FINAL PUBLISHABLE REPORT

(Key Action 2 “Sustainable mobility and intermodality” projects only)

CONTRACT N° : 2000-AM-10816

PROJECT N° : SI2.186859

ACRONYM : EXPEDITE

TITLE : EXpert-system based PrEdictions of Demand for Internal Transport in Europe

PROJECT CO-ORDINATOR : RAND Europe

PARTNERS : STRATEC
ARPA
TRANSEK
Institute of Transport Economics (TØI)
Heusch/Boesefeldt Verkehrsconsult
Imperial College of Science, Technology and Medicine
Swiss Federal Institute of Technology (ETHZ)

REPORTING PERIOD : FROM 1 May 2000 TO 31 October 2002

PROJECT START DATE : 1 May 2000 **DURATION : 30 Months**

Date of issue of this report : 13 December 2002

Project funded by the European Community under the ‘Competitive and Sustainable Growth’ Programme (1998-2002)

ISBN: 0-8330-3441-3

RAND is a nonprofit institution that helps improve policy and decisionmaking through research and analysis. RAND® is a registered trademark. RAND's publications do not necessarily reflect the opinions or policies of its research sponsors.

Published 2003 by RAND
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138
1200 South Hayes Street, Arlington, VA 22202-5050
201 North Craig Street, Suite 202, Pittsburgh, PA 15213-1516
RAND URL: http://www.rand.org/
To order RAND documents or to obtain additional information, contact Distribution Services:
Telephone: (310) 451-7002; Fax: (310) 451-6915; Email: order@rand.org

EXPEDITE

EXpert-system based PrEdictions of Demand for Internal Transport in Europe

Contract No: 2000-AM-10816

Prepared for the European Commission
Directorate-General for Energy & Transport
by the EXPEDITE Consortium

Title:	**EXPEDITE FINAL PUBLISHABLE REPORT MR-1673/1-DGTREN**

Authors Jong, G.C. de, J. Baak, M.E. Ben-Akiva, P. Burge, J. Fox, H.F. Gunn, Ch. Lu, M. Pieters and B. Zondag (RAND Europe)
Berquin, P., S. Godart, A. Henry, N. van Isacker and S. Gayda (Stratec)
Coppola, P.L., A. Improta, V. Marzano and A. Papola (ARPA)
Hovi, I.B., M. Killi, G.C. Lillehammer and F. Voldmo (TØI)
Algers, S., I. Jarlebring and J. Widell (Transek)
Duesterwald, M. and L. Klinge-Habermannn (HBVC)
Polak, J. (ICSTM)
Axhausen, K.W., Ph. Froehlich and M. Vrtic (ETHZ)

Work Package:	1
Report Version:	1.1
Submission Date:	December 2002
Dissemination Level:	PU - Public Usage
Deliverable Nature:	RE - Report
Deliverable Type:	PD - Programme Deliverable

Coordinating Partner:	RAND Europe
Contact Person:	Gerard de Jong
Address:	Newtonweg 1 2333 CP Leiden The Netherlands
Telephone:	+31-71-5245151
Fax:	+31-71-5245191
e-mail:	jong@rand.org

EXECUTIVE SUMMARY

The EXPEDITE project was carried out for the European Commission, Directorate-General for Energy and Transport (DGTREN) by a consortium of consultants and institutes, coordinated by RAND Europe, as part of the 5th Framework.

The objectives of EXPEDITE were to generate forecasts for both passenger and freight transport for Europe for 2005, 2010, 2015 and 2020, to show which policies can be effective to reach substitution from car and lorry and air transport to other modes and to identify market segments that are sensitive (and those that are insensitive) to policy measures.

In previous deliverables in this project, we have reviewed existing national and international transport models, presented the base-year (1995) data, defined a Reference Scenario for 2020 and the intermediate years, defined policies to be simulated, and carried out runs with existing models (the SCENES European model and a number of national models for passenger and freight transport). On the basis of this information we created two new models, the EXPEDITE meta-model for passenger transport and the EXPEDITE meta-model for freight transport.

In this EXPEDITE Final Report, we present the main outcomes of the entire project. In particular we give the results of runs with the meta-models and the SCENES models for the Reference Scenario. Furthermore, we report on the policy runs carried out with those models and the evaluation of these policies in EXPEDITE. On the basis of these policy runs we have also reached conclusions on the effectiveness of policy measures and on (in)sensitive market segments.

Conclusions on freight transport:

- In the period 1995-2020, under the assumptions of the Reference Scenario, the number of tonnes lifted in the study area will increase by 44% (lorry +39%) and tonne-kilometrage will grow by 79% (lorry +89%). A higher growth is predicted for the Central and Eastern European Countries (CEEC), for long distance transport and for general cargo.
- If lorry costs increase, there will only be significant shifts at trip distances above 100 kilometres. Below 100 kilometres, road transport is the dominant mode (except for some small niche segments, e.g. shipments between firms with rail sidings or inland waterways or sea terminals at both origin and destination). Policy measures are unable to change this situation below 100 kilometres; it is an insensitive market segment. This is not generally true for shipments with trip distances above 100 kilometres. Here, an increase in lorry cost can lead to substitution, mainly to inland waterways transport (where available) and train.
- If the lorry transport time goes up, there will also be only significant mode shifts for consignments above 100 kilometres. For this change in transport conditions, most of the substitution is towards combined road-rail transport, but also to conventional rail transport.
- If the rail/combined transport cost or time decreases, then for fuels and ores, metal products, basic and other chemicals, large machinery (but only above 100 kilometres) there will be a significant decline in lorry tonne-kilometrage, but a shift will also take place from inland waterways transport (where this mode exists).

- If the cost or time of inland waterways transport decrease, then there will only be a significant reduction of lorry transport for specific countries (where inland waterways transport is a viable option, such as The Netherlands, Belgium, Germany and France).
- If the sea shipping cost or time goes down, there will only be small shifts towards sea transport and no significant reduction for lorry.
- In passenger transport an increase in transport time by x% has a bigger impact than an increase in transport cost by x%. This is not generally true in freight transport; in many situations an x% change in cost has a bigger impact than an x% change in time.
- Elasticities keep increasing with distance after 100 kilometres (especially time elasticities).
- Changes in tonne-kilometres are bigger than changes in tonnes for lorry, while the changes are close to being equal in tonnes and tonne-kilometres for rail and inland waterways. This shows that goods would mostly be transferred between modes in consignments where trip lengths are longer than average lorry trips.
- The most effective policy measures to achieve substitution from road to other modes are (without implying that these are the best policies for society; that depends on the outcomes of the overall evaluation; see the last three bullet points for freight):
    - Increases in lorry cost for all or the higher distances (congestion and road pricing, infrastructure tariff, cost internalisation, kilometre charging, fuel price increase);
    - Increase in lorry time (maximum speed limits, harmonisation of rules on speeding);
    - Decrease in non-road handling and storage cost (intermodality and interconnectivity).
- Policies that make the non-road modes cheaper or reduce the travel times on the non-road networks are less effective for reducing lorry tonne-kilometrage; often they also lead to substitution between the non-road modes.
- Effective policy bundles should contain elements of the three most effective policies (increased cost and time for road, lower non-road handling and storage cost). Decreasing the non-road travel times and cost can only have a substantial effect on substitution away from the road mode if the bundle includes measures that make all non-road modes more attractive. Otherwise, there will be a large amount of substitution between the non-road modes.
- To make polices effective the target segment should be shipments above 100 kilometres. Also policies targetted at bulky products are more effective for substitution from road to the other modes than policies focussing on other commodities.
- Increasing the lorry cost (one of the three effective types of policy mentioned above) leads to increases in the cost for the users of transport, which according to the evaluation carried out, are not compensated by the reduction in external cost for society as a whole (emissions, noise, accidents). On the other hand this type of policy increases government revenues.
- Policies that increase the lorry transport time (another of the three effective types of policies) increase the time cost of transport users, but decrease the driving cost of the user and the external cost (because of substitution from road to modes that are cheaper and have lower external cost). The total internal and external costs remain more or less the same, according to our evaluation.
- Intermodality and interconnectivity, simulated as a decrease in handling and storage cost (the third of the above effective policies) reduce both internal user cost and external cost

of transport. These policies however require substantial investments in infrastructure and do not generate government revenues.

The above conclusions on the policy measures for freight transport are summarised in the table below.

Summary table for the assessment of policies for freight transport

	Effectiveness (modal shift from road to other modes)	**Change in internal and external transport cost**	**Required investment and operation and maintenance cost**
Intermodality	High	Small user cost reduction	Medium
Interconnectivity	High	Small user cost reduction	Medium
Congestion and road pricing	High	Big user cost increase	Low and government revenues
Parking policies	Low	Big user cost increase	Low and government revenues
Infrastructure tariff	High	Big user cost increase	Low and government revenues
Rail and fluvial interoperability	Medium	Small user cost reduction	Medium
Market liberalization (rail)	Medium	Small user cost reduction	Low
Cost internalisation	High	Big user cost increase	Low and government revenues
Maximum speed limits	High	No change in user cost	Low
Vignette, Eco-points, km charge	High	Small user cost increase	Low
Sea motorways	Low	Small user cost reduction	Low
Harmonisation of inspections and controls	High	Small user cost increase	Low
Harmonisation of rules on speeding	High	No change in user cost	Low
Deregulation for sea and IWW	Low	Small user cost reduction	Low
Fuel price increase	High	Big user cost increase	Low and government revenues

Conclusions on passenger transport:

- For the period 1995-2020 the meta-model predicts for the bulk of usual daily travel (trip distances up to 160 kilometres) that the number of tours (these are round-trips that start and end at home) will grow by 5% (car driver +22%) and passenger kilometrage will increase by 10% (car driver +24%). There will be a much higher growth in the CEEC.
- Long distance travel (above 160 kilometres) increases much faster (car, train and especially air) than shorter distance transport.
- Policies that increase car cost (fuel price increase, congestion and road pricing, parking policies, infrastructure tariff, cost internalisation), will only have limited mode shift effects, especially for business travel. There will be non-marginal reductions of car use, but most of the impact on car kilometrage is due to destination switching. The biggest reduction in car kilometrage is found for 'other' purposes (social and recreational traffic).
- Policies that lead to an increase in car time (speed limits, speed controls) are a relatively effective means of reducing car use (again mainly through destination switching, not mode shift). This does not automatically imply that these are the most desirable policies

for passenger transport; this also depends on the other impacts (see the evaluation outcomes below) of the measures than just the impacts on the transport volumes.

- Air transport (especially the leisure segment) is very sensitive to the level of the air fares.
- Increasing travel time by x% has a larger impact than increasing travel cost by x%. This goes for changes in cost and time for all modes.
- Policies that decrease the public transport cost or time (intermodality, interconnectivity, public transport pricing, rail and fluvial interoperability, rail market liberalisation), will have a large impact on kilometrage for the mode itself (or these modes themselves), but a very limited impact on car use.
- Elasticities (in absolute values) increase with distance.
- None of the policies simulated was really effective in shifting passengers from car driver to the non-car modes. Policies that increase the car cost or time are most effective in reducing car kilometres (mainly through destination switching, not much modal shift), but considerable increases in car cost or time are needed for this. To be effective in reducing car use, a policy bundle should include elements of a car cost and/or car time increase. At the same time, such a policy could be complemented by policies that make public transport more attractive (also for equity purposes and to provide accessibility to lower income groups).
- Segments of the passenger transport market that might be targeted because of their higher than average sensitivity to policy measures are long distance travel and social/recreational travel (and by definition for policies that make car less attractive: travellers from car owning-households). We did not find clear differences between the responsiveness of different income groups, area types and countries.
- Policies that make public transport cheaper or faster, such as public transport pricing, intermodality, interconnectivity, new urban public transport, interoperability and rail market liberalisation lead to a reduction in the total internal and external cost of transport. Such policies increase the user benefits from transport, because the public transport users have lower fares or lower time costs, and at the same time (slightly) decrease the external effects. Not taken into account here is that the revenues of the public transport operator might decrease when the fares are reduced. Most policies that make public transport more attractive require substantial investment and/or operation costs.
- Promoting housing densification or employment densification leads to a decrease in the external costs, but the increase in internal cost for the travellers dominates the picture.
- Cost internalisation, congestion pricing, road pricing, parking policies, harmonisation of rules on speeding, maximum speed limits and fuel price increases all make car more expensive or slower. This leads to a substantial increase in the user cost (the travellers have to pay more or incur higher time costs), which is not outweighted by the reduction in the external cost for society as a whole. Therefore all these policies lead to an increase in the total internal and external cost of transport. Not taken into account here is that the policy measures that increase the cost for transport users also increase government revenues (there is a shift of taxes or charges from the transport users to the government). Moreover, policies that make car less attractive usually have lower investment cost than policies that make public transport more attractive.

The above conclusions on the policy measures for passenger transport are summarised in the table below.

Summary table for the assessment of policies for passenger transport

	Effectiveness (modal shift from road to other modes)	**Change in internal and external transport cost**	**Required investment and operation and maintenance cost**
Intermodality	Low	Big reduction	Medium
Interconnectivity	Low	Big reduction	Medium
Congestion and road pricing	High	Medium increase	Low and government revenues
Parking policies	High	Medium increase	Low and government revenues
Rail and fluvial interoperability	Low	Small reduction	Medium
Market liberalization (rail)	Low	Small reduction	Medium
Cost internalisation	High	Big increase	Low and government revenues
Maximum speed limits	High	Big increase	Low
Harmonisation of rules on speeding	High	Big increase	Low
Public transport pricing	Low	Big reduction	Medium
New urban public transport	Low	Medium reduction	Medium
Fuel price increase	High	Big increase	Low and government revenues
Housing and employment densification	Low	Big increase	Medium