

**Evaluation
Report**

**CONTRIBUTION OF MAJOR
ROAD AND RAIL INFRASTRUCTURE
PROJECTS
TO
REGIONAL DEVELOPMENT**

EIB Author:
Flavia Palanza, Evaluation Unit

Consultants:
S.E.E.E., Paris
Gérardin Conseil, Pierrefonds

Luxembourg, September 1998

EUROPEAN INVESTMENT BANK

The EIB and Regional Development

The objective of reducing disparities in growth rates between the regions is enshrined in the fifth recital to the Treaty establishing the European Community:

“Anxious to strengthen the unity of their economies and to ensure their harmonious development by reducing the differences existing between the various regions and the backwardness of the less-favoured regions”.

However, in order to avoid distorting competition between Member States, the Treaty sets out a very strict framework for possible forms of regional development aid.

The Treaty explicitly entrusts the EIB with the remit of supporting regional development: “The task of the European Investment Bank shall be to contribute...to the balanced and steady development of the common market... For this purpose the Bank shall.... Facilitate the financing of ... projects for developing the less-developed regions” (Article 130 of the Treaty of Rome superseded by Article 198e of the Treaty on European Union – 1992).

Until 1975 and the creation of the European Regional Development Fund (ERDF), managed by the European Commission, the EIB was virtually the sole source of Community financing for regional development projects.

The dawn of the ERDF represented a significant stage inasmuch as it ushered in substantial, direct contributions from the Community budget in the form of grant aid, a development that in no way undermined the importance of the EIB's input.

Over the years, a variety of additional Community objective mandates have been handed down to the EIB, including that of helping to improve communications between the Member States. Nonetheless, regional development has consistently ranked foremost, with almost two-thirds of aggregate annual financing given over to the least-favoured countries.

In 1988, reform of the Structural Funds introduced a new distinction between the different levels of regional development in terms of “Objective” classifications. The main category was labelled “Objective 1” and embraces all regions recording average per capita income 75% below the Community average¹.

Adoption of the Single European Act served to speed up the process, according unequivocal priority to the aim of strengthening the Community's economic and social fabric. At the same time, the go-ahead was given to doubling the Structural Fund's budgetary appropriations, with the proactive partnership of the EIB.

The Treaty on European Union (the Treaty of Maastricht) gave the EIB increased responsibilities in the drive towards greater economic and social unity.

These responsibilities encompass:

1. direct contributions towards financing capital projects in areas eligible for assistance under the Structural Funds (Objectives 1 – 2 and 5(b));
2. operations in areas covered by other specific support measures promoted by the European Union;
3. infrastructure financing having an indirect impact on regional development.

¹ Regional objectives:

Objective 1:	Economic adjustment of regions whose development is lagging behind
Objective 2:	Economic conversion of areas affected by industrial decline
Objective 5(b):	Economic diversification of vulnerable rural areas
Objective 6:	Development of areas with an extremely low population density

The purpose of this report is to provide a clearer insight into how the third category of activity serves to foster regional development.

The study is one of three offering an evaluation of the impact on regional development of investment in major road and rail infrastructure, telecommunications and industry.

Note: In community parlance and in contrast to other multilateral development agencies, the term “region” denotes an entire country or parts thereof rather than an area encompassing several countries. In its Nomenclature of Territorial Units for Statistical Purposes (NUTS), the Community adopts three subdivisions. In most cases, “region” falls within the NUTS 2 subdivision, generally considered the most important in economic terms.

Correlation between NUTS and national administrative subdivisions:

	NUTS 1	NUTS 2	NUTS 3
Belgique/België	Régions	Provinces	Arrondissements
Danmark			Amter
Deutschland	Länder	Regierungsbezirke	Kreise
Ellada	NUTS 2 groupings	Development regions	Nomoi
España	NUTS 2 groupings	Comunidades autónomas	Provincias
France	ZEAT + DOM	Régions + DOM	Départements + DOM
Ireland			Planning regions
Italia	NUTS 2 groupings	Regioni	Provincia
Luxembourg			
Nederland	Landsdeien	Provincies	COROP-Regio's
Österreich	Gruppen von Bundesländern	Bundesländer	Gruppen von Politischen Bezirken
Portugal	NUTS 2 groupings	Comissões de coordenação regional + Regiões autónomas	Grouping of cancelhos
SuomiFinland	Manner-Suomi Ahvenanmaa	Suuralueet	Maakunnat
Sverige		Riksomraden	Län
United Kingdom	Standard regions	NUTS 3 groupings	Counties, local authority regions

TABLE OF CONTENTS

	Page
SUMMARY	1
1. DESCRIPTION OF STUDY	2
1.1 Objectives	2
1.2 Criteria adopted for selecting the sample	2
1.3 Structure of study and methodology	3
1.4 Cost of study	3
2. EVALUATION OF THE RESULTS OBTAINED	3
2.1 Compliance of project implementation with forecasts	4
2.1.1 In line with technical definition	4
2.1.2 In line with implementation schedules	4
2.1.3 In line with project budget	4
2.1.4 Compliance with competitive bidding procedures	4
2.1.5 In line with special financing conditions at the appraisal stage	5
2.2 Effectiveness of inputs and outputs	5
2.2.1 Division of projects	5
2.2.2 Comparison of unit costs	6
2.2.3 Recorded vs. forecast traffic flows	6
2.3 Impact	7
2.3.1 Direct employment	7
2.3.2 Environment	7
2.3.3 Internal and economic rates of return	8
2.3.4 Limitations of the economic analysis	9
3. RELEVANCE - CONTRIBUTION TO REGIONAL DEVELOPMENT	9
3.1 Problems	9
3.2 Approach adopted	10
3.3 Results	11
4. CONCLUSIONS AND RECOMMENDATIONS	12
4.1 Conclusions	13
4.2 Recommendations	14

Annex 1 : List of points examined

Annex 2 : Summary of criteria used for gauging success

Abbreviations :

EU : European Union

RFT : Project Completion Report

(from "Rapport de Fin de Travaux")

m-y : man-years

m-d : man-days

Exchange rate :

ECU 1 = US\$ 1.11
as at 31.07.1998

* * *

NOTICE

The EIB has an obligation of confidentiality in relation to the owners, promoters and operators of the projects referred to in this report. Neither the EIB nor the consultants employed on these studies will disclose to a third party any information that might result in breach of that obligation, and the EIB and the consultants will not assume any obligation to disclose any further information nor to seek consent from relevant sources to do so.

* * *

SUMMARY

The study covers a sample of sixteen large-scale road projects and seven major rail projects financed by the European Investment Bank (EIB) in five European Union (EU) countries between 1982 and 1991 in terms of their contribution to regional development. The sixteen road projects involved seven major highways: four projects were separate operations and twelve were part of capital expenditure programmes concerning three motorways.

The projects were evaluated from two angles: the success of the operations as such and their contribution to the EIB's priority statutory objective, viz. regional development.

The success of the projects was examined by comparing the forecasts made at the appraisal stage with the operational results. On the whole, with the exception of one motorway, the study attests to the fact that the projects were fully justified, despite the occurrence of sometimes major slippages in cost and implementation deadlines. On the basis of the evaluated sample it can be concluded that the EIB's projects portfolio consists of operations which have proved a success technically, financially and economically.

This favourable conclusion must be qualified by the fact that it is EIB practice to divide up projects involving the same road or railway line into separate sections. This practice makes it impossible for the coherence of these projects to be assessed systematically and gives rise to constraints with regard to analysing traffic and rates of return.

In terms of the contribution to regional development, the success of the operations is a necessary but not sufficient criterion. It enables a judgement to be reached on whether the projects were justified from the national point of view but not with regard to the distribution of the net benefits between the region in question and the rest of the country or the EU, or even between the different areas of the same region. The implementation of these infrastructure projects in an eligible area is, in isolation, also not a sufficient criterion. In view of the difficulties involved in isolating and, in particular, quantifying the distribution of the benefits, the study proposes criteria for making a qualitative assessment. These criteria include the contribution made by the infrastructure examined towards bringing the less favoured regions closer to the rest of the country, its accessibility, by means of a well-developed regional network, to the least favoured areas and its integration into a regional development programme eliminating bottlenecks in other sectors. If the local network is inadequate and/or there are deficiencies in other sectors directly or indirectly related to the project, the operation must be combined with parallel accompanying measures, in order to contribute effectively to regional development.

By applying these criteria to the operations investigated, the evaluation concluded that all the projects brought the regions in question closer to the major national and/or European economic centres; that in the case of two roads and two railway lines, thanks to the implementation of accompanying measures, the projects had a positive effect on regional development; that one road, however, had a negative impact. In the other nine cases, the analysis was inconclusive, given the absence of data on how the infrastructure fitted into its regional context.

The study led to two main recommendations:

- ◆ major infrastructure projects should be examined and, if necessary, financed as a whole, without being divided up artificially into partial operations. Appraisal would then focus on the multiannual capital expenditure programme and the loan would be disbursed in line with regularly monitored progress on the works;
- ◆ the operations should be studied in context, with a view to checking that the prerequisites for their contribution to regional development are satisfied and, where appropriate, that the necessary accompanying measures are adopted. This approach must be initiated at the project appraisal stage and continued during monitoring as well as evaluation of the impact of the operation.

* * *

1. DESCRIPTION OF STUDY

1.1 Objectives

The study analyses a sample of 23 road and rail operations financed in regions which are lagging behind in their development, referred to as "Objective 1" areas.² The EU defines six levels of "backwardness" in terms of development, the "Objective 1" areas being those which are lagging behind most from the structural point of view, with an average per capita income of less than 75% of the Community average. Transport infrastructure can help to open up the less favoured regions by improving their accessibility, i.e. by encouraging the movement of people and goods or enabling economic activities to be set up which, all things being equal, tend to gravitate towards the best-served centres. In 1995, EIB support for road and rail infrastructure projects accounted for more than a quarter of the Bank's total lending.

The sample was analysed from the point of view of its success and its contribution to regional development. The study took as its starting point a report on the portfolio of road infrastructure projects financed with EIB assistance, which had shown that the actual return was higher than expected. This deserved to be verified and explained. The study also draws on the first report of the Cohesion Fund, which concluded that the gap between the richer and the poorer countries within the Community was narrowing but that the gap between favoured and less favoured regions within the same country was widening. Although transport infrastructure is only one link in the development chain, it is regarded as playing a crucial role in this field.

1.2 Criteria adopted for selecting the sample

The EIB's Evaluation Unit (EV) selected the sample of road and rail infrastructure projects mainly on the basis of the following criteria:

- ◆ eligibility in terms of the development of Objective 1 areas³;
- ◆ type: major roads or railways which insofar as possible were part of the same capital expenditure programme. Urban transport was excluded;
- ◆ timing: operations signed between 1982 and 1991 and completed no later than 1992, which had therefore been operating for between five and ten years, the time needed to evaluate the impact of infrastructure projects which are slow to become fully operational;
- ◆ country: only those countries which offered at least one road project **and** one rail project meeting the above criteria were selected.

The choice thus fell on sixteen road projects and seven rail projects located in France, Greece, Italy, Portugal and Spain⁴. In all, ten promoters were involved. The sample is considered representative of the EIB's portfolio, even though it comprises operations which are marginally larger than average:

%*	ROAD	RAIL
Number of operations	13	22
Amount invested	19	36
Amount of loans	20	35

* of total operations financed in the EU over the period in question in the road and rail sectors.

The sixteen **road projects** involved seven highways: four were separate operations and twelve were part of capital expenditure programmes involving three motorways.

² See EEC - Regional and cohesion policy - First Cohesion Report (15.11.1996).

³ Six operations were also supposed to contribute towards European integration by facilitating communications between EU Member Countries.

⁴ The projects are not identified for reasons of confidentiality.

The sample covered various types of scheme :

- ◆ the **seven roads**, which totalled *nearly 900 kilometres*, included:
 - four new motorways to two-lane dual carriageway design;
 - one scheme involving the widening of a two-lane dual carriageway motorway by adding a third lane in either direction and;
 - two schemes to widen trunk roads.

The promoters of the five motorways were concessionaries; those of the two projects involving trunk roads were the relevant ministries;

- ◆ of the **seven rail projects**, totalling *nearly 1 400 kilometres of track* and including *rolling stock*, a distinction can be made between :
 - two schemes involving new high-speed lines,
 - 2 schemes involving a new conventional line,
 - 2 operations involving modernisation and/or the construction of a second track,
 - 1 operation to renew rolling stock.

The seven promoters were the national railway companies.

1.3 Structure of study and methodology

The evaluation covered two main aspects:

- ◆ the technical, environmental, financial and economic success of the individual operations;
- ◆ the contribution of the operations to the EIB's priority statutory objective: the harmonious development of the EU by increasing income in the less favoured regions.

The main stages consisted of :

- ◆ examination of the files for each operation, based on the documentation available at the EIB ;
- ◆ preparation of a detailed questionnaire on how projects had evolved since they had become operational (see Annex 1 - List of points examined) and sending this questionnaire to the promoter;
- ◆ a site visit, followed by the drawing-up of a working paper on each operation by the external consultants;
- ◆ recapitulation and analysis of the information gathered together in this summary report.

1.4 Cost of study

It took 260 design staff m-d, 80 support staff m-d and 127 external consultant m-d to produce this study.

2. EVALUATION OF THE RESULTS OBTAINED

The results were evaluated on the basis of the same criteria as adopted for *ex ante* project appraisal, which related in particular to the execution, effectiveness and impact of the operations. The results of each operation were compared with the appraisal forecasts with a view to rating them accordingly. The ratings given in respect of the main criteria are summarised in Annex 2.

2.1 Compliance of project implementation with forecasts

2.1.1 In line with technical definition

The physical implementation of the road and rail projects was satisfactory for the whole of the sample, except in one case. Technical modifications or improvements were made to certain operations during implementation, but without affecting the ultimate aim. The exception was a trunk road upgrading scheme where numerous changes to junctions and intersections with local roads have yet to be completed and have been postponed by the promoter to a later date.

2.1.2 In line with implementation schedules

Of the sixteen **road** projects:

- one was completed more than 10% ahead of schedule;
- six were completed on, if not slightly ahead of, schedule; and
- nine were completed late, on average taking 50% longer than scheduled (twice as long in the case of one operation).

Of the seven **rail** projects:

- two were completed within the timeframe envisaged by the EIB, but they are not particularly representative because of the comparatively late stage of the Bank's involvement;
- two others were only just behind schedule; while
- three operations were subject to major delays and took up to nearly twice as long as expected.

2.1.3 In line with project budget

In every case, the project budget was exceeded. For roads the ratio of final costs to projected costs ranged from 1.06 to 1.70 (median: 1.18); for rail projects it ranged from 1.06 to 1.75 in the case of six operations and was as high as 3.80 for the seventh (median: 1.16).

There is a marked correlation between cost overruns and delays: the operations with low cost overruns were those that were completed on time; those whose cost increased significantly were the ones which suffered the biggest delays. These delays and increased costs were due mainly to:

- technical problems, sometimes affecting critical sections (tunnels, bridges, etc.), although in some cases part of the infrastructure was able to be used before full completion;
- project design deficiencies prior to issue of invitations to tender: the operations which had not been so carefully prepared were subject, during implementation, to substantial technical modifications involving considerable additional work and hence took longer and cost more. In the case of the rail project which actually cost 3.80 as much as expected, a vague technical description led to major revision of the work and delays of more than three years;
- and, finally, in the case of certain operations or in certain countries, failure to finalise land purchases prior to starting work.

2.1.4 Compliance with competitive bidding procedures

The Community directives governing the opening-up of contracts to international competitive bidding have applied only since 1 January 1993 and were not therefore mandatory in the case of the road and rail projects in question, for which national invitations to tender were thus acceptable.

Nevertheless, tenders were invited internationally for some of the civil engineering and equipment contracts for the sixteen road projects and four out of the seven rail projects, the proportion covered ranging from 10% to 90% of total cost, in combination with national invitations to tender and/or direct-agreement procedures. In general, international invitations to tender are more common in countries obliged to import their capital equipment.

With regard to rail projects, competition is not possible for the rails themselves, as each manufacturer has to submit its price list to the ECSC. Similarly, for rolling stock it is reasonable that the very precise specifications intended to ensure compatibility with the existing rolling stock should lead to enquiries being confined to regular suppliers only.

For both road and rail projects the promoters consider that the opening-up of public works contracts to international competitive bidding has hardly any significant impact on costs or penetration by foreign contractors, given that the domestic contractors in this sector are highly competitive and in view of the importance of legislation and of local price structures, which are often difficult for foreign contractors to assess. On the other hand, there is a big difference in terms of cost and timeframe between the invitation to tender procedure (whether national or international) and the direct-agreement procedure.

However, according to the EIB's operational departments, the opening-up of contracts to international competitive bidding should ultimately have beneficial effects on the cost of operations by, for instance, curbing unlawful agreements between national firms.

2.1.5 In line with special financing conditions at the appraisal stage

The award of EIB finance was subject to special conditions in the case of one road project and two rail projects in the same country.

The promoter of the **road project** was asked to extend the section of road financed by the EIB by constructing a bypass around a built-up area to provide a link with another existing fast road.

The promoter formally complied with this condition by including the development of the network in its medium-term programme, but the work in question had not been carried out by the time the project financed by the EIB had been finished and has still not been completed, which means that it will be about twelve years after the road which was the subject of the financing operation has been brought into service before the bypass at the end of the road is constructed.

It would have been preferable, from the overall economic point of view and in the interests of coherent network development, to build this bypass first and then extend it by means of the operation funded by the EIB.

The financing of **two rail projects** with the same company called for conditions whereby the Government undertook to cover shortfalls and improve the company's financial situation. These conditions, included in the appraisal reports, did not however feature explicitly in the finance contracts. Although measures were taken at the time when the projects were carried out, thereby formally complying with the above conditions, other restructuring measures remain necessary to improve the situation on a more lasting basis.

2.2 Effectiveness of inputs and outputs

2.2.1 Division of projects

Projects involving a complete road or rail link are often not considered as a whole but divided up into "discrete" operations, each financed independently of the other. This sometimes makes it difficult to assess fully the coherence of the overall capital expenditure programme or choices in terms of priority schemes. *Ex post* analysis reveals that certain "discrete" operations have sometimes been carried out on the most critical and hence most risky sections (bypass or in the vicinity of a built-up area) but also those which are most promising in the general interest. In other cases work has started with the "routine" sections, for which the projects were ready, but the more awkward sections (expropriations, site-related technical difficulties) have been put off until later, so detracting from the profitability of the initial components.

In addition, if projects are divided up, this makes it more difficult to assess the linkage between the scale of the operation and the volume of traffic and hence the return on the project (see sections 2.2.3 and 2.3.3).

2.2.2 Comparison of unit costs

It is not easy to compare unit costs (per kilometre) for **road projects**, in view of differences in the nature of individual projects (those at the end of a network are usually the most expensive), geological conditions and relief, which determine, for instance, the number of bridges, tunnels and other structural works required. Expressed in 1996 ECUs⁵, the unit costs for the three new roads ranged from ECU 3.3m/km to ECU 14.7m/km, the latter figure reflecting the technical difficulties associated with an area which was particularly hilly. The unit costs for widening existing roads ranged from ECU 0.7m/km to ECU 5.5m/km.

The unit costs for **rail projects** involving construction of new infrastructure (calculated excluding the purchase of rolling stock) are also difficult to compare because their characteristics and geographical situations are very different; they ranged from ECU 6 m/km to ECU 60m/km, the latter figure being attributable to the exceptional technical complexity of the project. Unit costs for the modernisation projects, on the other hand, are comparable (ECU 0.36m/km to ECU 0.54m/km).

2.2.3 Recorded vs. forecast traffic flows

As stated above, the fact that projects involving major roads and railway lines are divided up into sections imposes a constraint when it comes to analysing *ex post* traffic flows, as it has not always been possible to relate the traffic statistics to the section selected by the EIB on a different basis from that of the promoter. Also, traffic varies considerably from one section of road to another, depending, for instance, on whether it is close to an urban centre. Where user behaviour was not consistent along the whole of a particular route, the analysis focused on the most characteristic sections, which determine the operation's cost-effectiveness.

Generally speaking, recorded traffic flows were higher than forecast, in terms of both the level of traffic when the project was brought into service and its rate of growth. The results differed from one operation to another:

- in the case of five out of the seven roads considered (i.e. ten out of sixteen operations), the forecasts were exceeded by around 25% ;
- with regard to the sixth road - a motorway divided up into five sections - the actual volume of traffic was 30% lower than forecast, even though the promoter's estimates had already been revised downwards at the appraisal stage. In this particular case, there are very marked seasonal variations in traffic flows and, while the project has attracted heavy goods vehicles, there is strong competition from an adjacent trunk road for light vehicles;
- in the case of the seventh road - a trunk road completed in 1989 - there is no way of telling how the volume of traffic has changed, as there is only one set of figures available for 1993. These were 35% lower than the forecasts.

With regard to the **rail projects** the initial objectives of the two projects for constructing new high-speed track were attained and the rate of growth in the volume of traffic was higher than forecast. For the other five operations, which resulted in improvements in the quality of service (capacity, speed), no estimates or actual figures relating specifically to these operations are available.

The favourable results for road projects corroborate the conclusions of the earlier analysis undertaken by EIB staff (see section 1.1). They raise the question of where this extra traffic has come from. Is it in addition to the existing traffic or is it a result of people switching from existing alternative routes? The evaluation endeavoured to answer this question.

⁵ In order to compare the unit costs for different operations, these were *discounted in terms of 1996 ECUs*, on the basis of the data available on the cost (in local currency) of the work during the different years of the construction period, the annual ECU conversion rates for the local currencies and each country's annual GDP deflators.

Traffic statistics could be obtained concerning the road and rail networks adjacent to two new motorways, one trunk road and two high-speed railway lines included in the sample. The following points emerged from the analysis of these statistics:

- ◆ in all cases the adjacent road network had reached or nearly reached saturation point before the new project came on stream. The traffic statistics collected after the road had been brought into service indicated that supply had stimulated demand; in other words, the increase in capacity due to the new project had eased traffic congestion and therefore reduced journey times, enabling the frequency of journeys to be increased. The volume of traffic on the infrastructure which was the subject of the financing operation exceeded the forecasts and, after a temporary decline, started to grow again at the old rate on the parallel roads;
- ◆ the impact of the two motorways on rail traffic, however, was negative, with regional passenger traffic falling by 25% on certain sections. The effects of trunk road upgrading on rail traffic are not known;
- ◆ high-speed trains have a limited impact on road and air traffic for the region as a whole but a significant impact on inter-regional traffic. Thus in one of the cases evaluated a high-speed train caused the share of road traffic to fall by 19% and that of air traffic by 5%; although the terminal town's airport traffic declined by 25%, it is difficult to determine, without a far more complex analysis, whether this downturn was attributable to the arrival on the scene of the high-speed train or to other exogenous factors.

2.3 Impact

2.3.1 Direct employment

In general, transport infrastructure projects have a limited impact on employment. In both the road and rail sectors temporary employment per kilometre of road/track varies considerably from one operation to another. Employment per kilometre of road ranges between 8 and 85 man-years (m-y) and may increase by a factor of two or even three for different operations in the same country. Employment per kilometre of track ranges between 4 and 170 m-y.

Permanent employment involves mainly jobs in tollbooths, station operations, facilities maintenance and safety. The employment created by toll motorways amounts on average to just over 100 jobs, at an average cost per job of ECU 5 million at 1996 prices; with regard to rail operations few, if any, jobs have been created, except in the case of two new lines, which led to 200 and 700 permanent jobs being created at a cost of ECU 17 million and ECU 4 million respectively (at 1996 prices). It should be noted that these new vacancies were, given the very high level of overstaffing in most European rail companies, probably filled by internal transfers, without any new staff being taken on.

These conclusions corroborate another internal study conducted by EV, which concludes that transport infrastructure on the whole creates few direct permanent jobs and that the number created varies from one operation to another. There could be an indirect impact but it would have to be possible to measure this (the econometric models are still not very reliable) and localise these positive effects in order to conclude that they have contributed to regional development.

2.3.2 Environment

The impact on the environment must be evaluated from the points of view of:

- ◆ the construction work stage

For all the road and rail projects the impact on the natural environment was investigated at the project design stage, often in consultation with the parties concerned. In some cases alternative solutions were examined. In one case the environmental study led to a project that was under way being rerouted. The protection of flora and fauna and measures to minimise pollution for those living nearby received special attention, and sometimes, while the work was in progress, additional measures (noise abatement) were taken to offset the effects. Of course in order to keep within budget and meet the deadlines it is always preferable clearly to identify these aspects at the project design stage rather than during implementation.

- ◆ the operational stage

Whilst the environmental impact of the construction stage of individual infrastructure projects has been carefully investigated, their overall impact does not seem to have been the subject of a comparative analysis.

An environmental impact assessment was carried out on two road projects approximately two years after they were brought into operation, and this made it possible to identify those sections which might require new protection measures and to confirm the usefulness of long-term monitoring.

However, on the whole the road projects that were evaluated have helped to improve safety and reduce the volume of traffic on adjacent roads (and in particular divert heavy goods vehicle traffic), leading to lower pollution in urban centres. These substantial benefits are offset, though, by two disadvantages which are often ignored: the net increase in the volume of traffic and, consequently, in noxious emissions; and, insofar as roads are concerned, the attractions of road haulage, at the expense of rail, for some freight, whereas a shift in the other direction would cause less pollution.

The evaluation study found that when formulating its lending strategy the EIB fails to take account, at least explicitly, of the positive effects which rail projects - by diverting traffic from the roads - have in terms of pollution.

2.3.3 Internal and economic rates of return

At the appraisal stage the internal rate of return on **road projects** was estimated for five out of seven roads (i.e. 14 out of 16 operations), the remaining two roads not being subject to tolls. The return on the investment in one road, part of a still relatively underdeveloped network, was even very high, with some sections achieving a rate of 13%. On the other hand, the return on four expensive motorways at the end of a network was low (for three of them the rate was estimated at less than 3% on average and for the fourth it was negative).

In the **rail sector** the rate of return was estimated for five out of seven operations: it was close to 10% in one case, 4% in two others and around zero for the last two. With regard to the remaining two operations it was not possible to dissociate the impact of the projects from the profitability of the line or the company.

The fact that the internal rates of return are low does not have any practical implications from the point of view of the EIB's banking risk: either the borrower (and guarantor) is different from the promoter, or financially sound companies (particularly the motorway companies) service the debt by means of cross subsidies from the more profitable sections of the network; or loss-making companies receive public transfers and/or subsidies.

The economic rate of return, calculated according to the traditional method used in the transport sector, compares the benefits (based on an estimate and evaluation of time savings) with capital expenditure and operating costs. Other benefits which are less easily quantifiable (for instance, the reduction in the number of accidents) are sometimes cited as helping to increase the rate of return.

In the **road sector** the economic rate of return was, at the appraisal stage, often well above 10% and in some cases as high as 25%. The sole exception was the project referred to above with a negative internal rate of return and for which the economic return was put at around 3%. In the **rail sector** the return was lower, mainly because of the lesser volume of traffic. In the case of two operations (including the one with a high internal rate of return mentioned above) it was just over 10% and ranged between 5% and 8% for the others. These rates are higher than the borrowing rates in real terms.

At the evaluation stage the lack of precise data on operating revenue and expenditure - not itemised according to section - or on time savings (for estimating the economic rate of return) meant that it was not possible to recalculate the internal and economic rates of return for the projects identified by the EIB. However, they would appear to differ only minimally from the forecast levels as the higher-than-estimated growth in traffic offset the cost slippage and probable reduction in time savings associated with the increase in traffic. The only exception to this is the motorway project for which the internal rate of return was negative and the economic rate of return 3%. These rates were definitely lower *ex post*

because of the combined effect of two adverse factors, viz. the increase in capital costs and the lower-than-expected volume of traffic.

The evaluation therefore concluded that, with the exception of the abovementioned project, the economic return was good for all the operations and the internal return low for six out of the ten operations for which it could be calculated.

2.3.4 Limitations of the economic analysis

Decisions concerning the plans for improving transport networks are taken by the national or regional authorities over a number of years or even decades. Matters such as societal choices, pricing arrangements and the cost of energy - which are well beyond the scope of the promoters of the infrastructure projects for which EIB assistance is being requested - are involved. EIB finance is sought once the decisions have been taken concerning the preferred type of transport (road or rail) and the route. At such a stage the search for an optimal least-cost solution to the problem of the increase in traffic compared with other competing schemes and the integration of externalities, including ecological aspects, become difficult.

According to the Evaluation Unit, this constraint does not justify the limitations of the current procedure nor exempt the EIB from carrying out a detailed economic and environmental analysis - on the contrary. An excessively narrow analysis of each individual operation does not enable the general context and the underlying economic strategy to be assessed. An economic analysis which fails to take account of externalities, such as the cost of pollution, evades the issue of the choice of the mode of transport. And yet this choice is not neutral insofar as the environment is concerned and taking account of these externalities on the high-density routes would probably affect the economic rate of return on the operations studied, increasing it for rail projects at the expense of road projects. This point has already been raised by non-governmental organisations.

If the EIB is to follow a strategy of providing assistance for sustainable transport infrastructure schemes, it is up to it to widen the scope of financing for road and rail projects and, insofar as possible, to include externalities, particularly those relating to the environment, in the economic analyses.

To sum up, leaving aside the above reservations:

the current, albeit limited, data on the whole confirm, with one exception, the quality of the infrastructural schemes selected in terms of how they have been implemented and subsequently used.

3. RELEVANCE - CONTRIBUTION TO REGIONAL DEVELOPMENT

3.1 Problems

The aim of regional development policy is to create a situation of sustained, autonomous growth which will bring the per capita income of the less favoured regions closer to the European average. Infrastructure contributes only indirectly to this aim: in itself, it has only a marginal multiplier effect, as infrastructure use does not contribute significantly either towards increasing the national product, the creation of permanent jobs or the transfer of technology, nor does it have an impact as a purchaser on the other regional industries or services. Communications infrastructure may, though, act as a catalyst in promoting development.

This role is very difficult to assess or even quantify, however. In the EIB's appraisal documents eligibility under the heading of regional development is based primarily on the geographical location of the projects, these being justified, moreover, by a sensible allocation of resources at national or Community

level. With regard to regional development, this sensible allocation is a necessary but not sufficient criterion, since it does not enable an assessment to be made of the distribution of the net benefits between the region and the rest of the country or the EU, or even between the different areas of the same region, owing to the large number of factors involved.

The establishment of industrial zones close to a new motorway may, for instance, involve merely transferring activities from another region or from another area of the same region. High-speed trains promote employment and generate income in the centre of the towns served, which often have an average per capita income at the outset which is higher than the regional, national or even Community average.

It is also virtually impossible to tackle the question of the regional impact from the macroeconomic angle, because of the dearth of statistics at provincial and even municipal levels with respect, for example, to trends in net terms in per capita income, employment and trade flows. These data are often available at regional level, but then it is impossible to establish a causal link between changes to the region's transport network and its economic development because of the multiplicity of factors involved. Highly complex macroeconomic models have indeed been created in order to try to measure this impact, but they are cumbersome and lead to controversial results.

3.2 Approach adopted

The study therefore endeavoured to assess the impact of the operations upon regional development by adopting a different approach, based on the assumption that transport infrastructure does contribute to regional development, provided that certain conditions are met. It analysed the projects according to five criteria, each corresponding to a condition which, by itself, is necessary but not sufficient:

- ♦ the first criterion relates to **the quality of the project** as such and therefore involves analysis of the project in accordance with the criteria referred to in the preceding section; the aim is to justify the project at national level, without taking account of the regional distribution of net benefits;
- ♦ the second criterion examines whether the **infrastructure studied brings the less favoured region closer to the country's economic centres**: the infrastructure must not merely pass through but serve the region, failing which its local impact will only be negligible, even if the rate of return is high;
- ♦ the third criterion checks that the infrastructure not only brings the region closer but is itself **accessible from the different areas within the region**, that is:
 - whether the degree of penetration and the capacity of the regional network feeding the new infrastructure are adequate;
 - whether the new infrastructure is not being constructed at the expense of sections of the local network which are not particularly profitable, adversely affecting the degree of penetration within the region (for instance, the closure of certain rail links).

If the outlying areas of the region have inadequate access to the infrastructure financed, this may encourage economic activities to relocate to sites which are better served; according to studies carried out in research centres, there is a strong presumption that major interregional links which bring the main centre(s) of a less favoured region closer to the rest of the country may accentuate the disparities in development within the region in question if they have poor connections with the rest of the region: besides, all things being equal, economic activities will tend to converge towards the better-equipped and more accessible centres.

- ♦ the fourth criterion concerns the **regional policy into which the infrastructure project dovetails**, in order to check that existing or potential deficiencies in other sectors of the economy do not prevent optimum use being made of the project. For example, good road infrastructure forming part of an overall programme to develop a site for the purpose of tourism will not be sufficient if the other types of infrastructure (water, electricity, etc.) are lacking;

- ♦ the fifth criterion, which stems from the preceding two, concerns **verifying whether the following measures have been implemented**:
 - accompanying measures in the transport sector:
 - the improvement of existing road infrastructure (such as the construction of interchanges and access roads, the elimination of bottlenecks) ;
 - the electrification of conventional railway lines, guaranteeing continuity with the new lines;
 - the establishment of more practical connections with the new rail services linked to the operation;
 - the creation/renovation of intermodal terminals (stations, car parks, coach stations, etc.);
 - or other parallel independent accompanying measures :
 - a pricing policy;
 - commercial initiatives combining the use of the infrastructure with other activities (such as a winter sports package, holiday package, etc.) ;
 - the elimination of any bottlenecks in other sectors (e.g. urban infrastructure).

3.3 Results

This approach was tested on the road and rail projects studied. Each operation was analysed and given a rating according to the individual criteria. The first criterion incorporates the conclusions of section 2 concerning the results. The ratings, which were given on an *ex ante* and *ex post* basis, are on a scale from 0 (minimum) to 5 (maximum) (see Annex 2).

Criteria	Road projects			Rail projects		
	No. of roads on which information available	Average rating		No. of lines on which information available	Average rating	
		<i>ex ante</i>	<i>ex post</i>		<i>ex ante</i>	<i>ex post</i>
Number of roads/lines studied	7			7		
Criterion 1: Quality of project						
- Volume of traffic	7	4	4.3	7	4	3.7
- ERR	7	4.1	3.7*	7	3.3	3.7*
- Environmental impact						
- during construction	7	4	4.3	7	3.5	4.3
- during use	0	-	-	0	-	-
Criterion 2: Region brought closer to centre	7	4	4	7	4	4
Criterion 3: Infrastructure accessibility for outlying areas	2			2		
Criterion 4: Examination of regional policy	0			0		
Criterion 5: Accompanying measures						
- necessary	2			2		
- if so, implemented	2			2		

* estimates

The average rating according to critterion 1 on the whole confirms the positive contribution of the projects to national development. The only exception is the road with a negative return referred to in section 2.3.3, which does not contribute to national or, by extension, regional development.

The average rating awarded under critterion 2 shows that all the projects also contributed towards bringing the main economic hubs of the less favoured regions closer to the country's economic centres. This phenomenon was particularly marked in the case of one high-speed railway line, which led to urban growth and an increase in land values in one of the major towns served. One motorway also resulted in a significant rise in the number of tourists visiting the area for the day since it became more easily accessible from major towns located outside the region.

The situation with regard to critterion 3, however, is not so clear-cut. Problems of infrastructure accessibility for outlying areas had been referred to in the appraisal documents for two road and two rail projects. On the other hand, the analysis of the other ten projects examined was inconclusive owing to the lack of information at the appraisal stage on the conditions regarding accessibility.

With reference to critterion 4, there was no information in the appraisal reports on the regional context, which precluded any analysis of this aspect at the evaluation stage. Regional development is a dynamic process and, in the absence of a full picture of the situation at the appraisal stage, there is no way of establishing whether the post-project situation is related to the project as such or to other exogenous factors. Piecing together at the evaluation stage this picture or the conditions concerning accessibility referred to under criterion 3 is a very complex, long-drawn-out process beyond the terms of reference of this study.

The fifth and final critterion covers the accompanying measures recommended when the four projects referred to under criterion 3 were appraised. The evaluation found that these measures had indeed been implemented, reflecting an effort to bring the outlying areas closer, although the work on one of these measures is still under way and much behind schedule. Assessment of one of the operations considered shows that while it did open up certain areas, this opening-up process tends to increase competition between districts close to the motorway and those located further away.

To sum up:

The study confirms the positive impact on regional development of four transport links and the negative impact of one. Owing to the absence of information at the project appraisal stage it is not possible to judge the nature or extent of the impact of the other nine road or rail links.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

On the whole, the road and rail projects did not present any particular problems from the point of view of **physical implementation** or **competitive bidding procedures**.

Adherence to project implementation schedules and budgets varied considerably from one country to another, notably in the light of the very uneven degree of detail in the preliminary designs and the success in finalising, prior to start of the work, land acquisition or consolidation of farm land.

The average contribution to **employment** was modest, which is normal for major transport infrastructure projects.

The artificial **division** of a project involving the same road or rail link into "discrete" operations makes it difficult to analyse the overall coherence of the project or the source of changes in traffic levels and profitability.

Traffic projections were conservative for five out of seven roads and optimistic for the other two (a trunk road and a motorway competing with an uncongested trunk road not subject to tolls). Traffic forecasts for the high-speed rail projects were also exceeded.

In those cases where it was possible to collect traffic statistics on the road or rail networks adjacent to the projects examined, it was concluded that, after an initial impact, the volume of road traffic on the contrary did not decrease, while the construction of railway lines had an impact only on the road and air traffic of the centres served by the lines.

The effects on the **environment** were examined in depth as regards construction of the infrastructure but poorly appreciated in terms of its use. The choice of transport mode is, however, not neutral for the environment.

It was not possible to recalculate the **internal and economic rates of return** for want of precise data. However, the trend of the principal variables does not suggest any marked deviations from the initial projections, except in the case of the two projects where the volumes of traffic were low and for which the rates of return inevitably deteriorated. A motorway capital expenditure programme with internal and economic rates of return poor at the appraisal stage and negative at the evaluation stage raises the question of the EIB's lending criteria, particularly in relation to the financial costs associated with borrowings, including those from the EIB.

The EIB bases the eligibility of a project in terms of its contribution to regional development primarily upon geographical location. This is a necessary but insufficient criterion, since it gives no indication of the distribution of net benefits between the region concerned and the rest of the country or the EU, or even between the different areas of the same region.

On the basis of the criteria proposed by the Evaluation Unit, it was possible to conclude that:

- two rail and two road projects did effectively incorporate measures to improve access exerting a positive impact on development;
- one road link did not contribute to regional development, because it did not even meet the necessary conditions for the proper allocation of resources at national level;
- for the other nine operations, lack of information precluded a meaningful judgement as to their impact. Regional development is a dynamic process and, in the absence of indicators established at the appraisal stage, it is difficult to identify the crucial factors *ex post* or to ascertain whether the post-project situation is related to the project as such or to other exogenous factors. This does not mean that the operations have had no impact on the development of the regions concerned, but only that it is not possible to evaluate the full extent of that impact.

These results may seem mediocre to those who consider that any infrastructure located in a less favoured area ought to contribute to regional development. A distinction needs, however, to be made between inter-regional projects and small-scale local infrastructure projects, which improve communications within a less favoured region. If the latter are carried out under the right conditions, any increase in traffic may be deemed to result in their having a favourable regional impact. This is not the case with major inter-regional transport infrastructure projects, which, in order to contribute effectively towards reducing economic disparities between regions, must be accompanied by favourable supporting conditions in terms of accessibility and appropriate local measures.

Further studies are necessary in order better to identify those supporting conditions.

4.2 Recommendations

RECOMMENDATIONS	RESPONSE
Analysis of results	
<p>Projects involving the same road or rail link should not be divided up artificially but analysed and possibly financed as one operation. Appraisal would then cover the capital expenditure programme, which is often multiannual. The loan would be disbursed as the work - which would be regularly monitored - progressed.</p>	<p>Over the past few years a start has been made on moving in this direction; it should be taken forward and procedures developed accordingly.</p>
<p>In order to contain any slippage with regard to costs and construction deadlines, check that the technical design and certain pre-project costs are kept well under control prior to invitations to tender and the provision of EIB finance.</p>	<p>This recommendation may, in general terms, apply to all infrastructure projects financed by the EIB.</p>
<p>If externalities, notably the effects of pollution, can be quantified, they should be included in the economic analysis.</p>	<p>EIB staff have launched a study dealing in particular with the problems associated with environmental externalities in the transport sector and how they should be taken into account in the economic analysis of operations.</p>
Analysis of contribution to regional development	
<p>The contribution of EIB lending operations to regional development in the transport sector would be enhanced if the project's regional context is firmly established at the appraisal stage. This could be achieved by consulting the relevant regional authorities in order to verify fulfilment of conditions enabling the transport links financed to contribute effectively to the region's development and implementation of all requisite additional investment.</p>	<p>It has been agreed to test incorporation, at the appraisal stage, of more precise criteria making it possible to verify individual projects' contributions to regional development, in addition to the criterion of location alone.</p>

Individual evaluation of projects

List of points examined

I RESULTS OF PROJECT

- 1- Project characteristics
 - technical aspects
 - timetable
 - project cost; other capital expenditure following commissioning
- 2- Financing arrangements
 - timetable with reference to actual project expenditure
 - appropriateness of financing terms in relation to project characteristics
 - promoter's other sources of finance
- 3- Traffic
 - trends in traffic on road/rail link studied since commissioning and projections
 - trends in traffic on the parallel road and rail network and projections
 - reasons for variations in relation to assumptions made at appraisal stage
 - structure of traffic and categories of passenger traffic
- 4- Tariffs
 - changes in tariffs since commissioning of the road/rail link studied and projections
 - impact, if any, of tariff increases on traffic trends
- 5- Updating of the project's operating account and the internal rate of return
- 6- Updating of the economic aspects and the economic rate of return
- 7- Employment
- 8- Environment
 - changes in situation since commissioning of the road/rail link studied, compared with projections; lessons which can be learned for future projects
- 9- Tendering procedure: advantages and disadvantages of the procedure followed
- 10- EIB impact
 - promoter's relations with the Bank
 - advantages and disadvantages of EIB financing
 - future recommendations

II IMPACT ON REGIONAL DEVELOPMENT

1- Macroeconomic context

2- Background to project

- plan of network, with section in question highlighted; change(s) made since completion of project
- was access to the project from other areas in the region adequate at the time of commissioning? What bottlenecks were there, if any?
- how did the project fit into the regional development plan?
- what were the main accompanying measures planned ?
- how did the project fit into the promoter's development strategy?
- changes in the transport situation in the vicinity of the project, impact on the project

3- Regional impact of project on:

- land values in vicinity of
 - * the trunk roads
 - * the motorway
- establishment of new economic activities/new industries
- relocation of industries/enterprises
- redistribution of income
- redistribution of employment

Impact, if any, of exogenous microeconomic or macroeconomic factors which might have affected the region and/or the project.

Summary of criteria used for gauging success

Road projects

Criterion	No. of road link operations providing information	Minimum value	Median	Maximum value	Rating			Comments
					min.	av.	max.	
Physical implementation: in line with definition	16/16	inapplicable	inapplicable	inapplicable	2	3.7	4	Good for all projects bar one
Ratio of actual to projected costs	16/16	1.06	1.16	1.68	1	2.6	4	
Delays in implementation, as % of projected timeframe	16/16	-13 %	14 %	100 %	2	3.6	5	
Procurement procedures	16/16	inapplicable	inapplicable	inapplicable	--	--	--	Community directives not yet applicable but still numerous international invitations to tender
Conditionality	16/16	inapplicable	inapplicable	inapplicable	--	--	--	Applied in one case; conditions satisfied but substantial delay
Unit costs at 1996 prices (ECU million/km) - improvement schemes - new operations	16/16	0.7 3.3	1.3 5.6	5.5 14.7	--	--	--	Comparison difficult owing to major geographical differences
Financial implementation	16/16	inapplicable	inapplicable	inapplicable	--	--	--	Link between loan and operations not clear-cut
Traffic assessment (traffic 10 years after opening as % of theoretical capacity *)	7/7	100 %	84 %	33 %	2	4.3	5	
IRR <i>ex ante</i>	5/7	< 0	4 %	9 %	1	2	3	Cannot be calculated <i>ex post</i> but same trend as <i>ex ante</i>
ERR <i>ex ante</i>	7/7	2.5 %	15 %	25 %	2	4.1	5	
Impact on environment - construction - use	7/7 0/7	inapplicable	inapplicable	inapplicable	4 not avail.	4.3 not avail.	5 not avail.	Thorough study for "construction"; information on "use" vague
Employment (man-years/km)	15/15	9	33	85	--	--	--	Criterion of little significance for sector

* Traffic recorded 10 years on from commissioning of road or projected traffic based on current levels and growth rate assumptions.

Rail projects

Criterion	No. of operations providing information	Minimum value	Median	Maximum value	Rating			Comments
					min.	av.	max.	
Physical implementation	7/7	inapplicable	inapplicable	inapplicable	4	4	4	Good for all projects
Ratio of actual to projected costs	7/7	1.06	1.16	3.79	1	2.7	4	
Delays in implementation, as % of projected timeframe	7/7	0 %	14 %	95 %	1	3.0	4	
Procurement procedures	7/7	inapplicable	inapplicable	inapplicable	--	--	--	As for road projects
Conditionality	7/7	inapplicable	inapplicable	inapplicable	--	--	--	Recommended at appraisal stage for one project, but not strictly speaking applicable
Unit costs at 1996 prices (ECU million/km)* - improvement schemes - new operations	7/7	0.36 6.0	14.9	0.54 57.20	--	--	--	As for road projects
Financial implementation	7/7	inapplicable	inapplicable	inapplicable	--	--	--	As for road projects
Traffic assessment	6/6	inapplicable	inapplicable	inapplicable	3	3.7	4	
IRR <i>ex ante</i>	5/6	<0	4 %	10 %	1	2	4	As for road projects
ERR <i>ex ante</i>	6/6	4 %	7 %	13 %	2	3.5	4	As for road projects
Impact on environment - construction - use	6/6 0/6	inapplicable	inapplicable	inapplicable	3 not avail. .	3.7 not avail.	4 not avail. .	As for road projects
Employment (man-years/km)	5/6	4	128	167	--	--	--	As for road projects

* Construction of infrastructure only; does not include rolling stock

Performance ratings

- 5 Highly successful (objectives exceeded)
- 4 Successful (objectives completely achieved, very significant overall benefits)
- 3 Partially successful (objectives largely achieved, significant overall benefits)
- 2 Inadequate (some objectives achieved, some significant benefits)
- 1 Very inadequate (very few objectives achieved, few significant benefits)
- 0 Failure (no objectives achieved or project abandoned)

THE EUROPEAN INVESTMENT BANK

The European Investment Bank (EIB) is owned by the fifteen European Union (EU) Member States and has its headquarters in Luxembourg. It supports EU policies on a self-financing basis, raising its resources on the world's capital markets for onlending to sound capital investment projects that promote the balanced development of the European Union.

Set up in 1958 by the Treaty of Rome, the EIB has its own administrative structure and decision-making and control bodies (Board of Governors - usually the Finance Ministers of the Member Countries - Board of Directors, Management Committee and Audit Committee).

As a major international borrower, which has always been awarded the highest "AAA" credit rating by the world's leading rating agencies, the EIB raises large volumes of funds on fine terms. It onlends the proceeds of its borrowings on a non-profit basis.

The volume of the EIB's operations has grown steadily and the Bank is today one of the largest financing institutions of its kind in the world. While the bulk of its loans are within the European Union, the Bank has also been called upon to participate in the implementation of the Union's development aid and cooperation policies through financing for the benefit of some 120 non-EU countries. It therefore supports:

- economic growth in the African, Caribbean and Pacific States and the Overseas Countries and Territories, as well as in the Republic of South Africa;
- a stronger Euro - Mediterranean partnership;
- preparations for the accession of the Central and Eastern European Countries and Cyprus;
- industrial cooperation, including the transfer of technical know-how, with Asia and Latin America.

The EIB began carrying out ex-post evaluations in 1988, mainly for its operations in non-EU Member Countries. In 1995, the Bank established an Evaluation Unit to cover operations both inside and outside the Union. Ex-post evaluations take a thematic approach and are intended for publication. To-date the bank has published:

1. Performance of a Sample of Nine Sewage Treatment Plants in European Union Member Countries (1996 - available in English, French and German)
2. Evaluation of 10 Operations in the Telecommunications Sector in EU Member States (1998 - available in English, French and German)
3. Contribution of Large Rail and Road Infrastructure to Regional Development (1998 - available in English, French and German)
4. Evaluation of Industrial Projects Financed by the European Investment Bank under the Objective of Regional Development (1998 - available in English, French and German)
5. An Evaluation Study of 17 Water Projects located around the Mediterranean (1999 - available in English, French, German, Italian and Spanish).
6. The impact of EIB Borrowing Operations on the Integration of New Capital Markets. (1999 – available in English, French and German).
7. EIB Contribution to Regional Development A synthesis report on the regional development impact of EIB funding on 17 projects in Portugal and Italy (2001 – available in English, French, German, Italian and Portuguese).

These reports are available from:

Mrs. Barbara Simonelli, Information Desk
Fax: (+352) 4379-3188
e-mail: B.Simonelli@eib.org