2000-2006 vs. 2007-2013) and, although five years of project operation is a reasonable time span for assessing the long-term effects, *ceteris paribus* the **resilience can be better judged on the older projects**.

Table 21. Scores for the relation with the context as a determinant of project outcomes (from -5 to +5)

Sector	Case study	Strength (*)	Comments
Road	Germany – Autobahn A14	-2	The local context – characterised by slow economic growth and increasing de-population – badly affects transport demand in the area. These circumstances are unlikely to change in the short term.
	Greece – Rio Antirio Bridge	4	By providing a faster and more reliable connection over the Gulf of Corinth, the Rio Antirio bridge will remain relevant in the long-term, maintaining its positive relation to the context.
	Hungary – M43 Motorway	3	Up to now, the socio-economic crisis of the region after 2008 has made a negative contribution to the overall performance of the project. However, the project will remain relevant over the years because the generated effects will persist in future years.
	Latvia – Saulkrasti Bypass	5	The positive relation with the context was a success factor in the overall project performance. The project was conceived to remain relevant in the long-run.
	Spain – Malaga Bypass	5	Besides being conceived to respond to the urgent need of relieving traffic from the old bypass, the project was designed to be a long-term intervention able to remain relevant and support city expansion.
Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	5	The context was favourable for the construction of the railway airport connection as the broader modernisation of Line 8 was a suitable framework. The positive relation with the context had been confirmed by the increased patronage and modal shift in the first years of operation.

Sector	Case study	Strength (*)	Comments
	Slovakia – Žilina Railway Modernisation	-1	The project was developed as part of a wider programme for the modernisation of the national railway network. The project context is, however, characterised by the fact that the region and project area are overall scarcely populated, and the existing and potential demand attracted and generated in the region seem to be relatively limited.
Urban transport	France - Le Havre tramway	-1	The project has a slightly negative relation with the context. Some citizens appreciate the new tramway's impact on mobility and urban development. However, the project fell short of delivering a significant modal shift as local habits and policies still favour the use of private cars. If consistent policy towards more sustainable urban transport is taken, the project's relation with the context may improve.
	Italy - Naples Metro Line 1	5	The context in which the project was developed was highly favourable and appropriate, in the sense that the expected impacts were not only within reach, but were perceived as urgent needs by both citizens and local institutions. Concerning the future, concrete actions are now in place to resolve the current shortage of trains. As such, the project's relationship with the context is expected to remain positive.
	Poland - Gdańsk Tram	4	The project is a phase of a broader set of interventions in an urban development programme. The project has a good relation with the context thanks to its consistent integration with City needs and existing infrastructures.

*Note: * the strength score reflects the weight of the role that the relation with the context played compared to the final judgment of the project. In particular:*
-5 = the determinant is responsible for the negative performance of the project;
-4 = the determinant makes a negative contribution to the overall performance of the project;
-3 = the determinant contributes in a moderately negative way to the overall performance of the project;
-2 = the determinant makes a slightly negative contribution to project performance;
-1 = the determinant plays a negative, but almost negligible, role in the overall project performance;
0 = the determinant does not play a role in project performance;
+1= the determinant plays a positive, but almost negligible, role in the overall project performance;
+2 = the determinant makes a slightly positive contribution to project performance;
+3 = the determinant contributes in a moderately positive way to the performance;
+4 = the determinant makes a positive contribution to the overall performance of the project;
+5 = the determinant is responsible for the positive performance of the project.

In line with the results of the relevance assessments, most of the projects were appropriate to the local context when they were implemented. Focussing on the future perspective, it appears that **most of the projects are likely to maintain their good relationship with the context** in the long-term. In some cases, projects were designed to **take into account expected economic and population development**. Especially in projects aimed at relieving traffic from an existing over-congested road, **attention was paid to creating an infrastructure that will remain relevant over the years**. This is particularly pronounced in the ***Malaga*** and ***Saulkrasti Bypasses***. In the former case, the old MA-20 bypass was built in late 1992. It was supposed to bypass the densely populated city centre and alleviate traffic congestion problems in the urban area of Malaga. However, as the city continued its expansion westward, it became clear that this new road only provided a temporary solution to the problem. As early as 1997, a preliminary study for a new further western bypass was carried out. Several additional studies were performed to ensure an optimum location suitable for serving the western outskirts that were outside the catchment area of the previous bypass. Moreover, prior to the construction phase, the Ministry decided to expand the road width from three to four lanes per carriageway in order to increase its capacity. The project was designed **with a future perspective and conceived in order to support the city's expansion**. Thanks to its high capacity, the project will be able to absorb the increasing traffic, thus showing great resilience to future development. The situation in

Saulkrasti before the implementation of the project was similar to the one in Malaga: an old state road crossing the city was insufficient to absorb traffic. Thus, like in the Malaga case, a new bypass was constructed, and its capacity is expected to be sufficient in the long-run.

In other cases, **future changes in the context may play a decisive role in project performance**. In some cases, **changes in the wider context may accelerate project obsolescence**. For instance, if a new airport opens in 2027 and takes over the operation of Chopin airport (which might then only be used for military purposes) the ***Warsaw airport railway connection*** will lose the demand associated with the airport and limit its relationship with the context to the use of the existing services as part of the suburban and regional railway network. **The dynamic nature of the relation to the context is to a certain extent linked to the managerial capacity to adapt to future evolution and changes in the project area.** For instance, while **the ex ante relation to the context was overall positive in *Naples*** (i.e. the project was perceived as urgent by all local stakeholders) and it was a major driver for project implementation, the metro is currently underperforming due to a shortage of trains. However, concrete actions are now in place to tackle this issue and thus the project's relationship with the context is expected to remain positive in the future. On the other hand, the opposite situation was also observed throughout the case studies. For instance, the current underperformance of the ***Le Havre tramway*** may be due to an unfavourable relationship with ongoing urban mobility policies and trends. Indeed, local citizens favour private cars and the recent interventions aimed at improving the city road network somehow consolidate this trend. However, it should be noted that the municipality is currently bringing forward a sustainable mobility plan, which may increase modal shift to the new tramway (for instance by introducing parking tolls). If this broader policy change eventually takes place, the project may have a better relationship with the context and thus – probably - improve its performance. In other cases, **only radical and quite unlikely changes in the project context may eventually reverse the current project underperformance.** This is particularly clear in the case of the ***A14 Autobahn***, which was implemented in a de-populating and economically stagnating area. For these reasons, the project is currently running under capacity and is also expected to do so in the future. The implementation of supplementary projects in the area (above all the completion of the southern extension of the A14 from the A24 to Magdeburg) may make the project performance slightly more favourable in the future. A similar case is the modernisation of the railway in ***Žilina***, which was implemented in a scarcely populated area whose socio-economic context is unlikely to significantly change after the project implementation.

The project's relationship with the context can be assessed not only by analysing how the project adapts to a given area, but also the other way around, i.e. how the project is able to affect the contextual features. **Generally, in projects well suited to the context, changes in the transportation system are easily observable and take place rather quickly**. This is clear in projects **shifting users** from an existing infrastructure to an improved one or to another transport mode (modal shift). In its first operational years, users of the ***New West Malaga Bypass*** were mostly vehicles diverted from the old one (MA-20). Another example is provided by the Rio Antirio Bridge. One year after its inauguration, 84% of total crossings were made by bridge; this shows that users quickly appreciated the faster and more reliable service offered by the new infrastructure, thus largely forsaking the ferry crossing. In ***Warsaw***, shortly after the new railway connection to the Chopin airport opened, a sharp decrease in passengers reaching the airport by private cars or buses was accompanied by a significant rise in train use, as well as by an increase in

the patronage of public transport services by railway on the lines interconnected to the airport (which were put into operation upon completion of the project).

4.2 SELECTION PROCESS

The selection process refers to the **institutional and legislative framework that determines how public investment decisions (and especially those co-financed by European Structural and Investment Funds (ESIF)) are taken.** 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 policymakers and project promoters to either take transparent decisions or strategically misrepresent costs and benefits at the ex ante stage.

Table 22. Scores for the selection process as a determinant of project outcomes (from -5 to +5)

Sector	Case study	Strength (*)	Comments
Road	Germany – Autobahn A14	1	Project selection followed standard procedures with no major complications except a general delay in the entire process. Complaints by an important environmental organisation were addressed in the project design.
	Greece – Rio Antirio Bridge	4	Given the unprecedented technical and financial requirements, the selection process was rather complex. It was overall successful thanks to the very close cooperation between the Ministry of Economy, the European Commission and the EIB.
	Hungary – M43 Motorway	2	The selection process was coordinated by the National Development Agency. The project was finally included in the Transport Operational Programme approved by the Government. JASPERS supported local authorities in the selection process.
	Latvia – Saulkrasti Bypass	4	The whole project definition and options selection process managed by the Latvian State Administration – with the support of different consultants – played a positive role in the project's final performance. The process was based on sound feasibility studies and involvement of all the stakeholders, including the municipalities and citizens through two public consultations.
	Spain – Malaga Bypass	3	The selection process leading to the public investment decision was highly centralised because the project itself is part of national road network. Local authorities had a marginal role in the whole process, which resulted in a rather poor coordination with other local plans. However, the overall smooth selection process positively contributed to project performance, by ensuring the implementation of the best option to achieve the project's objectives.
Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	3	The selection process was carried out by the project promoter (PKP PLK S.A.) and it followed ordinary procedures, including public consultation and environmental assessment. No significant complications emerged.
	Slovakia – Žilina Railway Modernisation	-4	The selection process was affected by a weak estimation of the economic viability of the project at the feasibility study stage. A more precise ex ante assessment could possibly have led to the definition of a more cost-effective solution for the major project than the one eventually implemented. The delay in the implementation of the modernisation of the other sections of the Rhine-Danube Corridor, including the Krásno nad Kysucou–Čadca, is also likely to have negatively impacted on the overall performance of the project.

Sector	Case study	Strength (*)	Comments
Urban transport	France - Le Havre tramway	-2	The selection process was strongly driven by political considerations. However, it included an open and participatory consultation process three years before the construction of the tramway line, to ensure that citizens' voices were heard and taken into consideration.
	Italy - Naples Metro Line 1	4	The selection phase of the project made a positive contribution to the performance of the project. The underlying logic of the selection process was to maximise the social benefits (e.g. improve transportation services as soon as possible).
	Poland - Gdańsk Tram	5	The implementation of the wider programme, including the definition of each phase, is supported by a prioritisation mechanism based on constant monitoring of the technical status of the tram network vis-à-vis the demographic, economic and spatial development of the city and citizens' needs assessed through public consultations. The public consultations revealed the citizens' preference for a larger parking lot.

*Note: * the strength score reflects the weight of the role that the selection process played compared to the final judgment of the project. In particular:*
-5 = the determinant is responsible for the negative performance of the project;
-4 = the determinant makes a negative contribution to the overall performance of the project;
-3 = the determinant contributes in a moderately negative way to the overall performance of the project;
-2 = the determinant makes a slightly negative contribution to project performance;
-1 = the determinant plays a negative, but almost negligible, role in the overall project performance;
0 = the determinant does not play a role in the project performance;
+1= the determinant plays a positive, but almost negligible, role in the overall project performance;
+2 = the determinant makes a slightly positive contribution to project performance;
+3 = the determinant contributes in a moderately positive way to the performance;
+4 = the determinant provides a positive contribution to the overall performance of the project;
+5 = the determinant is responsible for the positive performance of the project.

Overall, the **selection process made a positive or slightly positive contribution to project performance.** That is to say that – on average – the **selection process went smoothly and there were no major complications.** This is also due to the fact that in most cases the projects were included in wider transport and mobility plans for which the planning and selection processes follow well established regulatory and administrative frameworks. The steps, which may differ from case to case, usually include a preliminary needs assessment followed by a feasibility and options analysis. Once an option is selected, it is subject to a stakeholder consultation, usually in the form of a public hearing where complaints and suggestions may be taken into account. Following this, the project design is fully developed and the project is implemented.

As noted in the section on efficiency, the ten cases did not experience major delays during the construction phase, i.e. from the start of the work to the completion. If looking, however, at the entire process from initial identification to the formulation of plans, the prioritisation mechanisms, the project selection and preparation, **such processes may be extremely lengthy**. The implementation of a major project takes a lot of time: decades may pass from the first project idea to its actual implementation. For strategic, financial and technical reasons, **projects may remain in the pipeline for a significant time**. For instance, the very first idea of the ***Malaga Bypass*** was conceived in 1997, 10 years before the beginning of its construction phase. Similarly, the first idea for the ***A14*** between Wismar and Schwerin was envisaged in 1992, 15 years before the construction of the section Jesendorf – Schwerin Nord under assessment. The first proposals for the ***Rio Antirio*** were considered in the 1970s. Most critical delays usually occur during such phases rather than during construction.

A particularly critical step in the selection process within a wider plan is the **prioritisation of individual projects**. In the ***Gdańsk Tram***, the project promoter (i.e. the City of Gdańsk) used a prioritisation mechanism based on constant monitoring of the technical status of the tram network vis-à-vis demographic, economic and spatial development of the City and citizen's needs collected through public consultations. A similar case occurred in ***Naples*** where a radically innovative approach was adopted. Some of the former urban transport related issues were partly caused by an approach characterised by comprehensive and rigid choices to be realised without indicating any priority or precise timing. In the case of Metro Line 1, the logic of the selection process was to maximise the social benefits given the existing physical constraints and optimising the available budget. Systematic planning prioritising more mature and urgent interventions was considered a success of the plan implementation.

Stakeholders' consultations were part of the selection processes in most of the cases under assessment. While bringing value to the project design and acceptability, such practices may also add complexity and introduce uncertainty if not appropriately steered. In the case of the ***Metro in Naples*** stakeholder participation was high and active. The involved stakeholders ranged from the local government to EU institutions, guaranteeing multi-level standpoints. The consultation was organised in five steps in which each stakeholder's opinion was listened to and taken into account. It is considered a successful practice that added value to the project. The ***Malaga Bypass*** is an example of a more **top-down process of consultation with local stakeholders.** Given its national relevance, the selection process was implemented by the Ministry of Infrastructure, which also assessed the possible alternatives. As laid down by Spanish law, the preliminary design is submitted to public consultations through which stakeholders (from citizens to other institutions) can express their suggestions and concerns. Then, the Ministry examines these inputs providing an official response and adapting the design if needed.

Effective **stakeholder consultations are helpful to increase project acceptability by the local population**. 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 and discuss the project. Communication campaigns reached most media (informational videos, public film projections, leaflets, posters, newspaper articles, televised news segments), and also took the form of local exhibitions in city halls and public buildings, and interactive public meetings. Furthermore, eight 'ambassadeurs tramway' (tramway ambassadors) were posted at the construction site and intervened in events during the work to inform citizens and answer their questions. During 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 via communication material. This practice ensured high visibility and social acceptability of the project on the part of the population.

Besides more strategic considerations, the selection process includes the development of 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** (see further discussion on option analysis in the next section). For instance, the decision to select a wider road in Malaga proved to be efficient in the long-run. The socio-economic assessment of the railway modernisation in Žilina led to

the conclusion that 160 Km/h railway for all train types is too costly compared to the potential benefits.

As the selection process may take a long time, the validity of these assessments may be challenged by changes in the circumstances. In some cases, despite **the long duration of the selection process, no significant update on the technical and economic analysis had been carried out**. As the project had already been in the pipeline for a long time, the selection process proceeded without re-considering the suitability of the project 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. In that period, improving infrastructures in the former German Democratic Republic was widely supported at the political and institutional level. The selection process was politically driven and relied on forecasts and expectations that became outdated by the time of project implementation. Perhaps, given the observed negative population trend, the selection process should have been more critical in assessing whether the project was still relevant given the changed context. Also, while different options were considered, in an ex post perspective a different alignment of the motorway seemed more appropriate.

In other cases, an effective updating and review of project feasibility studies was conducted. A good example is the ***Malaga Bypass*** which was initially conceived in 1997 and the first feasibility study was carried 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 and an environmental assessment. The selected project was flexible, leaving open the possibility to expand the road from three to four carriageways without necessarily modifying the full project design and thus restarting the procedure. This updating and this flexibility proved to be a success factor in the project design. In the ***Latvian case***, the selection process relied on updated and detailed technical analyses. Two of the six possible alternatives proposed in 1998 were selected for further detailed analysis and subsequently submitted to public consultations. Then, the best option was selected through a multi-criteria approach including stakeholder consultations and technical and financial considerations. **The validity of the project was scrutinised several times and in different periods.** The same also applied to the ***Rio Antirio Bridge*** whose technical complexity called for a number of updated option analyses.

As discussed in Section 3.5, the timely involvement of the EU services in the selection process and project preparation may deliver added value. If interaction with the EC only takes place for the funding decision, then 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 (e.g. in the two Polish cases that benefited from JASPERS assistance).

In a number of cases, the selection process was driven more by strategic and technical considerations, while the CBA was prepared at the very last moment in the framework of the request for funding. Most of the selected projects were already in 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 funding requirements and not that of appropriately informing the selection process already in the early stages. In such cases, the informative potential of the CBA clearly remains under-utilised.

4.3 PROJECT DESIGN

Project design refers to the technical capacity (including engineering and financial expertise) to properly design the infrastructure project. From a general standpoint, we can distinguish:

- The technical capacity to identify **the most appropriate conceptual design, including more strategic considerations in terms of alternative options.**
- The technical capacity to **develop the more detailed level of design (preliminary and detailed), and to identify the most effective and efficient infrastructure solutions and construction techniques**, thus avoiding common pitfalls in the construction stage (such as introducing variants that are not consistent with the original conceptual design) and the risk of cost overruns during the construction phase by choosing inappropriate technical solutions.

Table 23. Scores for the project design as a determinant of project outcomes (from -5 to +5)

Sector	Case study	Strength (*)	Comments
Road	Germany – Autobahn A14	2	The conceptual design was flawed by the decision to align it with the road on the eastern side of the Lake Schwerin. From an ex post perspective, this decision did not maximise project benefits as the area is less populated. On the other hand, the designed infrastructure proved to be well-suited using recent technology, with effective environmental mitigation measures.
	Greece – Rio Antirio Bridge	5	The Rio Antirio Bridge was a challenging project from a technical point of view. Due to the peculiar conditions (especially seismic activity) of the area, several unique engineering problems needed to be considered and overcome. Special design and construction techniques were applied, including a seismic monitoring system. The project won the 2005 ASCE Outstanding Civil Engineering Achievement Award.
	Hungary – M43 Motorway	3	Overall, the project design contributed positively to the outcome of the project. The conceptual design initially laid down a bypass around the City of Mako that was postponed due to delays in the environmental impact assessment. The road crosses a hydrocarbon field and a river, but efficient countermeasures were taken in both cases.
	Latvia – Saulkrasti Bypass	4	As the Latvian State did not have solid previous experience in road construction, the project posed some challenges. Moreover, it was the first ever project to be implemented in compliance with EU standards. No major accidents occurred and no complaints by local citizens were recorded. This evidence shows that the project design had a positive impact on project performance.
	Spain – Malaga Bypass	5	The conceptual design was marked by two distinct constraining factors effectively addressed by the project manager (The Ministry). On one hand, the physical features of the implementation area limited the scope of the design. On the other, the width of the road posed some challenges. All four contractors involved in the road construction delivered high quality. The Churriana Tunnel won the FIDIC award in 2016.
Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	3	The project's conceptual design did not present specific technical difficulties. The construction of the new railway did not involve any unconventional construction techniques. However, the capacity at Warsaw Służewiec railway station (from which trains depart for the airport) is not sufficient in peak hours. Users cross the railway line to exit the station. Countermeasures have been taken, including installing "do not cross" signs and barriers, but these have not proven to be effective. The City of Warsaw and the infrastructure manager are currently examining infrastructure solutions to solve the problem.

Sector	Case study	Strength (*)	Comments
	Slovakia – Žilina Railway Modernisation	3	The design of the project did not pose specific technical difficulties as also commented by JASPERS in their review. As a matter of fact, the project entailed only limited realignments of the existing railway line. Some technical issues emerged in the first operating days as problems occurred in the automatic control systems of level crossings, which were promptly solved.
Urban transport	France - Le Havre tramway	5	The conceptual design was grounded in the objective of ensuring social cohesion between the upper and the lower sides of the City. The project also contributed to re-designing the city streets by providing safer pedestrian and cycling routes. Overall, the project design was remarkable and appreciated by citizens and users.
	Italy - Naples Metro Line 1	4	Designed to tackle the two main problems of the city concerning transport needs and urban decay, the project design is technically complex and attracted both praise and criticism. Art stations were designed by famous engineers and architects, often using very sophisticated standards and technologies. The excavation work overcame issues related to archaeology and soil characteristics. Criticisms of the project design relate mainly to costs.
	Poland - Gdańsk Tram	3	Overall the conceptual design was good and efficient as it achieved the objective of providing a better public transport service to the southern area of the City. Some issues emerged in the design of the Łostowice-Świętokrzyska tram loop. Residents complained that noise emissions were not effectively reduced by the noise barriers because the tram tracks were too close. However, the constructor was unable to situate the tram tracks closer to the barriers due to land ownership issues.

*Note: * the strength score reflects the weight of the role that project design played compared to the final judgment of the project. In particular:*
-5 = the determinant is responsible for the negative performance of the project;
-4 = the determinant makes a negative contribution to the overall performance of the project;
-3 = the determinant contributes in a moderately negative way to the overall performance of the project;
-2 = the determinant makes a slightly negative contribution to the project performance;
-1 = the determinant plays a negative, but almost negligible, role in the overall project performance;
0 = the determinant does not play a role in the project performance;
+1= the determinant plays a positive, but almost negligible, role in the overall project performance;
+2 = the determinant makes a slightly positive contribution to the project performance;
+3 = the determinant contributes in a moderately positive way to the performance;
+4 = the determinant makes a positive contribution to the overall performance of the project;
+5 = the determinant is responsible for the positive performance of the project.

As far as the **conceptual design** is concerned (i.e. the decision to implement a given project to meet existing needs), most of its success relies on the **quality of the option analysis.** Projects selected through an effective option analysis usually have a better design. This is particularly clear in the ***Saulkrasti Bypass*** whose final design was the result of a good option analysis. The opposite is true of the ***Le Havre tramway*** whose strong political backing reduced the scope for an effective option analysis. In hindsight, the very decision to choose a tramway as an urban renewal tool can be debated. The options analysis considered only two alternative project options related to the tramway alignment, but it disregarded more strategic considerations. The option of a trolleybus was also discussed among elected officials, but not preferred due to the political preference for a tramway, and therefore excluded from the studies.

Concerning the technical capacity to **design the most effective and efficient infrastructure solutions,** evidence from the case studies shows that **most of the projects were designed with adequate and** – in some cases – **innovative and pioneering techniques**. The technical complexity varies significantly among the ten selected projects, ranging from a rather straightforward design (***Žilina***) to a technical and

engineering masterpiece (***Rio Antirio Bridge***). From the ten selected projects, it appears that **higher technical and engineering challenges resulted in a high quality project design.** This is particularly clear in the case of the ***Rio Antirio Bridge*** whose length and location in a seismic zone had been a historical obstacle. Despite these technical complexities, the construction phase did not face significant problems. It was the first ever non-US based project to win the 2005 ASCE Outstanding Civil Engineering Achievement Award (OPAL) and it was featured in many international media, including Discovery and National Geographic TV channels. Albeit not on the scale of the Rio Antirio, the ***Malaga Bypass*** also faced physical challenges and features highly advanced technical components. The area surrounding the bypass is mountainous and hostile, posing significant challenges for a road with such an extended width. The bypass includes a 1,250-metre-long tunnel under Sierra Churriana that won the 'FIDIC Award of Merit 2016'. The construction of ***Naples Metro Line 1*** is another notable example. Significant difficulties emerged during the excavation of groundwater layers and sophisticated technologies were used for the construction of the twin-tunnels including ground freezing for the excavation underneath groundwater layers. In addition, the design of the *Art Stations* appears to be effective and spot-on. Besides being widely appreciated by the public and users, the *Art Stations* won several national and international prizes.

In other cases, **the projects were not particularly complex *per se* but their smooth implementation shows good technical capacity by project managers.** This is particularly clear in the ***Saulkrasti Bypass*** which was considered to be rather complex vis-à-vis the existing road construction experience in Latvia after restoration of national independence in 1990. The project includes 17 different road structures including seven grade-separated junctions and two railway bridges and it was the first Latvian project to be built in compliance with EU standards. The current performance of the bypass (especially in terms of capacity and road deterioration) proved that the project had an effective technical design. Despite its sub-optimum location on the eastern side of the lake, the ***A14 Autobahn*** was built following high technical standards and completed within time and under budget, which is not common for public sector projects in Germany. In addition, the roadway is one of the first in Germany where the bearing and surface layers are combined. This recent technology is more efficient in the construction, requires less material and results in an improved quality of the roadway. Also, the project design successfully incorporated innovative environmental measures.

In other cases, **some technical design-related problems were identified that emerged once the project became operational**. This is particularly clear in the poor capacity of at Warsaw Sluzewiec station in the railway connection to ***Warsaw Chopin Airport***. The design solution of this station is not adequate to accommodate the passengers using the station to reach the Służewiec business area. This business area developed more than expected, with an overall low level of road accessibility and available parking infrastructure, all this resulting in high utilisation of the station. During peak hours, users struggle to leave the station as the number of exits is not sufficient. Some users cross railway lines, which is a serious safety risk. The City of Warsaw/Infrastructure Manager promptly reacted by installing "do not cross" signs but a more long-term solution is currently under analysis. To a limited extent, the design of the ***Gdańsk tram*** caused some problems with residents in the area of the Łostowice-Świętokrzyska tram loop. They complain about the noise externalities created by the tramway, arguing that the tram tracks should have been put some metres further from the existing housing estates and that parking should have been realised between their houses and the tram tracks. The

municipality answered this criticism stating that there were no alternatives due to land-ownership issues.

Good engineering capacity is also linked to managerial capacity since it relates also to the ability to react to unexpected technical issues. **In general, these were handled timely and effectively without significant cost overruns.** For instance, the excavation for the railway connection to Chopin airport led to the discovery of WWII landmines. These were promptly removed without significant delays or cost overruns. ***The M43*** runs through a hydrocarbon field and the appropriate countermeasures were taken without significantly affecting project design. Noise abatement measures were installed in ***Žilina*** upon completion of the construction work and measurement of the actual emissions of the operation of the line, proving additional noise barriers and windows in some public buildings were required to fully comply with the emission standards. This resulted in an extension of the contract duration of six months, albeit not increasing the originally estimated project budget.

4.4 FORECASTING CAPACITY

Forecasting capacity is understood as the capacity ex ante to predict future trends, forecast the demand level and estimate the technical challenges, thus estimating correctly the required resources. It is a dimension related to the technical effort put in place in the ex ante phase during project preparation and design.

In particular, technical forecasting capacity is related to the quality of the data used and the forecasting/planning techniques adopted. At the same time, forecasting capacity includes the ability of the project promoter and technical experts to avoid planning fallacy (the tendency to underestimate the time or cost needed to complete certain tasks) and optimism bias (the systematic tendency to be overly optimistic about the outcomes of actions).

The table below presents the assessment of the "forecasting capacity" as a determinant to project outcomes in each of the 10 selected case studies.

Table 24. Scores for the forecasting capacity as a determinant of project outcomes (from -5 to +5)

Sector	Case study	Strength (*)	Comments
Road	Germany – Autobahn A14	-3	The ex ante demand analysis was affected by an optimism bias and ex post data shows that the demand was grossly overestimated.
	Greece – Rio Antirio Bridge	5	The ex ante forecasts were prudently conservative and this proved to be a successful aspect of the project especially in the face of the economic crisis and its negative effect on demand.
	Hungary – M43 Motorway	-2	Demand analysis was overestimated ex ante, especially for heavy traffic, with severe implications in terms of economic benefits shortfall. Assumptions on the average speed were also unrealistic.
	Latvia – Saulkrasti Bypass	2	Demand was overestimated ex ante, but the forecast for the share of traffic on the new road was conservative. The project costs increased by 167% in nominal terms. However, forecasting pitfalls did not cause major difficulties in terms of project performance.
	Spain – Malaga Bypass	4	The forecasting exercise was appropriately carried out, the capacity of the bypass was increased in the very last stage of design to cope with an expected

Sector	Case study	Strength (*)	Comments
			higher demand.
Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	4	Ex ante forecasts were conservative and observed traffic is higher than expected. Project costs were slightly reduced compared to forecasts due to an appropriate management of the procurement process.
	Slovakia – Žilina Railway Modernisation	1	Traffic demand was slightly overestimated in terms of the number of trains and freight transport, but the observed total number of passengers is higher than expected. The cost estimates were accurate.
Urban transport	France - Le Havre tramway	-3	The forecasting exercise was overoptimistic both in terms of cost assessment and demand analysis. The high political pressure to implement the project may have provided an incentive for strategic misrepresentation of the project.
	Italy - Naples Metro Line 1	-3	The forecasting exercise was affected by an optimism bias especially as regards the conditions underpinning traffic demand, but also some strategic aspects of project management in the operational phase (in particular the capacity to ensure the conditions for proper service management).
	Poland - Gdańsk Tram	4	The forecasting exercise was appropriately carried out. The support of JASPERS was useful to steer the demand analysis in a more conservative direction and reconsider the tariff system of the service.

*Note: * the strength score reflects the weight of the role that forecasting capacity played compared to the final judgment of the project. In particular:*
-5 = the determinant is responsible for the negative performance of the project;
-4 = the determinant makes a negative contribution to the overall performance of the project;
-3 = the determinant contributes in a moderately negative way to the overall performance of the project;
-2 = the determinant makes a slightly negative contribution to project performance;
-1 = the determinant plays a negative but almost negligible role in the overall project performance;
0 = the determinant does not play a role in project performance;
+1= the determinant plays a positive, but almost negligible, role in the overall project performance;
+2 = the determinant makes a slightly positive contribution to project performance;
+3 = the determinant contributes in a moderately positive way to the performance;
+4 = the determinant makes a positive contribution to the overall performance of the project;
+5 = the determinant is responsible for the positive performance of the project.

The forecasting exercise (including data collection and modelling) is the foundation for a sound project performance. The development of a reliable demand model and the adoption of a prudential mind-set are central to the delivery of a robust appraisal. Whilst there are also some examples of good practice in the ten transport projects, we find that, overall, **forecasting is a major critical area**. The case studies show that **ex ante forecasts are often overly optimistic,** and this may affect the project design, the overall timeline, the financial sustainability as well as the actual delivery of long-term effects.

In some case studies demand had been overestimated. This was the case of the ***M43 Motorway*** in Hungary and the ***A14 Motorway*** in Germany. However, it should be remembered that these two projects are part of larger networks and the traffic demand on these two sections is influenced by the implementation of other investments foreseen in the network. A slightly different example was provided by the ***Tram in Le Havre***. Here, the weak forecasting capacity for passenger demand was mainly due to an over-estimation of the potential for modal shift from private vehicles to the tramway.

Apart from demand assessment, forecasting deficiencies related to the construction or service delivery may hamper project performance. In the case of

Naples Metro Line 1 forecasting capacity was affected by an optimism bias on several occasions regarding the conditions affecting a sound service management, including the availability of rolling stock. The insufficient number of circulating trains along the whole of Line 1 is a major factor negatively affecting the performance of the project today, and the completion of other planned interventions at urban and regional level. Considerations of the capacity of the service provider to manage in an appropriate way an enlarged and much more complex public network system in a situation of constrained public funds were too optimistic.

An additional recurrent aspect, although much less critical, is the underestimation of completion time. The most notable example is the construction of the ***new west bypass of Malaga*** which lasted 25 months longer than envisaged in the project dossier. The delay was at least partially due to the modification of the project design, but also to an external and unforeseeable event, a river flood. In the case of the ***Naples Metro Line 1***, timing issues affected the implementation of the overall metro system, especially the tunnel excavation and the implementation of some of the stations. In particular, regarding the excavation work, geological and archaeological features were not sufficiently reflected in the project time schedule, with noticeable negative consequences since the postponement of the implementation of the entire plan and opening of stations was reflected in increased road traffic congestion around the construction sites.

The main consequences of an optimism bias are reduced effectiveness and problems related to financial sustainability: projects cannot deliver the expected benefits and may experience financial problems. However, not all projects affected by over-optimism necessarily fail. There are several factors, either internal (such as managerial capacity) or external (such as unexpected favourable events) that can counteract the negative effect of weak forecasting capacity in the initial stage.

Depending on the case, the overestimation of demand had more or less serious implications for project performance. In ***Hungary***, where expected passenger traffic was overestimated, especially for heavy goods traffic, the observed project performance is below expectations, but still positive. More serious is the case of ***Le Havre***, where the weak forecasting capacity related to both passenger demand and project costs (the overruns stemmed from additional work required during the construction of the line as well as unforeseen circumstances like a fire or the death of a construction worker). In that case the extent and nature of the bias led to the negative performance of the project. On the other hand, the ***Saulkrasti Bypass*** provides an example of a project where the slightly over-optimistic demand forecast (the total number of vehicles forecasted on the old road and the new bypass was higher in the ex ante analysis than actually counted over 2000-2016) was counterbalanced by a larger share of diverted traffic than expected (much more traffic than expected was diverted to the bypass from the existing road crossing the city). This is the result of a combination of factors: residents' preference to use the bypass rather than the old road to cross the city, the changing political and economic situation which Latvia encountered after joining the EU and the economic crisis of 2008.

A prudential approach to predicting traffic flows, time and costs is a measure to prevent a project's underperformance. For example, in case of the ***Rio Antirio Bridge***, the ex ante CBA took a very prudential approach in predicting traffic demand. Thus, despite the significant decline due to the unforeseen global recession from 2008 onwards, the current traffic volumes are only marginally lower than the projections developed in the ex ante phase. Hence, the project's socio-economic performance has remained positive over the years. Also, the fact that the concession contract was based on these forecasts has

mitigated the effects of the economic crisis on the financial performance of this public-private partnership project.

Forecasting was also a positive asset of the two ***Polish projects***. In both of them, **the forecasting capacity of the project promoters benefitted from the technical support of JASPERS**. For example, during the projects' preparatory phase, JASPERS experts provided comments and suggestions to adjust the traffic forecasts, which led to the adoption of more conservative estimates for the modal split. In the case of the ***Gdańsk project***, JASPERS also recommended the introduction of tariff integration across urban transport services as a way of further increasing the attractiveness of the services and encouraging people to use public transport by simplifying switching between transport modes.

When one of the main project objectives is to induce a modal shift, an important aspect of the forecasting exercise is the analysis and modelling of the behaviour of travellers and firms. The appropriate incentives to induce the shift must be in place and the timing aspect must be carefully taken into account. In fact, it may take time before travellers effectively discover and make use of a new transportation facility and change their travel behaviour accordingly. For example, the ease of driving a car in ***Le Havre*** and its inhabitants' preference for this mode of transport have likely reduced the actual share of passengers originating from a modal shift.

Forecasting capacity is also important as far as financial sustainability is concerned. A huge escalation of the initial investment cost requires a sudden mobilisation of additional financing sources to cope with increased expenses on a year by year basis. For example, this is what happened in the construction of the ***Saulkrasti Bypass*** in Latvia. The state budget was used to cover the cost overrun, at the expenses of alternative uses of that money.

Good forecasting of demand is crucial to decide on an appropriate design or to design the most adequate tariff system. In some cases, the introduction of tolls can meet resistance from the users and hamper the overall financial sustainability as well as project performance. In Spain, the possibility of levying a toll on the ***new west bypass of Malaga*** was discarded because it would have discouraged vehicles, especially local users, from using the bypass. Moreover, the decision to put the bypass under the Ministry's direct control was expected to provide a stronger assurance about the project's financial sustainability in the long-term.

Inaccurate forecasts may be caused by a variety of factors, some of which are genuine errors or lack of technical expertise and tools. The availability of a solid and rigorous transport model, for example, is a condition that may limit forecasting bias. As discussed during the seminar, the reliability of traffic models depends on the assumptions underpinning the model. For example, a demand forecast for a transport project may be made on a single or bi-modal basis, which may not necessarily reflect the inter-dependencies and competition across all types of modes; also, it almost always ignores potential future intra-modal developments (such as self-driving cars). In addition, local models cannot be used for forecasts of projects with international relevance. Thus, there was consensus that there should be more focus on the quality of traffic models underpinning the entire forecasting exercise and the CBA. 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.

The availability of sound transport modelling is advisable also for the purpose of the ex post evaluation. To this end, it should be noted that the current study suffers from the limitation that in only one of the ten cases (Hungary) was it possible to re-run the traffic model with the current data and knowledge, which is a demanding activity and requires access to the model as well as the technical expertise to run it. In all the other cases forecasts of future demand were based on projections of current data based on ex ante assumptions, discussed during the interviews and, when relevant, slightly revised. While being a solid approach, this does influence the informative value of the ex post evaluations.

In other cases, inaccurate forecasts may result from the strategic misrepresentation of project promoters and decision-makers. It is worth noting that based on the evidence from the case studies, **projects driven by more political considerations are those that perform worse in terms of forecasting capacity** (see table below). When a project is not driven by a clear transport need, such as the reduction of traffic congestion, there could be an incentive to be less accurate and prudent on some critical assumptions, especially those related to context factors (e.g. income or population growth).

Table 25. Forecasting capacity and considerations driving the financing decision

Sector	Case study	Forecasting capacity (*)	Political will to maximise broad effects related to economic development and quality of life (§)
Road	Germany – Autobahn A14	-3	●
	Greece – Rio Antirio Bridge	5	●
	Hungary – M43 Motorway	-2	●
	Latvia – Saulkrasti Bypass	2	●
	Spain – Malaga Bypass	4	●
Rail	Poland – Warsaw	4	●
	Slovakia – Žilina	1	●
Urban transport	France - Le Havre	-3	●
	Italy - Naples Metro Line 1	-3	●
	Poland - Gdańsk Tram	4	●

*Note: * the strength score reflects the weight of the role that forecasting capacity played compared to the final judgment of the project. For the legend of scores, see the previous figure. § Legend: green circle = yes; yellow circle = partially; red circle = no; grey circle = not relevant*

The forecasting exercise is the core of the CBA. Thus, **deficiencies in the forecasts are reflected in the quality of the CBA.** Beyond the demand analysis and from a purely methodological point of view, there is the recognition that all the CBAs were in general rather sound and of a good quality and, as discussed during the stakeholders' seminar, this seems to be an improvement compared to the past programming periods. **It is evident from the review of the ten ex ante CBAs that they are broadly consistent in scope with the methodology of the EU CBA guide**. In addition, they often also reflected national guidelines, especially in the use of unit values for benefits. CBAs now include a set of standard effects and use parameters, such as VOC (Vehicle Operating Costs) and VOT (Value of Time), calculated based on common methodologies. The standardisation of CBA methodology across the EU allows for greater comparison between projects. Perhaps surprising, the limited quantification of reliability benefits is still troublesome; however, well

accepted methodologies and suggested unit values are available for this purpose. The most problematic aspects remain the inclusion of network effects and especially wider effects, in particular the more indirect ones, on socio-economic development. Such aspects were the weakest ones in the ex ante CBAs and were responsible for an inflated overall ex ante result (this is true of the German and French cases).

4.5 GOVERNANCE STRUCTURE

In the framework of this study **project governance concerns the number and type of stakeholders involved during the project cycle and how responsibilities are attributed and shared.** This is influenced by the incentive mechanisms in place. If bad incentives exist, this can lead different actors involved in the project management to provide benefits for their members, thus diverting funds away from their optimum use, or forcing them to delegate responsibilities according to a non-transparent procedure. On the contrary, if proper incentives are in place, there is a common commitment to the long-term objectives of delivering net benefits to society with an efficient use of funds.

The table below presents the assessment of "project governance" as a determinant to project outcomes in each of the 10 selected case studies.

Table 26. Scores for project governance as a determinant of project outcomes (from -5 to +5)

Sector	Case study	Strength (*)	Motivation
Road	Germany – Autobahn A14	4	The project governance of the A14 in Germany relied **on highly regulated and well-established national structures and** contributed positively to the outcome of the project.
	Greece – Rio Antirio Bridge	5	This was a project with a high number of stakeholders involved during the entire project cycle and **the fruitful institutional relationship between the project's stakeholders** resulted in a positive outcome.
	Hungary – M43 Motorway	4	A **well-functioning governance system and clearly delegated responsibilities** were identified as positive aspects that contributed positively to the outcome of the project.
	Latvia – Saulkrasti Bypass	4	The **governance structure was set up in accordance with the requirements for managing EU funds and proved to be effective** after initial complications.
	Spain – Malaga Bypass	1	The findings on the effect of the governance system on **project performance are mixed**: the predominantly top-down decision process contributed positively, while at the same time insufficient dialogue and coordination constrained the project's potential to improve the service conditions for local users.
Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	3	A number of stakeholders were involved. **Good cooperation among the different stakeholders**, as well as an experienced team, contributed in a moderately positive way to the outcome of the project.
	Slovakia – Žilina Railway Modernisation	3	The project involved a **very limited number of stakeholders** during the entire project cycle.
Urban transport	France - Le Havre tramway	4	Project governance was defined by a **compact and dynamic team set up for managing the project and good interactions with all other actors**.
	Italy - Naples Metro Line 1	-5	The assessment shows **that the complex governance structure was a key negative determinant** of the past and present performance.

Sector	Case study	Strength (*)	Motivation
	Poland - Gdańsk Tram	5	A high number of stakeholders were involved during the entire project cycle and **long-lasting experience and stability in the management team and a very high level of cooperation between the involved units** was reported.

*Note: * the strength score reflects the weight of the role that the project governance played compared to the final judgment of the project. In particular:*
-5 = the determinant is responsible for the negative performance of the project;
-4 = the determinant provides a negative contribution to the overall performance of the project;
-3 = the determinant contributes in a moderately negative way to the overall performance of the project;
-2 = the determinant makes a slightly negative contribution to project performance;
-1 = the determinant plays a negative but almost negligible role in the overall project performance;
0 = the determinant does not play a role in project performance;
+1= the determinant plays a positive, but almost negligible, role in the overall project performance;
+2 = the determinant makes a slightly positive contribution to project performance;
+3 = the determinant contributes in a moderately positive way to the performance;
+4 = the determinant provides a positive contribution to the overall performance of the project;
+5 = the determinant is responsible for the positive performance of the project.

While the picture of project governance is overall rather positive, there are a few projects with an intermediate or even bad performance. Only one clearly negative example was reported in the ***case of Naples***, where complex and uncoordinated project governance, mainly during the operational phase, had a major impact on project performance (both operational and financial).

The **number of stakeholders** involved throughout the case studies was not a clear determinant of positive or negative outcomes and was very diverse. For example, in the ***Le Havre Tram*** project a limited number of stakeholders ensured smooth implementation and a clear direction to project implementation. On the other hand, some projects like ***Rio Antirio Bridge*** in Greece or the ***Gdańsk Tram*** involved a high number of stakeholders during the process, but their coordination was ensured by a sound contracting structure (see more on this below).

Governance structures are strongly determined by how the project ownership and the funding mechanisms are spread among the stakeholders. The funding for the projects, the financial sustainability issues and how these influence project performance were already discussed in the efficiency section. It is worth discussing here the reflection of the funding structure on the governance system.

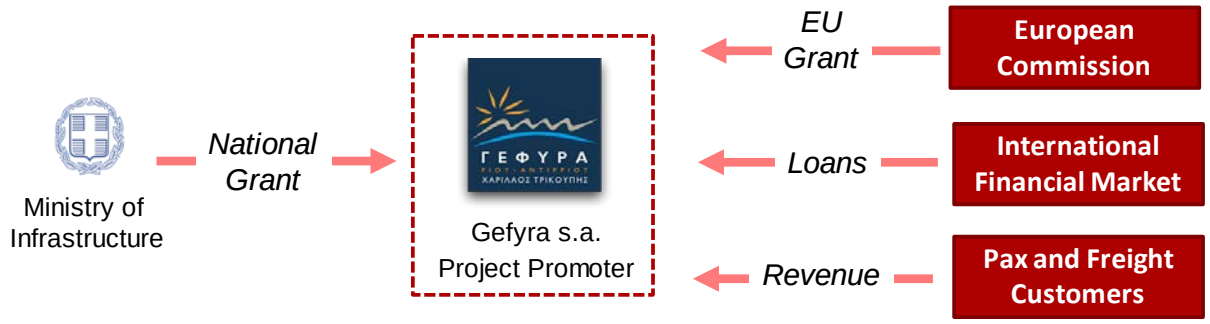
Project governance has major implications for the financial structure, especially in highly regulated network sectors where operators and infrastructure managers may need to be separated. Thus, key decisions for the definition of the financial governance of projects should be taken in an ex ante phase. A strategic decision, for example, relates to the choice of possible options such as Corporate Financing vs. Project Financing[35] or Programme vs. Project Financing. No unique solution exists since this needs to be considered on a case by case basis and fit the local context and capacity of the stakeholders.

A notable example is the ***Rio Antirio Bridge*****, the only case study project implemented as a public–private partnership (PPP) initiative**, one of the first ones in Greece. In the project a private company contributed 7.7 % of the project cost. The Greek State is involved through the Ministry of Development, Competitiveness, Infrastructure, Transportation and Networks, which is the contracting authority. The supervising authority

[35] The corporate finance approach means that the funding for the project is provided from the investor's own balance sheet resources. Instead, project finance refers to the financing of projects dependent on project cash flows for the repayment of debt and equity used to finance the project.

on behalf of the Ministry is the Special Secretariat of Public Works for Operation and Maintenance of Concession Projects. The legal basis for the concession was Law 1418/84 (public works law) and Presidential Decree 609/85 (public works contracting). The Greek Parliament was responsible for the ratification of the concession contract expressed in Law 2395/96 and Presidential Decree 387/97. The Concessionaire is "GEFYRA S.A." a Private Party with shareholders. The construction joint-venture included a number of contractors and subcontractors providing the design and construction. Two independent engineering firms reporting to the Concessionaire and to the Greek State performed the roles of Design Checker and Construction Supervision Engineer. A Lender's Technical Advisor provided an independent technical review for the financial partners prior to Financial Closing and throughout the design and construction periods. The role of all the Technical Advisors, who were interacting with and reporting to both the Concessionaire and the Lenders, was critical to this project given the number of innovative design solutions and unique construction techniques employed. In addition, GEFYRA was also the Operator of the project. Despite the high number of parties involved, the contractual arrangements and the identification of a unique strong coordinating partner, also managing the different sources of funding, proved to be a success factor in the specific case of this project.

Figure 7. Governance structure and funding mechanism in the Rio Antirio project



Source: authors

Appropriate contractual arrangements balancing autonomy and responsibility are key to ensure appropriate incentive schemes in project implementation. A well-designed PPP is just one of a number of available options. For example, an incentive system between different stakeholders in ***Le Havre*** was identified as a positive contribution to the project outcome. The region and the transport operator entered into a contract for the period 2012-2017 to define the shared responsibility for the organisation and management of the transport services. The contract was designed to ensure that the operation and maintenance of the services guaranteed a high level of quality, thanks to a system of financial rewards or penalties for the operator based on a set of criteria: punctuality of services, cleanliness of vehicles, quality of travel information, accessibility to persons with low mobility, sustainability, fraud prevention and certification. This incentive system has been common in France since the 1980s.

In **projects with a large number of stakeholders the importance of good cooperation, communication and a clear allocation of tasks, especially in terms of funding responsibility, were determinants of success**. In ***Naples*** this was not the case and its current governance arrangements have not helped the coordination of the fragmented actions and often conflicting interests of the many institutions and stakeholders involved in the project. A crucial difference compared to other projects was the lack of a clear division of responsibility between infrastructure construction and transport service operation. This caused the main inefficiencies in the overall coordination. A more effective

governance structure based on appropriate incentive mechanisms linking the construction with the service operating phase could have limited misalignments (in terms of time and budget) between investments in fixed infrastructures and those necessary to deliver a good transport service. As opposed to Naples, in the ***Žilina*** rail modernisation and the ***Warsaw*** airport rail connection both construction and service operations were managed by the railway infrastructure manager. Governance structures in such cases were more effective than in the Naples case.

The experience of the staff involved made a critical contribution to reliable performance. For example, in the urban transport project in ***Gdańsk***, the considerable experience and stability of the management team, including the project managers and coordinators who gained experience during the previous phases of this wide Gdańsk urban transport development scheme, positively affected the whole investment process and allowed for its further application in other programme components. Also in ***Saulkrasti*** a professional project management team with experience and knowledge gained in other Via Baltica reconstruction projects (implemented until 2005) ensured successful project management.

Governance structures following established frameworks were important success factors. For example, the project governance of the ***A14*** in Germany relied on highly regulated and well-established national procedures, since in Germany investments in the highway network follow strict national standards and did not need to be further investigated. Overall, this proved to be a positive determinant of project performance. Also, the ***Žilina*** rail modernisation project followed established routines and involved a very limited number of stakeholders during the entire project cycle.

The EU **played an important role in some cases by providing such a framework**. For the bypass project in ***Saulkrasti*** the governance structure was set up in accordance with the EU requirements to manage EU funds and proved to be effective after complications at the beginning due to the transition period once Latvia became a member of the EU. A shared objective, a clear allocation of responsibilities and close cooperation among the different actors assured good project implementation. In the very early phases of the project the governance structure and the number of stakeholders to be involved in project preparation and implementation were defined by mirroring the requirements set out in the EU ISPA regulations. The transition from the ISPA to the CF financing and implementation rules did not negatively affect the project's governance since procedures are quite similar, with the exception of the procurement rules. Also in the ***M43 project*** in Hungary project governance followed the standard Hungarian and EU procedures even though the project implementation process resulted in some important lessons that have been utilised for other major projects since then. The main lessons refer to the project management structure, the process of expropriation, environmental planning and the prevention of liquidity problems on the part of the building contractors. The structure was supported by the EU through mentoring and legal harmonisation. According to JASPERS, the Hungarian governance structure was capable of project implementation and it was able to integrate the main lessons into its management structure.

4.6 MANAGERIAL CAPACITY

In the context of this study managerial capacity is understood as the **professional ability to react to changes** in the context/needs and to unforeseen events both during project implementation and afterwards, in addition to **the professional capacity to manage the project** ensuring the expected level of service in the operational phase. Although managerial capacity is correlated to the governance structure, the latter relates to the wider

context while the former is more narrowly project focused. The table below presents the assessment of the "managerial capacity" as a determinant of project outcomes in each of the 10 selected case studies.

Table 27. Scores for managerial capacity as a determinant of project outcomes (from -5 to +5)

Sector	Case study	Strength (*)	Motivation
Road	Germany – Autobahn A14	4	No problems occurred during the construction phase. The project management does not entail major challenges as the motorway is managed by the state authority in line with national regulations.
	Greece – Rio Antirio Bridge	4	The **managerial capacity of the concessionaire,** which is responsible for the design, construction, financing, maintenance and operation of the Bridge during the 42-year concession period, **proved to be very positive**.
	Hungary – M43 Motorway	4	The managerial **capacity was one of the strengths of the project and contributed the successful implementation within budget** despite the presence of problems that had already started during the application process for EU funding.
	Latvia – Saulkrasti Bypass	5	The bypass was challenging due to the nature of the project as one of only a limited number of roads and in general **major construction projects, but the project management reacted positively to complications**.
	Spain – Malaga Bypass	4	The project was **implemented without any unexpected technical issues and remains in good condition**. In addition, the project owner, the Spanish Ministry of Infrastructure, **reacted positively to an unforeseen situation when the 2008 economic crisis** led to the Region suspending another project.
Rail	Poland – Warsaw Line 8 Modernisation and Airport Connection	3	The **implementation was challenging due to a number of technical factors that were handled properly**; during the **service operation phase problems surfaced that had yet to be entirely solved** at the time of writing.
	Slovakia – Žilina Railway Modernisation	4	The **project followed others within the modernisation programme of the Slovak railway lines and the implementing consortium had also already been involved in previous contracts and no problems occurred** in the project life-time.
Urban transport	France - Le Havre tramway	3	This factor was described as contributing somewhat positively to the project outcome – **the project was completed on time while at the same time showing a large budget overrun**.
	Italy - Naples Metro Line 1	-5	Poor managerial capacity is **one of the key negative determinants of the project**. The case study suggests that a favourable context and good ex ante preconditions avoided the complete failure of the project brought about by the negative determinants.
	Poland - Gdańsk Tram	4	**Management capacity is a largely positive determinant**. Some additional work was required during the construction phase, which, in turn, led to some additional expenses. However, considering some savings in the procurement procedures, the final investment cost amounted to nearly 20% less than the planned investment cost. **Unexpected technical issues were promptly and timely addressed by the project management**.

*Note: * the strength score reflects the weight of the role that the managerial capacity played compared to the final judgment of the project. In particular:*
-5 = the determinant is responsible for the negative performance of the project;
-4 = the determinant provides a negative contribution to the overall performance of the project;
-3 = the determinant contributes in a moderately negative way to the overall performance of the project;
-2 = the determinant makes a slightly negative contribution to project performance;
-1 = the determinant plays a negative but almost negligible role in the overall project performance;
0 = the determinant does not play a role in project performance;
+1= the determinant plays a positive, but almost negligible, role in the overall project performance;
+2 = the determinant makes a slightly positive contribution to project performance;
+3 = the determinant contributes in a moderately positive way to the performance;
+4 = the determinant provides a positive contribution to the overall performance of the project;
+5 = the determinant is responsible for the positive performance of the project.

Together with project design and relationship with the context, this determinant is one of those that contributed in a largely positive way to the overall performance of the projects. Only in one project, the ***Metro Line in Naples***, did managerial capacity have a clearly negative effect on the outcome of the project, while in the other projects it was predominantly positive or neutral.

In some cases, during the construction phases the projects ran into unexpected challenges. However, in all cases the project managers were able to address those problems. For example, in the ***Warsaw*** airport rail connection project the implementation was challenging due to a number of technical factors, including adapting to complicated local conditions by adopting special measures during the construction phase to prevent water egress, repairing a failure in the underground tunnel drainage system and removing landmines and hazardous waste from the construction site. Also in ***Gdańsk*** some additional work was required during the construction phase and such unexpected technical issues were promptly and timely addressed by the project management. In ***Hungary*** the project was delayed for seven months due to the bankruptcy of one of the building contractors, which caused a problem for the project management since many subcontractors of this building contractor were in difficulty due to unpaid costs. However, the project management reacted quickly to solve the problem and after an agreement with the remaining members of the M43 Tisza Consortium was reached in July 2010, it was possible to continue the project.

The application process for EU funding can help to structure the project but, on the other hand, it can also entail additional challenges. In the case of the ***M43*** motorway in Hungary the managerial capacity was challenged during the application process for EU funding: the feasibility plan had to be modified at the request of the EC, a disagreement over the eligibility of VAT as a cost for EU funding caused difficulties, and the environmental impact assessment (EIA) was also an issue since the Hungarian procedure was not in compliance with the EIA Directive and Natura 2000 guidelines. This was the first test for the project management of the M43 motorway and it ensured a basis of efficient cooperation among the different actors. In the case of ***Saulkrasti*** all tender documents had to be approved by multiple national institutions and eventually also by the European Commission Delegation since this occurred before Latvia joined the EU in 2004. This administrative procedure was very time-consuming and caused some delays. However, the project management reacted positively to this and other complications during the tender process and eventually the opening of Saulkrasti bypass was delayed only by three months.

During the operating phase, projects are vulnerable to unforeseen circumstances that must be addressed by the project managers. An extreme case is again the ***Naples Metro Line 1*** where inadequate management aggravated existing problems in the governance setup. Road projects all report good management during the exploitation phase, which is not surprising since most of them have been 'standard' schemes part of a bigger road network that was subject to national or regional management procedures. In the case of the ***Rio Antirio Bridge***, the only PPP in the set of projects whose management was in the hands of private sector actors, management was also seen as a success factor even though the project faced major challenges resulting from the 2008 economic crisis. In the two rail projects experiences were varied; while in ***Žilina*** the project management was able to build on experience and existing structures from the bigger rail network, in Warsaw the management faced challenges stemming from underestimation of the number of passengers using the Służewiec station, which still partly remain to be addressed.

The 2008 economic crisis entailed challenges in some projects either in the construction or in the operating phases, depending on their start date; in those

cases, flexible project management played a major role. For example, in ***Greece*** the concessionaire managed to keep the bridge service competitive despite the negative effects of the 2008 economic crisis by introducing a system of e-pass subscriptions that allows frequent users to reduce the cost of each single journey. The solution aims to keep the service competitive compared to the ferries. In ***Malaga*** the project owner, the Spanish Ministry of Infrastructure, reacted positively when the 2008 economic crisis led to the Region suspending another project, a connection between the new bypass and the Malaga airport. Since the lack of direct access to the airport would have limited the benefits generated by the project, the Ministry of Infrastructure decided to step in and take responsibility for the 1.6 km segment linking the bypass to the airport. The way in which the Ministry reacted to an event that was out of its control in order to make sure that the New West bypass fully delivered its intended service testifies to the its good managerial capacity. In ***Naples*** the actors failed to promptly implement effective actions to tackle the progressive reduction in funds due to the crisis and to solve the financial problems of the service provider stemming from internal management issues and factors external to the company (e.g. the financial difficulties of the Municipality and the crisis itself).

4.7 BEHAVIOURAL PATTERN

4.7.1 Testing stylised behavioural patterns

A project's behavioural pattern aims to define the **path taken by the project throughout its life-cycle**. As already stressed in the First Intermediate Report, project outcomes are not certain, as they result from a non-deterministic and often erratic combination of different and interrelated factors. The combination of the effects of the above-described determinants leads to the project's behavioural pattern. The interrelation of these determinants is crucial as they may reinforce or weaken each other. Furthermore, it is important to understand the dynamic perspective of the determinants. They may occur at different stages in the project cycle. While some of the above-described determinants are particularly relevant in early project phases (i.e. forecasting capacity), others are crucial in the operating phase (i.e. managerial capacity) or they can also involve the whole project life-cycle (relationship with the context).

Following the study's methodology, once the interrelation and the dynamic perspective of the determinants have been described, the final step consists of an in-depth analysis of the chain of interlinked causes determining project success or failure. In the First Intermediate Report a set of typical project behaviour patterns ('archetypal pattern') was proposed (see Table 2). Despite being necessarily stylised, the proposed behavioural pattern effectively takes into consideration the different phases of project cycles and reflects how determinants influence project success or failure. These stylised project behaviours have been helpful in framing different projects into common patterns. Furthermore, they provided a solid conceptual basis upon which variations and additions were made in order to capture nuances in project behaviours.

The findings of the study in terms of project behaviour confirm that **the reality is much more complex and nuanced than could reasonably have been expected ex ante**. Only three out ten projects fell appropriately into the original stylised pattern. For the remaining seven projects, new patterns emerged as variations of the archetypes. On the one hand, this finding confirmed that most of the projects tend to follow a unique path during their life-cycle, which hardly matches the stylised archetypes. On the other, the overall conceptual framework beyond the design of the archetypes appears to be workable.

The new patterns are either crossovers or nuanced versions of the original archetypes.

4.7.2 Interrelation between performance, determinants and dynamic behaviour

Once the project behaviours are identified, it is interesting to relate them to the scores for the evaluation criteria and determinants. The objective is to cluster (as far as possible) the different projects in order to draw general policy lessons, trying to establish a kind of comprehensive assessment in terms of degree of success (see the table and the graph below).

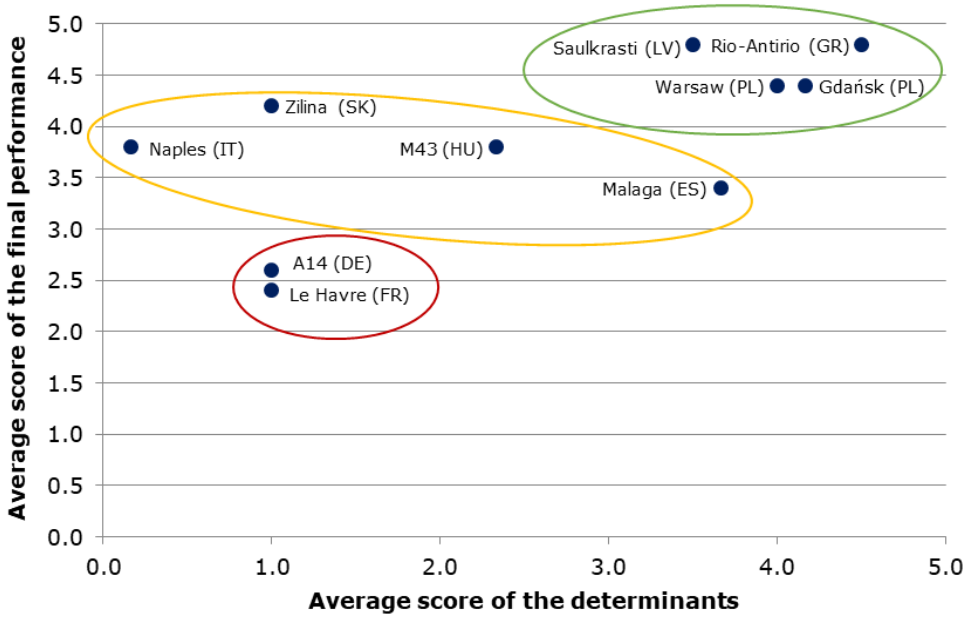
Table 28. Project performance, determinants and behaviour

Cluster	Case study	Behavioural pattern	Final performance					Determinants					
			Relevance	Coherence	Effectiveness	Efficiency	EU added value	Relation with the context	Selection process	Project design	Forecasting capacity	Project governance	Managerial capacity
Successful	Greece – Rio Antirio Bridge *(Bright Star)*	A project in which the good predictions made ex ante turned out to be accurate. **The project delivered value for money and success**. Even in the event of exogenous negative events, the project performance remained positive.	5	5	4	5	5	4	4	5	5	5	4
	Poland - Gdańsk Tram *(Star)*	**Project performance was highly positive**. However, due to the fact that the infrastructure and services refer to a small intervention embedded in an existing wider network the positive performance of the project is highly influenced by network effects not fully attributable to the project itself.	5	5	4	4	4	4	5	3	4	5	4
	Poland – Warsaw Line 8 Modernisation and Airport Connection *(Star)*		5	5	4	5	5	5	3	3	4	3	3
	Latvia – Saulkrasti Bypass *(Rising Sun)*	**The project was affected by unfavourable exogenous factors in the initial phase**. However, thanks to the commitment of stakeholders and the managerial capacity, **it turned out to be successful**.	5	5	4	4	4	5	4	4	2	4	5
Intermediate success	Spain – Malaga Bypass *(Blurred Star)*	**The project was partially successful**. The sub-optimum coordination among levels of government partially clouded the fulfilment of all the expected objectives. However, the most urgent need was successfully addressed.	5	5	3	3	1	5	3	5	4	1	4
	Hungary – M43 motorway *(Little Star)*	**Project performance was positive, but far below expectations.** This was	5	4	3	3	4	3	2	3	-2	4	4

	Slovakia – Žilina Railway Modernisation *(Little Star)*	due to some deficiencies in the planning phase.	5	5	3	3	5	-1	-4	3	1	3	4
	Italy - Naples Metro Line 1 *(Shooting Supernova)*	A project in which the propitious context and good ex ante preconditions avoided the failure of the project due to the negative effect of poor forecasting capacity and project management. **The project is underperforming.**	5	5	3	3	3	5	5	4	-3	-5	-5
Least successful	Germany – Autobahn A14 *(Rising Sun)*	**The project was affected by a combination of unfavourable ex ante factors** (over-optimistic traffic forecast, inappropriateness to the local context). However, the effective design and a good managerial capacity **prevented the project's failure**.	2	5	2	3	1	-2	1	2	-3	4	4
	France - Le Havre tramway *(Eclipsed Sun)*	**A project in which a combination of unfavourable ex ante factors** (optimism bias, inappropriateness to the local context and bad incentives) **prevented the project from achieving its expected benefits** and even the good managerial capacity is unlikely to prevent the project from underachievement.	2	3	2	1	3	-1	-2	5	-3	4	3

Source: Authors

Figure 8. Project by average score for performance and determinants*



*Note : * The green circle identifies successful projects, the yellow circle identifies projects with an intermediate level of success, the red circle identifies the cluster of least successful projects. Source: Authors*

Bearing in mind the limitations of this aggregation of findings, some considerations can be made in light of the different project behaviours, their performance and determinants.

A fully successful project such as the Rio Antirio Bridge is characterised by high quality at entry and solid resilience. Quality at entry refers here to the solidity and quality of the project preparation and selection processes, including the quality of ex ante feasibility and CBA analyses as well as the way the entire selection process is structured and works. Resilience instead is the capacity of the project to recover quickly and effectively from difficulties met during the implementation phase, taking the necessary measures to keep the project on a successful track. It is strictly linked to the managerial capacity and project governance. In the Greek case the pre-conditions were propitious as the project had an extremely positive relationship with the context, which provided stability in the definition of the project design and in the selection process. Forecasting capacity was wisely conservative and avoided over-optimistic expectations. Project governance was based on an effective PPP agreement and a highly technically qualified project management drove the project's current success. In addition, the project proved to be resilient to negative exogenous events such as the financial crisis. This showed that the negative impact of exogenous **events can not only be overcome by prompt reaction by the project managers, but also, to some extent, prevented ex ante** through sound and prudent planning.

Among the successful projects there are also the two ***Polish cases***. Compared to the Rio Antirio, these two projects represent smaller interventions embedded into an existing transport network. The ***Gdańsk Tram*** is an extension of an existing tramway and the ***connection to the Chopin Airport*** is part of a wider modernisation scheme providing accessibility to the airport and also and significantly improving public transport attractiveness and usage in the agglomeration of Warsaw. In both cases the complex and articulated nature of the major projects due to the fact that the infrastructure and services refer to a wider network led to a situation where the positive performance of the project

was highly influenced by network effects that were not fully attributable to the projects themselves. Nevertheless, the projects were positively influenced by the identified determinants.

The last project belonging to the cluster of successful projects is the ***Saulkrasti Bypass***. This project had a rather difficult start, but in the end it proved to be successful. The quality-at-entry of the project was good. Despite being the first major project in the road sector in decades, the technical design was spot-on and the overall forecasting capacity was accurate (although slightly over-optimistic). However, exogenous challenges threatened the project's success. The accession to the EU and the consequent price inflation and changes in the tendering procedures resulted in cost-overruns and delays. Were it not for a prompt reaction by the project managers and for solid project governance, the ***Saulkrasti Bypass*** may have become an underperforming project.

Among the projects with an intermediate level of success we find those whose behaviours are affected in different ways by different project determinants. These projects showed that a **favourable performance in some determinants can balance poor performance in others**. Nevertheless, they are characterised by the fact that their overall performance did not meet expectations.

Poor coordination granted the ***Malaga Bypass*** a place in this cluster. Even though it is a rather successful project that fully achieved its primary objective of improving mobility for long-distance traffic, the poor coordination between the Ministry and local administrators caused a sort of ancillary benefit shortfall since the project could have been further exploited as a driver of local mobility. If better coordination had been in place, the project's success would have been even more marked. This shows that project performance may go beyond the achievement of its primary objectives.

In both the ***Slovak*** and the ***Hungarian*** cases project performance is positive, but far below expectations. This is due to some deficiencies in the planning phase. The relatively high project costs and constrained levels of the existing and potential traffic in absolute terms are the main factors responsible for the low positive results of the ***Žilina*** project. For the ***M43*** motorway in Hungary, the underperformance is mainly due to the inaccurate traffic demand forecast.

The ***Naples*** case study suggests that a favourable context and good ex ante preconditions prevented the failure of the project that could result from a complex and uncoordinated project governance and a poor managerial capacity. The good relationship with the context positively influenced the selection process, which was characterised by high stakeholder participation. Forecasting capacity was overall sound in terms of user demand, with only a few problems related to assumptions about the interaction with other sections of the metro network. The project resilience however was at risk due to poor managerial capacity and weak governance. The managerial capacity negatively influenced the project on several fronts. Firstly, the inaccuracy of the transport service planning phase over the years led to the insufficient number of trains. Secondly, more appropriate ex ante mitigation measures to face the risk associated with archaeology would have prevented, at least in part, cost overruns and extremely long delays in delivering the new extensions of Metro Line 1. This, in turn, would probably have resulted in an increase in the number of passengers and would have avoided traffic bottlenecks in proximity to the construction sites, which were sources of annoyance for Neapolitans. The Naples case shows the **risk of taking for granted that good quality-at-entry necessarily results in good project performance.**

In the third cluster, i.e. the least successful projects, there are two projects characterised by low scores both in terms of performance criteria and determinants.

The A14 Autobahn and Le Havre tramway shared similar weaknesses in the planning phase. On the one hand, the weak performance of the ***A14 Autobahn*** was somehow foreseeable even during the planning phase. The region was quickly de-populating, the economy was stagnating and the need for transport infrastructure was rather blurred. A too optimistic traffic forecast led to an overestimation of the project's capacity to positively contribute to economic growth. The marginal positive performance of the project was possible thanks to the effective design and good managerial capacity, which guaranteed smooth construction within the deadline and under budget.

On the other hand, the ***Le Havre tramway*** shows **that if pre-conditions are particularly hostile, good managerial capacity is unlikely to save the project from underachievement.** Strongly politically motivated, this project entered the pipeline conceived as an urban development tool rather than a transport infrastructure. Then, because of an over-optimistic forecast, the project struggled to attract users despite its spot-on design. Good managerial capacity could do little to support modal shift in a city where traffic jams are rare and the use of private cars is widespread.

4.7.3 Lessons on behavioural patterns

Following on from the above assessment, some general considerations can be drawn regarding behavioural patterns:

- **Assessing whether a project is a clear success or failure is not straightforward**. The analysis of the behavioural patterns of the ten selected projects confirms that success or failure is determined by a composition of project-specific factors and events.
- However, it appears that **forecasting and managerial capacity are rather critical**: a solid forecasting capacity ensures good quality at entry and managerial capacity maintains the project on a good track. When both are poor, only the positive relation with the context can prevent a project from failing (***Naples Metro Line 1***). On the other hand, good project management can somehow limit the negative implications of a poor forecasting capacity. The ***A14 Autobahn*** was effectively managed during both the implementation and the operational phase. On the contrary, the ***Le Havre*** case seems to illustrate that if the forecasting exercise relies on fragile assumptions, managerial capacity alone is not sufficient to steer the project towards success.

While there is no unique recipe for success, the evidence from this study seems to confirm the findings of a previous ex post evaluation of major projects (European Commission, 2012a):

- **The quality-at-entry of a project is a relevant condition underpinning project success**. If 'good' projects are selected for financing this is a promising starting point. Quality-at-entry refers to aspects of a major project at the time it enters the EU portfolio. In the analytical framework of this study it includes the relation with the context, the project design, the selection process and the forecasting capacity. The findings of the study suggest that quality-at-entry is generally ensured as far as the identification of urgent needs and the capacity to design the project from a technical and engineering point of view are concerned. One critical issue that remains is a selection process conducive to a sound and realistic forecasting exercise.

- **Apart from the initial quality, and up to a point regardless of its level, the resilience of the project is a second broad condition for success**. The technical and strategic (managerial) capacity to solve upcoming difficulties as well as the incentives and commitment to actually take action (governance structure) are the two aspects of the project resilience. Promptly reacting to possible shocks (either expected or unexpected) and thus managing uncertainty and risks is the second key for success. In this regard managerial capacity and, to some extent, the governance structure are two crucial determinants.

5 CONCLUSIONS AND RECOMMENDATIONS

The findings of this ex post evaluation stem from the in-depth analysis of ten major projects and a stakeholder seminar. **They are generally in line with those of past evaluations but also sometimes expand beyond them** because they i) take a longer time perspectives as compared to ex-post evaluation of 2000-2006 and 2007-2013 (European Commission 2010, 2016) and ii) have a wider sample with respect to the ex-post evaluation of major projects financed in the period 1993-1999 which included only 5 transport projects (European Commission, 2012a), iii) offer an assessment based on in-depth evaluation of individual projects as compared to wider evaluation exercises such as those for ISPA and Cohesion Fund (European Commission, 2005).

The findings of the present evaluation discussed in the previous chapters show that the **selected projects were generally in line with strategic objectives** of the Operational Programmes as well as national and EU objectives. They were **relevant to address local needs mainly pointing to urgent transport problems** such as removing bottlenecks, increasing safety and reducing congestion. In some cases they also aimed at supporting wider economic development strategies.

The selected projects were **overall successful in delivering the expected benefits**: for most of the projects the time and vehicle operating costs savings are the dominant benefits observed ex-post. By increasing productivity they positively contribute to economic growth. More limited but still positive were benefits in terms of quality of life and well-being as well as those on environmental sustainability. Results of CBAs show that, with the only exception of Le Havre, all the projects delivered value for money. As already pointed out by previous evaluations (European Commission, 2010), findings related to effectiveness and efficiency in particular show that ex ante expectations on project performance are often too high as compared to the actual potential in terms of benefits delivered and resources needed for that. This holds particularly true for projects backed by high political considerations raising expectations in terms of wider economic effects. In line with the previous evaluations (European Commission, 2010) **wider effects were found to be difficult to isolate and to attribute to an individual project.**

Although the sample should not be seen as statistically representative, such findings can be reasonably used to draw some generally valid conclusions and distil some policy recommendations that are meant to contribute to shaping European Commission policy in the future.

5.1 CONCLUSIONS

Through major transport projects the ERDF and CF can positively contribute to multiple EU strategic objectives such as improving transport efficiency, removing bottlenecks in key transport infrastructures (especially TEN-T), promoting environmentally-friendly (including low-noise and low-carbon) transport systems, facilitating cross-border connections.

Major transport projects can produce important direct economic effects in terms of travel time savings and vehicle operating costs resulting in productivity gains (due to lower transport costs) and induced effects on regional development. Effects on quality of life are related mainly to safer transport conditions, especially when modal shift is encouraged. Indirect effects on the wider economy are likely to be activated by multiple projects rather than individual projects alone (if not megaprojects). This was clearly shown by the case studies, especially for urban transport projects, which alone could not trigger wider urban

regeneration effects. Too high expectations in this respect were systematically disappointed. There is evidence that for some of the projects the ex ante expectations on socio-economic and urban development were exceedingly optimistic.

As a result, **technical and economic considerations do not always drive the project design and selection**. In some cases, political will played a key role in greenlighting projects. While political support and commitment may play a positive role and help to implement projects on time, it may also have negative influence if politicians support projects not responding to a clear transport need (such as heavy congestion) and without being informed by technical analyses. An important finding is that when technical analyses, including CBA, are taken seriously this is beneficial for the project selection process and this, in turn, positively affects project performance.

The quality-at-entry of a project is a relevant condition underpinning project success. If 'good' projects are selected for financing this is a promising starting point. Quality-at-entry requires informed decisions and depends on two main factors: a forward-looking development vision and a framework to systematically develop high-quality feasibility studies that ensure good project design. Such a framework includes:

- an **accurate demand analysis**. This is the foundation for sound project performance and it depends on the forecasting capacity (including data collection and modelling). Whilst there are some examples of good practices in the ten transport projects, we find that overall forecasting is a major critical area. The case studies show that ex ante forecasts were often overly optimistic and this may have affected the project design, the overall timeline, the financial sustainability and the actual delivery of long-term effects. Inaccurate forecasts may be caused by a variety of factors, some of which are genuine errors or lack of technical expertise and tools. The availability of a solid and rigorous transport model is a condition that may limit forecasting errors.
- an even-handed **analysis of project alternatives**. The case studies point to the fact that option analysis is an area that is not consistently carried out, especially with respect to strategic considerations. While alternative technical options, location and choice of the route are typically considered at least from an engineering standpoint, the analysis of alternative strategies to address the project's objectives and needs is more often disregarded. In particular, the case studies suggest that strong political backing for a specific project solution reduces the scope for an effective option analysis.
- the **ex ante CBA**. CBA is a core tool in the selection process of major projects and it is dependent on a good forecasting framework (including experienced staff, availability of data and the right incentives). While it is clear that an improvement in the quality of CBAs has occurred compared to the past programming periods (for example all the observed projects, with just one exception of one of the oldest one, included environmental externalities in the ex ante CBA), the same cannot be said about the role of CBA in the decision-making processes, as already pointed by previous evaluations. CBA was not always used to inform the decision to finance a major transport project in a comprehensive and timely fashion, perhaps because there are concerns that it may lead to select less desirable projects when the motivations for implementing them are difficult to be reflected in the CBA (for example when pointing mainly to indirect or secondary effects).
- **ways of systematically informing and involving stakeholders** in project development. Stakeholder consultations were part of the selection processes in most

of the cases under assessment. However, only consultations whose feedback is actually listened to and (if needed) taken into account in the project idea/design are helpful to increase the suitability of the project and the acceptability among the local population.

- a specific **assessment of the most effective governance arrangement**. The findings of the case studies point to the fact that the governance structure is rarely assessed before a project is started in order to ensure that it is the most appropriate to support the project in all its phases.
- mechanisms to **verify and ensure financial sustainability** over the entire project life. The revenues generated by the ten projects analysed did not usually cover their operational costs so it was crucial that public financial arrangements were binding and well-arranged so as not to lead to adverse financial incentives. Evidence from the case studies confirmed that the financial structure of the projects was not sufficiently discussed in the project selection process.

With respect to quality-at-entry, **the role that EU services can play both in terms of strategic conditions** (i.e. definition of priorities and standards, supporting the development of the strategic framework) **and technical support** (i.e. definition of the technical aspects of the project such as demand analysis, risk assessment and compliance issues) may be important. Although the most visible, the role of the fund provider, as embedded in the current arrangement related to the financing decision on major project, is only one among different possible roles that the EU can play. As revealed by some case studies, strategic support is visible in some cases with informal but long-lasting interaction between the EU services, the Managing Authorities and project beneficiaries, but not evident in a systematic way.

There is also evidence that **it should not be taken for granted that a good quality-at-entry necessarily results in good project performance**. The causal chains linking determinant factors to project performance are diverse. Characterising project performance is not straightforward, the notion of “project behaviour” has been used in the study and it encompasses life-cycle performance and multiple stakeholders. The results of this exercise show that the relationship between determinants and the final project performance (i.e. “project behaviour”) is not deterministic as often causation takes place in unique ways and often challenges are project-specific.

Apart from the initial quality, and up to a point regardless of its level, **the resilience of the project is a second broad condition for success**. It relates to the capacity to timely and effectively react to upcoming difficulties during the project implementation. Promptly reacting to possible shocks (whether expected or unexpected) and thus managing uncertainty and risks is key for a good project performance in the long-run. **Resilience goes hand in hand with project governance and managerial capacity**. The former is less project-specific and relates to the institutional structure of the city/region/country where the project is embedded. The latter is more narrowly project focused and depends on the ability/capacity of the project management team.

As a matter of fact, the project governance system is strongly determined by how the project ownership and the funding mechanisms are allocated among stakeholders. Hence, **having a governance idea in the first place and finding the most appropriate arrangements** (balancing autonomy and responsibility) **among stakeholders in the second place, are two key ingredients for successful project governance**.

In terms of managerial capacity, there is evidence of good adaptation of projects to unforeseen events. The main categories of such events relate to on-site conditions in the

construction phase or exogenous events such as the financial crisis and/or delays in the implementation of complementary investments in the transport network during the operating phase. This determinant is among those that contributed in a largely positive way to the overall performance of the projects. In particular**, managerial capacity is key to keep the project on a good track** over the entire project cycle. **However, if the project pre-conditions are particularly unbalanced** (e.g. severe misalignment between needs and project objectives) **good managerial capacity is unlikely to save the project from underachievement**.

5.2 RECOMMENDATIONS

On the basis of the findings stemming from this ex-post evaluation we suggest below some recommendations aimed at improving the appraisal, selection, implementation, monitoring and ex-post evaluation of major projects under the assistance of EU funds. In particular, the EC and the Member States should strive to maximise quality-at-entry of major projects as well as their resilience to the evolving context. This has a number of practical implications discussed hereafter.

In order to maximise the EU added value the joint effort of the EC and Member States in planning and appraising major transport investments should be encouraged and further strengthened.

The current practice related to major project preparation and appraisal is a unique experiment of infrastructure planning in the transport sector. Because of their financial size and strategic importance, and differently from non-major projects, they are subject to an assessment and a specific decision by the European Commission. The evidence base of such a decision is a set of detailed information mandatorily provided by the Managing Authority including, amongst others, a feasibility study and a CBA prepared according to precise methodological guidance described in secondary legislation and valid for all Member States and type of projects. The coordinated effort of the EU and Member States to prepare projects aligned to EU strategic priorities and meeting urgent local transport needs following a consistent set of rules and methodological practices, offers a unique opportunity to carry out an EU wide stocktaking exercise on public investment management and evaluation. It allows the EC services to gain in-depth understanding and knowledge on how EU and national strategies are planned and implemented on the ground. It also motivates Managing Authorities and project promoters to systematically assess the expected net social value of their investment projects and be accountable to the EU taxpayers. The strategic dialogue in place during the project preparation and selection provides an opportunity to the EC services to influence the way such strategic operations are implemented by the Member States, for example influencing the process of priority setting or suggesting technical improvements to meet certain EU standards related to the infrastructure design or service management. This process of dialogue and technical support produces important lessons that can be easily transferred to other projects and public authorities throughout the EU Member States. As evidenced by this study, this is the most genuine and relevant aspect of the EU added value which should be preserved and further strengthened.

On more operational aspects, the collection of data and information about financed projects throughout the Member States in different regions and sectors in a structured and standardised way is a unique repository of strategic information on public investment planning in the EU. For example, it enables to systematically collect a set of standardised information and data on strategic objectives, investment costs, financial and economic performance indicators that can be exploited for benchmarking exercises, calculation of

standard costs or unit value, cross-sector or cross-country comparisons for learning purposes. This detailed level of knowledge on individual operations is by far more accurate and informative than what can be collected and the programme or priority level.

According to the recently issued draft proposals for the regulations of Cohesion Policy for the 2021-2027 period (Proposal for a Regulation COM/2018/375 final), the current system of decision on major projects will be not maintained. In particular, major projects will no longer be subject to a specific decision by the EC. Nonetheless, a number of specific recommendations can be provided based on the findings from this project:

- The existence of national or regional transport strategies with indication of broad sectoral priorities is a relevant condition but it is not enough to guide the project identification and formulation. The **preparation of transport master plans including a prioritisation system for the identification of a project pipeline based on a sound transport needs assessment** should be considered among the "enabling conditions[36]" for funding transport infrastructure with EU funds. Capacity building and institutional learning on project preparation and selection can be triggered by the EU assistance by a close dialogue and technical support of dedicated services (such as JASPERS for example) and this opportunity should be better exploited by the MA during the project preparation and selection.
- **Transport needs assessment should be based on robust and updated transport models.** In the appraisals of transport projects there should be more focus on the quality of traffic models underpinning the entire forecasting exercise. Evidence shows that there is still a need to develop more sophisticated transport network models which describe the relevant catchment area and consider transport demand as a function of the condition of the overall transport network , including transboundary. The availability and ability to capitalise on sound transport modelling is advisable also for the purpose of the ex-post evaluation. To support the MAs, **the EC can promote a coordinated effort** to develop national and regional transport models complying with the current best practice in the field.
- The rationale for including a major transport investment within an Operational Programme should also consider the potential EU added value. This **shall be assessed according to a well-defined framework**, in particular by pointing to the EU priorities and objectives that the project is expected to contribute to or discussing to what extent the selected project could be different in the absence of EU action. More precise criteria and methods could be developed by the EC and offered to MAs as standard methodology for the assessment.
- Economic justification of transport projects based on a CBA with a consistent set of rules should be mandatory for transport projects of strategic importance supported by EU funds. Current national practices are still varied in terms of legal obligations and content of CBA for transport projects. The EC has done a lot in the recent past to develop and suggest the use of common tools and methods and improvements are evident also from this study. **It should therefore keep on promoting harmonisation and the use of common practices in transport project appraisal** beyond what has been already done. This includes for example the update of existing reference values at member states level for the most common direct transport effects (VoT, VOC, safety) as well as the development of reference values

[36] In the period 2021-2027 "enabling conditions" will replace "ex-ante conditionalities".

and methodologies for those aspects which are still not sufficiently addressed in ex ante appraisal, such as reliability of travel time.

In order to improve the quality at entry of funded projects, timely and high-quality ex ante technical and economic analyses should be carried out and used to inform the public debate and the decision-making process.

Technical and economic assessment of projects should be carried out early enough to inform the project preparation and formulation, in particular by guiding the selection of the most valid project ideas to be included in the pipeline among a shortlist of different options. The EC should keep on encouraging project promoters and Managing Authorities to carry out good quality CBA. On their side, Managing Authorities and project promoters should be aware that a sound forecasting exercise and ex ante CBA are beneficial for the project success and should not be seen as a mere administrative step. More specific recommendations are the following:

- **Monitoring committees should ensure that a solid investment selection process is in place for structured decision making on major transport projects.** The selection criteria for operations of strategic importance should be based on sound and timely technical and economic analyses, including options analysis and risk assessment. It should also include considerations of long term project sustainability and suitability of the governance structure. To support the preparation and selection processes, the EC should promote EU and international best practices on transport project appraisal and selection and spread the knowledge and lessons learned on the most common pitfalls in project selection and implementation.
- **More specific requirements on financial sustainability should be introduced.** Ex ante appraisal of transport projects should put much more emphasis on the analysis of the long-term financial sustainability after project construction. Since financial sustainability of a project depends on how the project is financed, the financial structure of each project should be carefully looked at in the ex ante appraisal. In particular, a specific assessment of different pricing policies and their effect on the demand should be included. In cases where project revenues need to be complemented by public funds during the operating phase to ensure long-term financial sustainability, generic statements that the national/regional budget will cover any cash shortfalls over its life-cycle are not sufficient. The project dossier should clearly state if the conditions for that to occur are in place and will be ensured in the long-run.
- **It should be mandatory to consider at least three different alternative options, including a do-minimum or least cost option, in the ex ante CBA.** The accuracy of the option analysis stage in decision-making should be strengthened. The role of the option analysis – which is critical to inform decisions and to maximise the project effectiveness – should not be restricted to demonstrate that the most appropriate technical solution has been selected but that the selected option is also the optimal one in strategic terms. This clearly implies that option analysis is carried out during the project identification phase rather than during the design phase or even as a retrofitting exercise.
- **The use of CBA results in policy decision making and public debate should be encouraged.** A suggestion to incentivise good quality analysis and to actually use them in the public debate and for policy making would be to systematically publish feasibility studies, CBAs and any other evidence basis underpinning the

financing decision. Making available to the wider public, including the press or civil society organisations, the technical studies detailing costs, expected benefits and conditions underpinning their successful achievement can increase transparency and accountability towards the stakeholders and taxpayers and would stress the role of technical assessments within the process. At the project planning stage, it would be useful to promote an arena where bringing together technical experts and decision-makers to discuss in a transparent way the interplay of the CBA results and the political considerations underpinning the project idea and decision. These structured discussions can inform the open public consultations carried out in accordance to the legislation.

It is important that a lifecycle approach to the evaluation and implementation of major transport investment projects is adopted.

Evidence shows that major transport projects have a long time horizon and their performance evolves over time. A project with a good quality at entry is a good starting point but it is not necessarily going to be a success if it not able to adapt to an evolving context and possibly facing unexpected difficulties. This specific feature shall be recognised and tackled in the evaluation and implementation processes. More specific recommendations are the following:

- **MAs should keep records of the key financial and economic data** (at least investment costs, operation and maintenance costs, traffic demand with appropriate disaggregation of data, financial revenues) **for a sufficiently long period (at least five years would be needed for a meaningful exercise) after project implementation and make them available to the EC services for evaluation purposes.** In this activity reveals severe deviations from the ex ante forecasts or modified contextual conditions, additional more qualitative information could also be useful to collect. Post-construction information and data can provide a relevant basis upon which developing a better understanding of the extent and possible causes of optimism biases. Such monitoring system can also pave the way for ex-post evaluations. MA should also be aware that their projects could be subject of ex post evaluation implemented by the EC after the programming period and they should be prepared to support such exercises by providing the necessary information basis.
- **Member States should systematically carry out ex post evaluations of major projects.** It would be in the interest of those financing a major transport project to conduct an ex-post evaluation, not only for accountability purposes but also as an important learning process for the development of further projects and improving the decision making system. Ex-post evaluation exposes decision makers, which incentivises them to stick to good governance and be accountable for their decisions. Self-evaluation is viewed as beneficial for Managing Authorities in order to build internal capacity to carry out an ex-post evaluation of projects. Nevertheless, the possibility to support with technical assistance and independent body (such as JASPERS for example) is advisable as a way to help the Member States to develop useful and objective ex-post evaluation. The systematic implementation of ex-post evaluations calls for reference guidelines in order to ensure coherence of methodologies and approaches adopted across the EU28 that the EC could actively develop and promote. In this regard, it is worth noting that CBA is a suitable tool, not only for ex ante project appraisal but also for describing the dominant effects of a project in an ex-post evaluation.

ANNEX I. TAXONOMY OF LONG-TERM EFFECTS

	DIRECT EFFECTS	DESCRIPTION
EFFECTS ON ECONOMIC GROWTH	Travel time	Reduction in travel time for business travellers, shippers and carriers (including the hours gained because of a reduction of congestion) is a typical positive outcome of transport project, except those that specifically aim at environmental or safety benefits.
	Vehicle operating cost	Vehicle operating cost savings for the travellers (fuel costs, fares) and for transporters of goods (this refers to the distance-dependent transport costs) are relevant if the project aims at reducing congestion and/or the journey distances.
	Reliability of journey time	It means reduced variation in journey times. Reliability benefits are potentially important for many projects, unless journey times are already quite reliable. However, often forecasting models or other information for the impacts on and through reliability are missing (de Jong and Bliemer, 2015)
	Income for the service provider	It includes the revenues (e.g. rail ticket income increase) accrued by the producer (i.e. owner and operators together) as well as the operational cost savings. To some extent it can reflect the previous aspects (i.e. the service fare is increased to reflect a better service allowing for significant time saving for the users) so double counting shall be avoided. This aspect might be particularly relevant for public transport projects or toll road projects, especially if the project is expected to feature significant traffic (generated or induced) or a substantial change in fares.
	ADDITIONAL EFFECTS	**DESCRIPTION**
	Wider economic impacts	It refers to the agglomeration effect on productivity (the productivity of the economy is increased because the project leads to a clustering of economic activities together in a core city which makes these sectors produce more or better goods and services together than before). Agglomeration effects are unlikely to occur for small projects and even for large projects there are specific pre-conditions (see for instance Chen and Vickerman, 2017). Wider economic impacts (agglomeration effects) depend on whether the project makes a potential economic cluster location substantially more accessible. This is only possible if the infrastructure network before the project had important missing links which the project effectively removes.
	Institutional learning	It refers to wider spillover effects that any investment project may bring to the Public Administration and other institutions at national or regional levels in terms of expertise gained by working on large scale projects. Learning may lead to productivity gains by stimulating the improvement of existing technical know-how, improved policy-making, competitive tendering and divert resources towards the most growth enhancing projects.

EFFECTS RELATED TO QUALITY OF LIFE AND WELL-BEING	**DIRECT EFFECT**	**DESCRIPTION**
	Travel time	Leisure time saving relates to projects that provide a reduction in travel time for non-business travellers.
	Safety (accident savings)	It relates to the amount of fatalities, serious and slight injuries, damage-only accidents. Safety impacts should possibly be included in all project evaluation.
	Security	Safety of travellers in the vehicle and at stations, platforms and stops, safety of the goods transported (often damaged or stolen). Security impacts are often neglected in project evaluation, but for public transport projects (both urban and intercity) they can be of considerable importance.
	Noise	It refers to the exposure of population to noise measured in dB
	ADDITIONAL EFFECT	**DESCRIPTION**
	Crowding	A reduction of crowding in public transport is mainly relevant for projects that provide significant additional capacity in public transport.
	Service quality (other than crowding)	It refers mainly to the availability of specific service features increasing the journey comfort e.g. smoother movement of the vehicles, more comfortable seats, provision of electricity, Wi-Fi, catering.
	Aesthetic value	This relates to projects that provide infrastructure with positive visual effects (e.g. a beautifully constructed bridge) or when public transport provide a better image in the eye of the public. Also, it refers to projects that lead to a less attractively looking landscape (e.g. constructing high walls).
	Urban renewal	It refers to the spillover effects of urban transport projects on residents (not necessarily users of the project) due to an improved local context and possibly reflected in an increase in real estate values.
EFFECTS ON THE ENVIRONMENT	**DIRECT EFFECT**	**DESCRIPTION**
	Local air pollution	Local air pollutants are typically small particles, NO_x, VOCs and SO_2. The increased/decreased volume of local air emissions is a typical effect of transport projects.
	Climate change	Climate change refers to the volume of greenhouse gases (GHG) emitted by transport infrastructure. The increased/decreased volume of GHG emissions is a typical effect of transport projects.
	ADDITIONAL EFFECTS	**DESCRIPTION**
	Biodiversity	This refers to the reduction of biodiversity through the extinction of species in a specific area. It is not a common effect but it can be relevant in selected cases.
	Water pollution	Emissions of substances, e.g. from the road, into watercourses, that are harmful for people (as drinking water) or for life in the water
EFFECTS RELATED TO DISTRIBUTIONAL ISSUES	**ADDITIONAL EFFECTS**	**DESCRIPTION**
	Social cohesion	It encompasses the allocation of the main benefits over income and social groups
	Territorial cohesion	It encompasses the allocation of the main benefits over central (core) and peripheral areas

Source: Authors

ANNEX II. EVALUATION SCORES OF NON-MONETARY EFFECTS

IMPACT	TYPE OF CRITERION
+5	Given the existing constraints, the highest positive effect has been generated.
+4	Given the existing constraints, high positive effect has been generated, but more could have been achieved under certain conditions.
+3	Moderate positive effect has been generated, with large scope for further improvement.
+2	Little positive effect has been generated.
+1	Very little, almost negligible, positive effect has been generated.
0	No effect has been generated
-1	Very little, almost negligible, negative effect has been generated.
-2	Minor negative effect has been produced.
-3	Moderate negative effect has been generated, but they could have been worse.
-4	Highly negative effect has been generated.
-5	The highest negative effect has been generated.

Source: Authors

ANNEX III. EVALUATION QUESTIONS MATRIX

CRITERION	EQ	METHODOLOGY	SSESSMENT	SCORE
Relevance	To what extent the original objectives of the examined major project matched: • the existing development needs, • the priorities established at the programme, national, and/or EU level.	Historical reconstruction	The project was and over the years remained fully in line with the development needs and the priorities established at various levels	5
			At the beginning the project was in line with the development needs and the priorities established at various levels but it was not able to cope with changing needs	4
			At the beginning the project was not in line with the development needs and the priorities established at various levels but over the years it has been able to cope changing needs	3
			Since the beginning the project was not in line with the development needs but was in line the priorities established at various levels	2
			Since the beginning the project was not in line with the development needs and the priorities established at various levels	1
Coherence	• Are the project components in line with the stated project objectives? • To what extent the examined project was consistent with other national and/or EU interventions carried out in the same field and in the same area?	Historical reconstruction	Fully consistent	5
			Almost fully consistent	4
			Partially consistent	3
			Poorly consistent	2
			Not at all consistent	1
Effectiveness	• Has the examined major project achieved the objectives stated in the applications for Cohesion policy support? • Was the actual implementation in line with the foreseen time schedule? • What factors, including the availability and the form of finance and to what extent influenced the implementation time and the achievement observed? • What has changed in the long run as a result of the project (for example, is there evidence showing contribution of the project to the private sector investments)? • Were these changes expected (already planned at the project design stage, e.g., in terms of pre-defined objectives) or unexpected (emerged, for instance, as a result of changes in the socio-economic environment)?	CBA results	The project has achieved the expected objectives in line with the foreseen time schedule. It turned out to be the best option among all feasible alternatives. It also produced some unexpected positive benefits.	5
		Ordinal scores on non-monetary effects	The project has achieved the expected objectives in line with the foreseen time schedule. It turned out to be the best option among all feasible alternatives.	4
		Investigation of the project causal chain	The project has 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.	3
			The project has not achieved the expected objectives due to exogenous factors.	2

	• How have these changes matched the objectives set and addressed the existing development needs, the priorities established at the programme, national and/or EU level? • Did the selected project turn out to be the best option among all feasible alternatives?			
			The project has not achieved the expected objectives due to endogenous factors.	1
Efficiency	• Are there any significant differences between the costs and benefits in the original cost-benefit analysis (CBA) and what can be observed once the project has been finalised? • To what extent have the interventions been cost effective?	CBA results Sustainability analysis Project causal chains	Significant positive differences due to endogenous/exogenous factors	5
			Nil differences	4
			Negligible positive/negative differences	3
			Significant negative differences due to exogenous factors	2
			Significant negative differences due to endogenous factors	1
EU added value	• What is the EU added value resulting from the examined major project (in particular, could any of the major projects examined, due to its risk profile, complexity or scope, have not been carried out if not for the EU support)? • Did the examined major projects achieve EU-wide effects (e.g. for preserving the environment, building trans-European transport networks, broadband coverage etc.)? • To what extent do the issues addressed by the examined interventions continue to require action at EU level?	Project causal chains	Very high EU added value, i.e. the project achieved EU-wide effects which could not have been achieved without the EU support	5
			High EU added value, i.e. the project achieved positive effects which would have been hardly achieved without the EU support	4
			Modest EU added value, i.e. the project would have been hardly implemented without the EU support, however, its effects are still uncertain.	3
			Poor EU added value, i.e. the project would not have been implemented without the EU support, however, it did not achieve the intended effects due to unforeseen events.	2
			Nil EU added value, i.e. there is strong evidence showing that the results achieved by the project could have been achieved even without the EU support.	1

ANNEX IV. PROJECT SCORES FOR SELECTION PROCESS

Project title	Funding Period	MS	SCORING					Case studies
			A) Relevance for the evaluation	B) Availability and quality of data from existing sources	C) Cooperation by the stakeholder	Total	Score	
Rio-Antirio Bridge	2000-06	GR	1.60	1.05	0.75	3.40		1
Attiki Odos	2000-06	GR	1.60	1.05	0.75	3.40		
M43 Motorway between Szeged and Makó	2007-13	HU	1.00	0.90	1.05	2.95		2
Improvement of Via Baltica Route, Construction of Saulkrasti Bypass	2000-06	LV	1.30	0.90	0.75	2.95		3
Neubau der Autobahn A 14, Modul 1: 2. BA AS Schwerin-Nord – AS Jesendorf	2007-13	DE	1.20	0.90	0.75	2.85		4
Ronda de Circunvalación Oeste de Málaga	2007-13	ES	1.20	0.75	0.75	2.70		5
Budowa drogi ekspresowej S3, odcinek Szczecin - Gorzów Wielkopolski	2007-13	PL	1.10	0.75	0.75	2.60		
Budowa autostradowej obwodnicy Wrocławia A8	2007-13	PL	1.20	0.75	0.60	2.55		
Motorway construction on TEN-T 7, Constanta By-pass	2007-13	RO	1.10	0.60	0.75	2.45		
Motorway A2; Bič - Hrastje: Section Pluska – Ponikve	2007-13	SI	0.80	0.75	0.90	2.45		
M6 Athlone-Ballinasloe	2007-13	IE	0.90	0.60	0.90	2.40		
Dialnica D1 Sverepec – Vrtizer	2007-13	SK	0.80	0.75	0.75	2.30		
R1 Žarnovica - Šášovské Podhradie	2007-13	SK	0.70	0.75	0.75	2.20		
Rychlostní silnice R6 - úsek Jenišov - Kamenný Dvůr	2007-13	CZ	0.50	0.90	0.75	2.15		
Construction of Liulin Motorway, Sofia Ring Road - Daskalovo Road junction	2000-06	BG	0.90	0.45	0.75	2.10		
Construction of Lugoj – Deva motorway (section Lugoj – Dumbrava)	2007-13	RO	0.40	0.60	0.60	1.60		
Modernizacja linii kolejowej nr 8, budowa łącznicy do lotniska Okęcie (od przystanku osobowego Służewiec do stacji MPL Okęcie)	2007-13	PL	1.10	0.75	0.90	2.75		1
ŽSR, Modernizácia trate Žilina - Krásno nad Kysucou	2007-13	SK	1.00	0.75	0.90	2.65		2
L.A.V. Madrid - Castilla La Mancha - Comunidad Valenciana - Región de Murcia. Suministro y montaje de vía en Castilla La Mancha	2007-13	ES	0.80	0.90	0.90	2.60		

Project title	Funding Period	MS	SCORING					Case studies
			A) Relevance for the evaluation	B) Availability and quality of data from existing sources	C) Cooperation by the stakeholder	Total	Score	
Záhony térségében a vasúti infrastruktúra (szélesnyomtávú hálózat) fejlesztése	2007-13	HU	0.90	0.90	0.75	2.55		
IX B Rail - Structures and Sector 5	2000-06	LT	0.90	0.75	0.60	2.25		
Optimalizace trati Planá u M.L. (mimo) - Cheb (mimo)	2007-13	CZ	0.70	0.60	0.60	1.90		
Elektrifizierung der Schienenstrecke Reichenbach – Landesgrenze Sachsen/Bayern, Modul 1 (Bauabschnitte 1 und 2)	2007-13	DE	0.70	0.60	0.60	1.90		
Adeguamento linea ferroviaria tirrenica Battipaglia-Reggio Calabria: galleria Coreca	2007-13	IT	0.40	0.75	0.60	1.85		
Gdański Projekt Komunikacji Miejskiej - etap III A	2007-13	PL	1.10	0.75	1.05	2.90		1
Metropolitana di Napoli tratta Vanvitelli Dante codice MONTI 402	2000-06	IT	1.10	0.75	0.90	2.75		2
Extensão da Rede de Metro do Porto entre Estádio do Dragão e Venda Nova	2007-13	PT	0.90	0.90	0.90	2.70		
Première ligne de tramway de l'agglomération havraise	2007-13	FR	1.10	0.75	0.75	2.60		3
Metro d'Athènes et stations	2000-06	GR	0.80	0.75	0.90	2.45		
A budapesti Margit híd és a kapcsolódó közlekedési rendszer fejlesztése	2007-13	HU	0.70	0.60	0.60	1.90		

ANNEX V. THE TEN CASE STUDIES IN A NUTSHELL

PROJECTS IN THE ROAD SECTOR

AUTOBAHN A14

This case study illustrates the construction of **the motorway section Schwerin-Nord–Jesendorf, part of the A14 Wismar–Magdeburg (DE)**. This major infrastructure investment was co-financed by the EU over the period of 2006-2009. More specifically, this is the summary of an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to producing these effects. The analysis draws from an ex-post Cost-Benefit Analysis (CBA) and from an extensive set of qualitative evidence, both secondary (technical reports, official reports, press articles, books and research papers) and primary (interviews with 20 key stakeholders and experts carried out during September – November 2017).

The project concerns the construction of a **four-lane motorway section with a total length of 14.31 km** between the junctions Schwerin-Nord and Jesendorf in the federal state of Mecklenburg-Vorpommern (northern Germany). It completed the northern section of the A14 Schwerin–Wismar connecting the two east-west running coastal motorways A20 and A24 (Hamburg – 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, with an 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 the 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 the EU-regulation 1315/2013. It also contributes to the EU Strategy for the Baltic Sea Region (EUSBSR). However, those roles have only been attributed 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 50's mainly for military purposes. The first section connecting Leipzig East–Grimma to interchange Nossen was finalised in 1970-1971. In the 80's 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 junction Schwerin 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 the German reunification in 1989, **the case for completing the A14 between Wismar and Schwerin grew stronger.** Policy makers believed that the infrastructure would have **supported economic development** (especially tourism) in the region. The section between Wismar and Jeserdoff opened to traffic in 2006. **The section under analysis (Schwerin-Jeserdof) was the last to be completed and was finalized 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 ERDF Federal Transport Operational Programme for the 2007-2013 programming period in Germany. The project was open to traffic on 21st of December 2009 in line with the

schedule. The total costs of the project was 112.5 EUR Million, of which 57.7 (i.e. the 51% of all costs) were covered by ERDF financing. The remaining 54.3 EUR Million were provided by the National public funding.

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2007-2013	
First year of operation	2009	
Total Investment Costs (EUR Million Nominal)	112.5	100%
Source financing and co-funding rates over the total investment costs		
- European Regional Development Fund	57.7	51%
- National public funding	54.3	49%

After nine years of operations, **the economic effects of the Schwerin Nord – Jeserdoff 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 benefits by far. Reduction in vehicles operating costs and accidents due to improved road infrastructures are additional benefits. On the other hand, **the project fell short to deliver the expected wider benefits in terms of economic development of the region**. At the time of the assessment, the Autobahn is **running under capacity** and the population in the area is constantly decreasing. Traffic **forecast were highly over-optimistic**. However, in 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

This case study illustrates the story of the **Rio Antirio Bridge**, a major infrastructure investment co-financed by the EU funded Operational Programme 2000-06 “Road Axes, Ports, Urban Development” in Greece. More specifically, this is the summary of an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to producing these effects. The analysis draws from an ex-post Cost-Benefit Analysis (CBA) and from an extensive set of qualitative evidence, both secondary (technical reports, official reports, press articles, books and research papers) and primary (interviews with 36 key stakeholders and experts have been carried out in the period from October to April 2018).

The project consists 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 2,252m, the **Rio Antirio Bridge is one of the longest bridges of its type worldwide**. Moreover, the bridge is equipped with a seismic monitoring system and – in case of earthquake - the piers can move laterally on the sea floor with the gravel bed absorbing the energy. These cutting-edge technical features granted to the Rio Antirio Bridge several prestigious international engineering prices (such as 2005 ASCE Outstanding Civil Engineering Achievement Award (OPAL)). The Bridge aimed at playing a significant role in strengthening the **links between the Western part of 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 in the past**, in the vision of a Greek statesman. The vision of Charilaos Trikoupis, then Greek Prime Minister (1889), was 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 being consistently named as a national priority, the technical difficulties always postponed the interventions. The first invitation to tenders was held in 1980 but it did not go beyond the first phase, which included expressions of interest and general suggestions, because there was no interest from the construction companies. **The Greek entry to the European Union (1981) marked a turning point** in the bridge history as the perspective of EU funding made the project more feasible. In the late 80's several companies responded to the invitation to tenders and the final contract was signed in 1996. The project was implemented as PPP (Public Private Partnership) initiative. The construction works started in 1998 and were completed early August 2004. Costed EUR 888.3 million, the bridge opened for traffic on the **12 August 2004**, right before the start of the Olympic Games on the 13 August 2004.

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2000-2006	
First year of operation	2004	
Total Investment Costs (EUR Million Nominal)	888.3	100%
Source financing and co-funding rates over the total investment costs		
- Private Contractor (Geyfra S.A.)	68.5	7.7%
- European Investment Bank (Loan)	370	41.7%
- National funds	196.5	22.1%
- European Regional Development Fund	253.1	28.5%

After fourteen years of operations, **the project fully achieved its objectives**. The results of the ex-post CBA — with ENPV at the level of EUR 2,041 million and ERR equal to 6.65% — confirm that **the expected effects have materialised to such an extent that the project provides a good social return** of the invested resources, making it worthwhile form the point of view of the EU society. The most significant benefit is **travel time saving** as the Rio Antirio bridge allows crossing 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, a profitable involvement and commitment from all the relevant stakeholders.

M43 MOTORWAY

This case study illustrates the story of the construction of the **M43 motorway between Szeged and Makó in Hungary.** This major infrastructure investment was co-financed by the EU Cohesion Fund in the programming period 2007-2013. More specifically, this is the summary of an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to producing these effects. The analysis draws from an ex-post Cost-Benefit Analysis (CBA) and on an extensive set of qualitative evidence, including secondary (technical reports, official reports, press articles, books and research papers) and primary (interviews with 26 key stakeholders and experts carried out in October – December 2017) sources.

The project consists of the construction of a **31.6 Km motorway section running between Szeged and Makó, Southern Hungary**. The project is part of the M43 motorway which runs from Budapest to the Romanian border. The objective of this investment was to accomplish one of the targets of the Hungarian Transport Operational Programme (2007-2013), namely to **improve the international accessibility** of the country as well as to construct the missing section of the expressway network towards the national border. The project also aimed at **eliminating one of the existing bottlenecks** in the TEN-T Corridor N.4 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 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).

The original project for the full M43 was originally conceived in the early 90's. The first feasibility study was carried out in 1993. Between 1997 and 2008 the feasibility plan of M43 motorway was reconsidered several times due the modifications of the centre line. These modifications were based on new traffic models and tried to determine the optimal solution. This involved the re-drafting of the environment protection plans as well. Finally, **the modifications were approved in 2004**. In 2006, the M43 motorway project was integrated into the Transport Operational Programme. In 2008, a final feasibility study was prepared and the application – eventually approved in 2009 – was sent to the EC Commissions. The construction phase lasted from 2008 to 2011 and the section opened to traffic later on 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 realization. The total costs of the project were EUR 197.2 million, of which EUR 167.6 million (85%) represents Cohesion Fund contribution.

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2007-2013	
First year of operation	2011	
Total Investment Costs (EUR Million Nominal)	197.2	100%
Source financing and co-funding rates over the total investment costs		
- ISPA (Cohesion Funds)	167.6	85%
- National funds	29.2	15%

Almost seven years has passed since the start of the operations, **the economic effects of the project are positive but under expectations**. The project contributed to improving the accessibility of the area by providing a faster and safer road infrastructure. The largest benefit is that the heavy vehicles now avoid the inhabited areas. This represents a win-win situation in that the quality of life of the inhabitants has improved and there are better speed conditions for the HGV drivers on the motorway (as their speed can be closer to the optimal). This benefit is captured in the positive result of the CBA in which the travel time savings is the 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

This case study illustrates the story of the **construction of Saulkrasti bypass on the Latvian State main road A1** connecting Riga to the Estonian boarder, a major infrastructure investment co-financed by the EU over the programming period 2000-2006. More specifically, this is the summary of an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to producing these effects. The analysis draws from an ex-post Cost-Benefit Analysis (CBA) and from an extensive set of qualitative evidence, both secondary (technical reports, official reports, press articles, books and research papers) and primary (interviews with 20 key stakeholders and experts have been carried out in the period from November 2017 to March 2018).

The project consists of the construction of **a 20 km long bypass to divert long-distance traffic away from Saulkrasti town**, which was one of the main bottlenecks of Via Baltica in Latvia. As a matter of fact, before the project implementation the existing road A1 (2-lane carriageway with a 50 km/h speed limit) was the only road traversing the full length of the town and serving local traffic, public transport, as well as international and transit traffic. **This road crosses the urban area of Saulkrasti, a city with a clear touristic vocation, 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 (now 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** which was a priority not only at

national but also at European Level. The rehabilitation of the Via Baltica was originally envisaged in the mid-90's when the first Via Baltica Investment Programme 1996-2000 was approved with the aim of implementing infrastructure maintenance projects. Indeed, due to lack of maintenance, **Latvian road system was in poor conditions** after the independence and it needed to be integrated with the European network. Being part of the Via Baltica, **the project under assessment became a national priority included in the ISPA strategy**. After a thorough option analysis involving technical considerations and stakeholders consultations, the project was given green light in 2001 and considered eligible for co-financing with EU ISPA funds. Saulkrasti bypass was the first new construction project since the independence of Latvia to follow the ISPA procedures. The lack of experience in drawing up the necessary documents and the complex and lengthy administrative procedure for document coordination led to a **significant delays and the project construction phase started two years later** than planned (2005). Furthermore, after the Latvia entry to the EU, **there was an overall increase in construction prices** which affected project costs resulting in cost-overrun. The initial planned total cost was EUR 48.81 million, but the final total project cost was EUR 130.5 million. The project opened to traffic on the 27th of September 2007.

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2000-2006	
First year of operation	2007	
Total Investment Costs (EUR Million Nominal)	130.5	100%
Source financing and co-funding rates over the total investment costs		
- Cohesion Fund	40.03	30%
- National funds	90.47	70%

After more than ten years of operations, **the ex-post assessment points towards an overall positive outcome** from the Saulkrasti bypass in spite of the considerable cost increase experienced in the investment phase. As a matter of fact, the investment was the right and necessary initiative to implement to avoid traffic bottlenecks on one of the main artery of Latvia's road network as well as to sustain the local development of Saulkrasti. After the project implementation, long-distance traffic was effectively diverted from the Saulkrasti city centre to a wider and upgraded road located on the outskirt. The story of the Saulkrasti bypass illustrates that a major project can play a pivotal role in developing technical, legal and administrative capacities within the public authorities involved in the project conception, selection, and implementation, which should be capitalised for future projects. At the same time, the institutional capacity needed to implement such kind of projects should be acknowledged since the beginning in order to avoid adverse negative events such as delays, cost overrun or benefit shortfall.

NEW WEST MALAGA BYPASS

This case study illustrates the story of the **New West Bypass road of Malaga (ES)**, a major infrastructure investment co-financed by the European Union (EU) during the programming period 2007-2013. More specifically, this is a summary of an ex-post evaluation assessing the long-term effects produced by the project aimed at disentangling the mechanisms and determinants likely to have contributed to produce these effects. The analysis draws on an ex-post Cost-Benefit Analysis

(CBA) and an extensive set of qualitative evidence, both secondary (technical reports, official reports, press articles, books and research papers) and primary (site visits and interviews with 30 key stakeholders and experts have been carried out in the period from November 2017 to January 2018).

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 logistic areas in the outskirts of the city. It **has four lanes per carriageway in 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 two bridges, eight viaducts, nine overpasses, fourteen underpasses and a 1,250 m long tunnel in the mountain. The main objective of the project was **to relieve congestion from the old inner western bypass** (MA-20), which was often unviable due to high traffic intensity especially during the summer. In addition, the New West Bypass was expected to **provide a better connection** to the industrial and logistical area located in the 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 five years after the opening to traffic of the Old Bypass. **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 have provided only a short-term solution** to the problem. Indeed, in the early 00's, Malaga economy was thriving and population significantly increased. In that period, the MA20 was the only road bypassing the city and it absorbed **both long-distance and local traffic.** This led to **frequent congestions** which were a major limitation to economic development and quality of life. In 2006, the contracts for the construction of the New Wester 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 thousand vehicles per day and was near to reach its full capacity. The two first sections of the new bypass were opened in 2010. The last section was finalized in 2012 with a 24 month delays 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 Andalusia OP 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.

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2007-2013	
First year of operation	2011*	
Total Investment Costs (EUR Million Nominal)	437.9	100%
Source financing and co-funding rates over the total investment costs		
- European Regional Development Funds	234**	53.4%
- National funds	203.9	47.6%

**Only two sections were opened in 2011. The full New West Bypass was opened in 2012.*

***The ERDF financing initially was planned at EUR 190 million but, due to change in co-financing rate for Andalusia from 65% to 80%, the actual ERDF co-financing reached EUR 234 million*

After six years of full operations, 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 West Bypass improved territorial cohesion providing a reliable transport infrastructure to the outer Malaga zones outside the catchment area of the Old Bypass. However, various

complementary investments are necessary in order to maximise its positive spill-overs as the local road network has a relatively poor capacity as compared with the bypass.

PROJECTS IN THE RAIL SECTOR

CONSTRUCTION OF A NEW RAIL LINK FROM WARSAW TO CHOPIN AIRPORT AND MODERNISATION OF THE RAILWAY LINE NO. 8

This case study illustrates the modernisation of the **railway line no. 8 between Warsaw Służewiec and Warsaw Okęcie station**, and construction of a **new rail link to the Chopin Airport located at Okęcie**, a neighbourhood district of the Polish capital city. This major infrastructure investment was co-financed by the EU over the programming period 2007-2013. More specifically, this is a summary of an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to the production of these effects. The analysis draws from an ex-post Cost-Benefit Analysis (CBA) and from an extensive set of qualitative evidences, both secondary (technical reports, official reports, press articles, books and research papers) and primary (interviews with 21 key stakeholders and experts have been carried out in the period between September 2017 and March 2018).

The project "Modernisation of railway line no 8, construction of new railway link (Warsaw Służewiec – Chopin Airport)" is a **stage of a wider scheme aiming at modernising the Warsaw-Krakow rail line**. The project under assessment relates to the construction of the connection of the city of Warsaw with the Chopin airport from the existing railway line no. 8 to the terminus station located at the Chopin Airport for a **total length of 1.99 Km.** The works also include the modernisation of track no.1 railway line 8 for 1.2 Km and the reconstruction of Warsaw Służewiec station. The project aimed at providing **an alternative connection to the airport 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), the Warsaw Airport should have been connected to core networks by 2030.

At the beginning of 2000s the **City of Warsaw was suffering from 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 of the motorisation index. These resulted in **increased traffic congestion** and declining of travel conditions expressed in terms of travel times and reliability. The possibility of using EU Funds (following Poland accession to the EU in 2004) facilitated the implementation of the project. In 2006, an agreement between the Polish Treasury, the State-owned Airport Company, and the National Railway was signed laying down a direct railway connection to the second terminal of Chopin Airport as an extension of the line 8 (Warsaw-Radom). One year earlier, the modernisation works of railway line no. 8 between Warsaw Zachodnia (West) and Warsaw Okęcie had received approval. The construction phase began in 2007 and finished in 2012 – just in time for the EURO 2012 Championship despite 9 months delays. Total costs were 64 EUR million, 10% less than budgeted. Most of costs concerned the construction of the tunnel connection to the airport (EUR 34 million) and only a minor share regarded the modernization of the Line 8. The EU financing decision

was taken in 2011 and furtherly modified in 2015 to extend the co-financing rate of eligible costs from 65% to 80%.

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2007-2013	
First year of operation	2012	
Total Investment Costs (EUR Million Nominal)	64	100%
Source financing and co-funding rates over the total investment costs		
- Cohesion Funds	38.4	60%
- National funds	14.1	22%
- PKP PLK S.A (National Railway)	11.5	18%

After six years of operations, **the major project represents a good example of railway transport infrastructure project to promote sustainable transport in a wider metropolitan area**, including accessibility to a major transport hub and enhancement of transfer of passengers between transport modes in a core urban node of the TEN-T network. The outcome of the CBA shows that benefits largely exceed cost especially in terms of travel time savings and vehicle operating costs. Another important – but not quantified – benefit is the reliability offered by railway service which is not affect 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 be open in 2027 – will take over operations from Chopin Airport which will be then used only for military purposes.

MODERNISATION OF RAILTRACK IN ŽILINA

This case study illustrates the story of the **modernisation of the railway line Žilina – Krásno nad Kysucou (SK)**, a major infrastructure investment co-financed by the EU over the programming period 2007-2013. More specifically, this is a summary of an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to producing these effects. The analysis draws from an ex-post Cost-Benefit Analysis (CBA) and from an extensive set of qualitative evidence, both secondary (technical reports, official reports, press articles, books and research papers) and primary (interviews with 22 key stakeholders and experts have been carried out in the period from October to April 2018).

The project concerns the rehabilitation of **18.92 km long double track electrified section of the main railway network** of the Republic of Slovakia, between the railway station Žilina and Krásno nad Kysucou located in the north of the country. This section belongs to **line no 127 between Žilina** (in Slovakia) **and Cadca** (in Czech Republic). The project was inscribed into a plan to rehabilitate railway lines launched in early 2000's to develop the TEN-T network. The section under assessment has a **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 Rail Freight Corridors RFC9 and RFC5.

In the early 90's, **the Slovak railway network was in overall poor conditions**. Similarly 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 their expected operating life and some technologies were obsolete and not in line with modern standards. Stations had in many cases no platforms. Being part of an important cross-border line, **the section under analysis was firstly inserted in an ambitious programme for the modernisation of the trunk railway** network of the Czech and Slovak Republics. This was defined during the 1990s thanks to the involvement of the Delegation of the European Union. However, **major modernization works in Slovakia commenced only in the 2000s**. As far as concerned the section Žilina - Krásno nad Kysucou, the 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 once the construction was already begun. In line with 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 the modernisation of the line in full scope would have resulted in a total project cost at least two times higher than the one effectively incurred. Final costs was EUR 162 Million, 2% lower than budget.

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2007-2013	
First year of operation	2012	
Total Investment Costs (EUR Million Nominal)	162	100%
Source financing and co-funding rates over the total investment costs		
- Cohesion Funds	137.7	85%
- National funds	24.3	15%

The rehabilitation of the section Žilina – Krásno nad Kysucou **represents a step towards the modernisation of the core network along the itinerary of the Rhine-Danube Corridor**. After six years of operations, the performance of the project 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 the demand in the area and the delays in the completion of the programme for the modernisation of the entire corridor sections in Slovakia.

PROJECTS IN THE URBAN TRANSPORT SECTOR

NAPLES METRO LINE 1

This case study illustrates the story of **the Vanvitelli - Dante section of the metro Line 1 in Naples (IT)**, a major urban transport investment project co-financed by the ERDF in the programming period 2000-2006. More specifically, this is a summary of an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to producing these effects. The analysis draws from the ex-post Cost-Benefit Analysis (CBA) and from an extensive set of qualitative evidence, both primary (interviews with 25 key stakeholders and experts were carried out in the period November 2017- February 2018) and secondary (technical reports, official reports, press articles, books and academic papers).

The project concerns the construction of the section Vanvitelli-Dante of Metro Line 1 in Naples, southern Italy. The investment consists of the **construction of 5 km twin-tunnel with 5 stations** and the pedestrian tunnels connecting Line 1 with Line 2 and with the archaeological museum of the city. Remarkably, all the 5 stations included in this Section are considered Art Stations i.e. built with high architectural and aesthetics criteria including contemporary artworks both inside and outside the stations. The section Vanvitelli – Dante was at the heart of a sustainable mobility and territorial development strategy at the regional level whose aim was to tackle the mobility problems of Naples - an overcrowded city overrun by traffic - as well as to address urban degradation issues.

In the mid-1990s, Naples was facing both traffic problems and urban environmental degradation, which were hampering the process of transformation of the city towards a sustainable development path. As far as mobility is concerned, the city was so congested that it was snared in a semi-permanent gridlock from early morning to late in the evening and the same concept of peak times was questioned. The cause of this situation was an inadequate and unreliable existing public transport system in the city, which was insufficient to absorb the increasing demand of mobility. Along with mobility issues, Naples was also characterised by a general urban decay and degraded mobility infrastructures negatively contributed to this poor quality landscape. The extension of the Metro Lines 1 to the city centre with the segment Vanvitelli – Dante conceived in the Naples' Transport Plan in 1997 was the starting point to address these problems. Afterwards, in agreement with the Region of Campania, the project under assessment was integrated in a new, ambitious and wider transportation programme started in Naples in 1997, extended at the Naples' metropolitan area in 2000 with the so called 'Plan of the 100 Stations' and further extended to the whole Campania region with the Regional Metro System 2001.

The excavation and the construction of tunnels and stations took place between 1991 and 1998, the completion works (i.e. 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. In the programming period 2000 - 2006, through an ERDF grant of EUR 44 million, the European Commission support held on the completion works. The EC final decision to grant assistance to the project was taken in August 2005 when the project was already operating and according to a "retrospective" EU assistance. The total initial investment cost of the project is EUR 474 million – including the excavation, the tunnels, the *Art Stations,* and the completion works.

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2000-2006	
First year of operation	2004	
Total Investment Costs (EUR Million Nominal)*	88	100%
Source financing and co-funding rates over the total investment costs		
- European Regional Development Fund	44	50%
- National funds	44	50%

**this refers only to completion works financed by ERDF in the 2000-2006 Period. The total costs for the full Vanvitelli-Dante line are EUR 474 Million.*

The story of Vanvitelli-Dante section is strongly intertwined with the one 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; in contrast, it underperforms from the public transport service viewpoin**t 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 faces returns a slightly positive net-benefit for the society, meaning that with respect to 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.

TRAMWAY IN LE HAVRE

This case study relates to the **construction of a new tramway line in Le Havre, in the Normandy region (FR)**, a major infrastructure investment co-financed by the EU over the programming period 2007-2013. More specifically, this is a summary of an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to producing these effects. The analysis draws from an ex-post Cost-Benefit Analysis (CBA) and from an extensive set of qualitative evidence, both secondary (technical reports, official reports, press articles, books and research papers) and primary (interviews with 22 key stakeholders and experts have been carried out in the period from August 2017 to January 2018).

The **new tramway line is 13 kilometres long and composed of 23 stations and 22 trams, as well as a 575 metres long tunnel**. The tramway line has a distinctive y-shape, composed of a common section which then splits into the 'A' and 'B' lines. Also, the project included the construction of a tramway and bus depot, park-and-ride facilities, bicycle lanes. Together with the construction of the tramway, **overall street renovations** were carried out. Indeed, the project was inscribed in a political desire to **transform the image of the city as modern and attractive** but also to align with current practice in urban transport in France towards **the implementation of tramway systems as a modern and sustainable transport mode.**

Despite the tramway was the most costly option, it was preferred to a system of trolleybus due to the political preference for a tramway which was considered better than buses to improve the encourage the modal shift from cars to public transport, to improve the environmental performance of the public transport system, and to foster social cohesion. The construction phase started in 2010 and completed on schedule. The tramway opened to service the 12 December 2012 as planned. The total costs of the project were EUR 420 million thus an overshoot of nearly 26% from the 2009 budget. The financing decision from the European Commission approving ERDF funding was signed in June 2010 for a maximum amount of EUR 52 million, representing 21% of the total eligible amount of EUR 249,450,000 which was calculated ex ante. The final amount for the ERDF subsidy was finally set at EUR 10 million. The project was financed by different sources, as the table below shows.

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2007-2013	
First year of operation	2012	
Total Investment Costs (EUR Million Nominal)	420	100%
Source financing and co-funding rates over the total investment costs		
- European Regional Development Fund	10	2.5%
- National funds (French State)	48	12%
- Agence de Financement des Infrastructures de Transport de France	0.75	0.1%
- Normandy Region	10	2.5%
- Département Seine-Maritime	14	3%
- European Investment Bank (loan)	100	23.9%
- CODAH	238	56%

After five years of operations, **the tramway is still struggling to reach a satisfactory level of demand**. With 38,461 passengers per day projected in 2017**, the tramway falls short to reach transport objectives** of 56,000 passengers per day, 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 'façade-to-façade' renovations bringing aesthetic value to the city. On the other hand, **there are no evidences of real estate price increase thanks to the project**. In conclusion, the Le-Havre tramway had perhaps **over-optimistic expectations** both in terms of transport and urban renewal objectives. However, the project's good insertion within an urban renewal policy is likely to reap new benefits as other projects are developed, creating synergies to realise overarching social cohesion, environmental sustainability and economic objectives.

GDAŃSK TRAM

This case study illustrates the story of the **Gdańsk Urban Transport Project – phase IIIA** (further called GPKM IIIA), a major infrastructure investment co-financed by the EU over the programming period 2007-2013 in Poland. More specifically, this is a summary of an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to producing these effects. The analysis draws from an ex-post Cost-Benefit Analysis (CBA) and from an extensive set of qualitative evidence, both secondary (technical reports, official reports, press articles, books and research papers) and primary (interviews with 22 key stakeholders and experts have been carried out in the period from September to November 2017).

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 transport 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 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 spreading 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 boost with Gdańsk being one of the **venues of the 2012 European Football Championship**.

In the second half of the 1990's the City public administration started considering improving and developing the public transport system in Gdańsk. Thus, 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 the Polish accession to the EU that an intensive investment programme was put in place to implement the GPKM. The implementation of such programme is being carried out in phases, reflecting the evolution of the needs and objectives of the city. The first phase (2002-2003) included diagnostics of transport, set task for future years and rebuilt of five sections of the tram track infrastructure in the city. Under Phase II (2004-2008) the tram line to Chełm district was constructed together with modernisation of some parts of the network as well as purchase of the rolling stock suitable for different gradients. **In 2007, Phase IIIA was launched**. The construction phase began in 2007 and finished in 2012 in line with the schedule. The total investment costs were EUR 134.3 Million. The co-financing decision was taken in 2013, once the project was completed, and furtherly modified in 2015 (the co-financing rate passed from 60 to 80% of eligible costs).

OVERVIEW OF INVESTMENT COSTS AND SOURCES OF FINANCING		
Financing period	2007-2013	
First year of operation	2013	
Total Investment Costs (EUR Million Nominal)	134.3	100%
Source financing and co-funding rates over the total investment costs		
- Cohesion Fund	89	61.2%
- National funds (City of Gdańsk)	48	21.2%
- ZKM (Urban Transport Operator)	0.75	18.6%

After four years of operations, the Gdańsk Urban Transport Project – phase IIIA represents a **good example of infrastructural project which managed to deliver all the expected benefits at the expected time and costs**. Actually, the project was efficiently implemented, the service is operated as expected and the users are overall satisfied with the project. The good project performance is expected to last also in the longer-run in light with its integration with the upcoming phase IIIB and IVA of the Gdańsk Urban Transport Project (GPKM).

REFERENCES

- Chen, CL and Vickerman, R. (2017), Can transport infrastructure change regions' economic fortunes? Some evidence from Europe and China, *Regional Studies*, 51:1.
- Dasgupta P. (2001), *Human Well-Being and the Natural Environment*, Oxford University Press.
- de Rus G., Roman C. and Trujillo L. (1995), Convergencia en infraestructuras de transporte, *Economistas*, 64, pp. 563-570.
- Del Bo, C., Fiorio, C., and Florio, M. (2011), Shadow wages for the EU regions. *Fiscal Studies*, 32(1), 109-143.
- Department for Transport (2016), Transport Analysis Guidance: WebTAG. https://www.gov.uk/guidance/transport-analysis-guidance-webtag.
- 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 (2012a), *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 (2012b). *Guidance note to the COCOF on treatment of retrospective EU assistance during the period 2007-2013.* [COCOF_12-0050-01-EN].
- 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.
- Flyvbjerg, B. (2007), Policy and planning for large-infrastructure projects: problems, causes, cures, *Environment and Planning B: Planning and Design*, 34 (4): 578-597.
- Flyvbjerg, B., M.K. Holm and S.L. Buhl (2003), How Common and How Large Are Cost Overruns in Transport Infrastructure Projects? *Transport Reviews*, 23 (1): 71-88.
- Flyvbjerg, B., M.K.S. Holm and S.L. Buhl (2004), What Causes Cost Overrun in Transport infrastructure Projects?, *Transport Reviews,* 24 (1): 3-18.
- Flyvbjerg, B., M.K.S. Holm and S.L. Buhl (2005), How (In)accurate Are Demand Forecasts in Public Works Projects? The Case of Transportation, *Journal of the American Planning Association,* 71 (2): 131-146.
- Latvian State Roads - LSR (2015), *Methodological guidelines for economic evaluation of road project costs and benefits*.
- Mackie, P.J., Worsley, T. and Eliasson, J. (2014), Transport Appraisal Revisited. *Research in Transportation Economics*, 47, pp.3-18.

- Marchesini P. and Weijermars A, (2010), The relationship between road safety and congestion on motorways. SWON internal report R-2010-12
- Martens, K., Golub, A. and Robinson, G. (2012), A justice-theoretic approach to the distribution of transportation benefits: Implications for transportation planning practice in the United States. *Transportation Research Part A*: *Policy and Practice*, 46(4), 684-695.
- Romijn, G. and Renes, G. (2014), *General guideline for social cost-benefit analysis*, CPB/PBL, The Netherlands.
- Stiglitz J.E., Sen A., Fitoussi J.P (2009), *Report by the Commission on the Measurement of Economic Performance and Social Progress*.

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