1. Scope and Study Process

The aim of this study is to assess the impact of the existing transport barriers on the functioning of the internal market. Much of the benefits of the Internal Market programme stem from increased competition due to liberalisation of the regulatory framework and more efficient allocation of resources as a result of the removal of non-tariff barriers to free intra-EC trade. However, physical barriers, either natural such as geography, or artificial due to costly interfaces and poor connections between countries, are limiting competition and continue to impede the free flow of goods, services and people in the European Union.

The study is carried out in two stages. In the first stage the sources of inefficiency in the present transport network are investigated. This is done through a review of existing surveys on the transport system, and a new survey
which is implemented to collect the views of a sample of large European manufacturers and freight shippers.

In the second stage, a base case and some policy scenarios are prepared for the year 2005. The Base case which is a 'do-minimum' scenario of the transport system is compared with alternative policy scenarios of differing degree of integration, through using a simulation model. Operating statistics are produced for each transport mode. The cost, time and other indirect savings are estimated for each type of transport user. The effects are also evaluated at a macro-economic level in terms of regional growth and change. Direct and indirect effects on the economy are distinguished and a number of quantitative indicators are produced. The study provides a limited set of environmental indicators such as energy use and emissions by mode for each scenario; these indicators, together with other transport operating statistics, may be used in further analysis to assess the benefits of improving environment-friendly transport modes.

2. Present and foreseen inefficiencies

In order to identify the more critical existing and foreseen transport inadequacies and their impact on the internal Market, a survey was completed exploring the attitude and the point of view of European large manufacturers and freight shippers. The results were partially unexpected: the transport costs are perceived as declining in past years, and are foreseen as further declining also in the future, albeit at a slower rate.

Contradicting the "common wisdom" of the increasing burden of congestion, the combined effect of improved logistics ("Just in time" etc.) and the increasing value of the goods exchanged more than counter balances the increased transport costs related to congestion, inadequate infrastructure etc.

Another crucial inefficiency of transport in Europe, that is nevertheless outside the scope of this study, is its environmental impact. Being an externality, it is by definition not directly perceived by the firms (and the private car drivers) that generate it. It is anyway a critical factor in the sense that improving the environment-friendly transport mode is, together with enhanced competition, a major goal of the Common Transport Policies, potentially generating important economic trade-offs.

Figure 1.1 Logistics costs reduction (European Average)

3. The Base and Policy Scenarios

In order to pinpoint the impact of different possible policies, a Base (or "do-minimum") scenario is compared with two main policy scenarios, (Partial Integration and Full Integration) and two sensitivity tests based on the Full Integration scenario.

The contents of the alternative scenarios, Partial Integration and Full Integration, are defined in such a way to allow for separate assessment of the impact of infrastructure investment and of policy actions on the performance of transport systems in the Internal Market.
To do so, policy actions are assumed to vary between scenarios. The *Partial Integration* scenario includes all infrastructural projects but only a minimum number of policy measures. The *Full Integration* scenario, on the other hand, assumes that a set of policies are successfully implemented to enhance competition and to achieve cost reduction and larger scale, integrated transport operations in the Union by 2005.

The main assumptions on *infrastructure* are:

a. in the *Base* scenario, only limited components of the TEN priority projects are put into operation by 2005. The projects comprise those which are already under construction and due for completion by 2005, and those already committed by the Member States to be completed by 2005;

b. the *Partial and Full Integration scenarios* include all the remaining parts of the TEN priority projects that are expected to be completed by 2005.

c. The main assumptions about *policies* are:

**Harmonisation measures**

a. as far as policy measures are concerned, both the *Base* and the *Partial Integration* scenarios describe a situation in which an increase in qualitative environmental and safety standards is the only area for harmonisation.

d. the *Full Integration* scenario describes a situation in which Common Transport Policies to integrate and make transport services competitive in Europe are fully implemented. This would result in significant changes in relative prices, fares and tariffs of different transport modes.

**Liberalisation and Competition**

a. in both the *Base* and the *Partial Integration* scenarios in absence of a strong European commitment to remove price distortions, also the liberalisation of transport industries will be only partially achieved.

b. the adoption of a wide set of harmonisation measures in the *Full Integration* scenario is assumed to complement the establishment of a full set of regulatory powers by year 2005 to regulate monopolistic practices in the transport sector and guarantee competition in the European Union.

Two further sensitivity tests have been designed based on the *Full Integration* scenario. These deal with two critical issues in the European transport sector. The first sensitivity test examines the impact of an extensive introduction of congestion pricing on the main roads throughout Europe. The second explores the effect brought out by a quality improvement in rail services.

4. **Costs and Prices**

The different policy scenarios have been translated, for modelling purposes, into changes in the transport costs and tariffs perceived by the firms and the population. The *Base* scenario assumes that present costs and tariffs regimes continue with no more than minor variations. In the other scenarios each policy action or infrastructure implementation generates specific transport cost and price changes which affect the users’ choice of modes and routes. Besides these
direct cost accounting, an effort has been devoted to the quantification of "disutility functions", i.e. the indirect transport costs.

Values have been identified for critical factors such as the willingness to pay of different users for better levels of service and for the identification of determinants in modal choice in terms not only of costs but also line haul and terminal times and in particular the quality of transport services. Validation data has been prepared in order to estimate model parameters to represent the interaction between economic sectors and activity distribution, the choice of transport modes made by each type of passenger and for each type of freight and the network congestion effects.

5. Model Structure and Implementation

The assessment of the scenarios has been carried out by the implementation of the Meplan model, a suite of integrated regional-economic and transport models explicitly designed to consider the demand for transport services as an economic input and to disaggregate between transport costs and attributes that enter the production costs of different economic industrial sectors located in different regions.

The implementation of the model has been completed successfully. Data structures for the regional economic and transport modules have been determined. An extensive data analysis has been carried out in order to define the categories of economic sectors and trade, the types of transport flows and the transport modes. All the data has been classified in terms of the zoning system. The strategic multimodal transport network has been implemented representing all modes of transport for both passengers and freight for 1991 and for the different scenarios in 2005. Based on macro-economic and demographic projections the model has been run and provided estimates of transport demand in 2005 for the different scenarios.

6. Assessment of the Scenarios

As far as the two main scenarios are concerned, the model results highlight differences of some interest between the Partial and Full Integration: the impact of Common Transport Policies seems to be more significant, both on travel demand and on regional economies, than pure infrastructure improvement.

The Partial Integration scenario which is essentially an infrastructure improvement scenario, appears to stimulate the overall demand for transport. This results from an expansion of capacity as well as an improvement in service quality. Both in terms of passenger-km and ton-km there is a growth in comparison with the 2005 Base run. There is a marked increase in the use of High Speed Train, in response to the major projects included in the TENs, with passengers attracted both from conventional train and car (for the medium distance trips) and air (for longer distance trips). For freight, the overall changes in modal share are small, given that the majority of the TEN projects are mainly concerned with passenger services.

In the Full Integration scenario the impacts are more evenly distributed between freight and passenger flows, and there seems to be a more sustainable use of different transport modes: road loosing-out on longer distances to rail
and air for passengers, whilst for freight shipping and inland waterways have increased their share. Passenger travel sees a reduction of road travel as a result of motorway tolling; air captures some of the medium distance travel from road modes, a limited amount of the High Speed Train market, owing to a further reduction in air tariffs, and a small increase of the High Speed Train fares overall. On the other hand passenger trains gain in the short to medium distance where air cannot compete effectively. On the whole there is a slight decrease in passenger travel demand within the EU, compared with the 2005 Base scenario. In all scenarios substantial growth is forecast from 1991.

Freight transport sees a small yet significant increase in total t-km as a result of some freight being diverted to non-road modes, which generally involve an increase in travel to transfer points. Lorry use reduces slightly in volume yet significantly in t-km, shedding some of the medium and long distance movements to the other modes.

By extending congestion charging also onto non-motorway links there is a further decrease in road modes in favour of rail both for passengers, High Speed Train and conventional train, and for freight. Finally the sensitivity tests on railways show that there is a potential for rail service improvement, both freight and passenger respond positively to the modification of terminal costs and times.

An overall economic appraisal of the scenarios and sensitivity tests has been carried out showing the user's benefits and operator's revenues.

**Table 1.1 Annual savings against 2005 Base (million ECU 91)**

<table>
<thead>
<tr>
<th></th>
<th>Cost Savings</th>
<th>Time Savings</th>
<th>Total Cost &amp; Time Savings</th>
<th>Savings (including other indirect costs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Partial Integration (PI)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual savings</td>
<td>2,089</td>
<td>1,546</td>
<td>3,635</td>
<td>10,268</td>
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<td></td>
<td>53,407</td>
<td>13,118</td>
<td>66,525</td>
<td>92,467</td>
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<tr>
<td><strong>Congestion Charging (CC)</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Based on FI)</td>
<td>60,812</td>
<td>24,738</td>
<td>85,550</td>
<td>119,321</td>
</tr>
<tr>
<td><strong>Rail Service Quality (RQI)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Based on CC)</td>
<td>66,893</td>
<td>27,674</td>
<td>94,567</td>
<td>128,965</td>
</tr>
</tbody>
</table>

Notes:
1 Annual savings include passengers, freight and operator revenue. The last column is a composite sum of cost savings, time savings (i.e. hours converted into monetary units using the values of time) and savings on modal constants.
For passengers, all times are included in the calculations; for freight, only the times involved in general freight are included. For bulk freight, time and disutility savings are excluded, since for planned, regular bulk transport transit time would not seem to be a main consideration, so long as reasonable punctuality is maintained. Note the times include access, transfer and waiting at the terminal. Thus for some policies where passenger and freight are shifted from road to other modes, the actual door-to-door time may lengthen: this is then shown as a disbenefit. Such losses of time, however, should be taken with caution.

The results obtained from the regional economic model is important for us to gain insight into the potential impact of the transport policy scenarios. In fact the output from regional economic and the transport models offer parallel and consistent stories of what is going on in the interaction of regional economic activities and transport.

Compared with 2005 Base, under the Partial Integration scenario there is a small relative reduction in the peripheral countries in total production, due to improved access of other countries to the local markets in the peripheral regions. The pattern of relative strength is, however, somewhat uneven across the sectors. It seems that in agriculture and heavy industries the peripheral countries and regions are more likely to grow under infrastructure improvements, whereas light manufacturing and services tend to concentrate on the centrally located regions, by a small margin.

There is virtually no impact upon direct monetary cost of the goods and services, whilst both production and consumption is likely to benefit from the improvement of infrastructure and intermodal operations in disutility terms. This is consistent with what is shown in the transport evaluation.

There seem to be a certain degree of advantage under the Full Integration scenario for the better developed centrally located countries and the New Member States. The peripheral Cohesion Countries appear to lose out somewhat. It has to be remembered, however, this slight reduction in growth strength is shown comparing with a Base case, where the Cohesion Countries are expected to grow much more than the centrally located countries. Across the sectors, agriculture and light manufacturing are expected to grow more strongly in the Cohesion countries in the Full Integration scenario than in the Base case. Services in particular tend to lose out. This seems to result from the fact that air tariffs are assumed to fall substantially more than Partial Integration, which tends to exert an impact upon long distance business travel, which looms larger in the service sector of those outlying regions.

Under Congestion Charging, the locational impact in general seems to be similar to that of Full Integration. One noticeable change appear to be a tendency for the centrally-located countries and the New Member States to reduce their overall level of production in all primary and secondary industries. Tolling on long distance traffic results in a rise in production cost. However, in disutility terms (i.e. when indirect transport costs are taken into account), the cost rise does not seem to be as severe. Note that none of the cost and disutility signals include the redistribution of the toll revenue, and as well as the benefit of increased revenue for the non-road modes, where fixed costs are high and
A major difference that can be identified in the Rail Quality Improvement run is the reduction of production and consumption disutilities, which demonstrates the potential of rail service quality improvement to the economy as a whole. Heavy industries and services see the largest fall of production disutility, indicating the areas where rail has a natural advantage over other modes, i.e. bulk and semi-bulk freight and business travel.

7. Main impacts and results

Given the short time span of the study, the indicators produced by the model are suggestive rather than conclusive, and they need to be interpreted sensibly in the policy context. In summary, the main results of the study suggest the following considerations:

(a) The review and survey carried out in the study shows that transport cost need to be examined systematically. Apart from direct monetary cost incurred in course of the line haul, which were not identified as a crucial issue for the economic development of the European market, there are many extremely important factors such as travel time, reliability, flexibility, and interoperability. As the European industries develop and personal mobility rises, the above mentioned factors (which represent indirect transport-related costs) are gaining more and more importance in interregional passenger and freight transport. In many instances the indirect cost component may outweigh the direct monetary outlay in transport.

(b) Using the study methodology in accounting for direct and indirect transport costs, it is shown that the impact of the planned European policies and infrastructure construction is positive by comparison. The cost and pricing policies that apply to all the EU have a far more profound impact than the localised infrastructure improvements such as the TEN links.

(c) This impact is widely differentiated for the various transport industries: it is limited for road freight transport (the dominant mode), which is already fairly competitive; the potential impact is far greater with air services, given the wide opportunities for liberalising the sector and reducing the tariffs; a similar potential exists for the rail sector.

(d) Medium to long distance passenger travel stands to benefit from the policies included in the scenarios, particularly through developments in air services and high speed rail. This will bring benefits to the service industry and those sectors of manufacturing which are founded on highly skilled labour force. On the other hand intra EU tourism will gain from this. These would lead to further social and political benefits, such as cohesion of the EU.

(e) For freight transport there are trade-offs to be expected between the European policy objectives of reducing congestion and pollution, and the costs that road users will have to face. It is useful to bear in mind the fact that, in the future, higher monetary costs for firms (through road tolls and other congestion charges) should be translated into larger transport investments, reduced overall fiscal burden for the state, and an improved quality of life.

(f) A number of important issues deserve further analysis:
i the perspectives of rail transport: as stated in a recent white paper, railways can either enter a virtuous circle of growing efficiency through competition, or the burden of the required subsidies will be considered unbearable by the major states resulting eventually in a contraction of their role;

ii the role of transport costs for peripheral regions: for industries, improving the links with the more developed areas can have both positive impact (resulting from improved accessibility) and negative effects (due to increased competition). The exact extent of the impact would much depend on the local industrial structure. Close investigation is needed for each branch of industry;

iii congestion and pollution due to urban traffic probably needs stronger public action than that due to long-distance transport, while often the public attention is focused on the latter;

iv the impact of the Common Transport Policy and of new infrastructures on specific regions and industrial sectors would benefit from further more detailed analysis.

Figure 1.2 Structure of the study