

EUROPEAN UNION - TACIS

Technical Assistance to the Southern Republics of the CIS and
Georgia - TRACECA

TRADE AND TRANSPORT SECTORS

Terms of Reference

for

**Regional Traffic Forecasting Model,
and a
Review of International Route Capacity**

Final Recipients:
TRACECA Region Ministries of Transport

CONTENTS

- 1. Introduction and Background**
- 2. Objectives**
 - 2.1 Introduction and Establishment of Computer-Based Transport Planning Tools**
 - 2.2 Applications**
- 3. Scope of Work**
 - 3.1 The Forecasting Model**
 - 3.2 Scenarios**
 - 3.3 Synoptics**
 - 3.4 Implementation**
 - 3.5 Other Related Projects**
 - 3.6 Local Participation**
 - 3.7 Foreign Expertise**
 - 3.8 Logistics**
- 4. Time Table and Reporting**

1. Introduction and Background

1.1 During May 1993 a conference was held in Brussels organised by the Commission and attended by authorities of the eight Republics of the south of the former USSR:

- Armenia,
- Azerbaijan,
- Georgia,
- Kazakstan,
- Kyrgyzstan,
- Tadjikistan,
- Turkmenistan,
- Uzbekistan.

They are the Beneficiary States of this programme.

The objectives of the conference were :

- to stimulate co-operation among the participating Republics in all matters pertaining to the development and improvement of trade within the Region
- to promote the Central Asian - Trans Caucasian - Europe Transport Corridor
- to identify problems and deficiencies in the Region's trade and transport systems
- to define, in terms of contents and timing a Technical Assistance Programme to be financed by the European Union (EU).

TRACECA (Transport Corridor Europe Caucasus Asia) was thence created as a component of the TACIS interstate programme.

1.2 The "Brussels Declaration" issued at the conclusion of this conference recommended the European Union to address in the TACIS programme variously expressed needs for traffic forecasts, data retrieval, and feasibility studies.

Regional sectoral Working Groups (trade, rail, road, maritime), composed of experts and officials from each TRACECA state and the EU, have been established as part of the TRACECA programme. They meet periodically in the Region. They have inaugurated specific projects including this present one, and will monitor results.

A strategic study for Central Asia has recently been completed by the EBRD under TACIS financing (see Section 3.5).

1.3 National and Regional Technical Assistance projects carried out, approved or prioritised to date, are mostly aimed at halting a deterioration of the existing transport system due to maintenance difficulties, and obsolescence. Few consider reinforcing capacity. In fact transport demand has declined since the break up of the FSU.

East-West transit links are little exploited and North-South links were artificially discontinuous at the old borders of the FSU.

Enormous needs for investment in transport infrastructure have been expressed by regional authorities. New links and the relief of bottlenecks, present or future, would undoubtedly permit a reorientation of Regional-international trade along more efficient routes. To rigorously examine and help prioritise such options, there is a need for a quantitative planning tool which can simulate impacts of major developments and actions.

1.4 While the present macro-economic situation in the region appears moribund, there is strong private sector interest in large-scale regional industrial investments. The area is rich in natural resources, including substantial reserves of petroleum. There is an undoubted potential for rapid development of certain poles, which would immediately overstrain the present transport system.

Under these circumstances a wide range of future scenarios can be postulated.

1.5 Radical Institutional transformations are taking place in the region. The transport system has been particularly affected by these, especially the rail sector which is losing market share to the benefit of road transport.

Tariff structures under the old regime were detached from economic considerations. It is by no means easy for regional authorities to inaugurate a market-based system.

The newly independent states are intensely interested in developing national systems, and there is a very real risk that this could lead to restrictive regulation of cross-border transport and trade, to the detriment of overall efficiency.

The need is apparent for a tool to assist in the analysis of all transport demand vectors in the Region, including institutional restraints, and tariffs.

1.6 The CETIR (EBRD sponsored project; CETIR=Central European Transport Information Reporting) database is considered an interesting exercise for eventual emulation in the TRACECA Region. The present project has different immediate objectives. However it may be considered as a pilot for eventual expansion along the lines of the CETIR.

2. Objectives

There are to be several interrelated component objectives or outputs:

2.1 Introduction and Establishment of Computer-Based Transport Planning Tools

The project will assemble the data elements and model required to forecast transport demand on all modes, across the Region. The model will be applicable to long term transport planning studies, notably investments in infrastructure. It must be sensitive to disaggregate input and a wide range of scenarios.

The following elements must be set up:

- common regional database(s), compatible with EUROSTAT and CETIR for :
 - transport and trade flows,
 - transport infrastructure, being links and nodes on rail, road, and maritime, on a pre-defined network (GIS based)
 - transport costs
- a software based multi-modal model for analysing scenarios, developing forecasts, and sensitive to:
 - time; of transit and administrative delays, generalised cost
 - multi-product demand
 - congestion, weak nodes or transfer points
 - reinforcement of capacity (e.g. Turkmenbashi-Batumi)
 - new links (eg. Yerevan-Turkey, Nakhichevan - Turkey, Mashed-Iran)
 - socio-economic changes
- the database and model are to be permanently accessible at one or more Regional centres for use on research and feasibility studies

2.2 Applications:

- create comprehensive multi-modal (road/rail/maritime) synoptics of existing transport flows, and of forecasts of future flows based on scenarios
- highlight the main commercial, institutional, organisational, physical and infrastructure bottlenecks, present and anticipated
- identify the best positioned centres for development of multi-modal transfer nodes
- identify and catalogue specific road/rail/maritime and multi-modal projects, which best address problems highlighted, for detailed feasibility studies

2.3 Know-how Transfer

The transfer of know-how in transport database design and modelling is a prime objective of this project. Furthermore this project will be a key Pilot exercise, to assist in the formulation of ongoing technical assistance for TRACECA regional co-operation in these domains.

3. Scope of Work

There will be essentially three overlapping phases to the project, corresponding with the Objectives as described.

The first phase will comprise initial data acquisition and storage, to be completed at month 13. At that point preparation for modelling applications must also be complete, and phase two will comprise the production of the required synoptic forecasts, at the end of month 15.

The final phase will consist of a period of three months maintenance, assistance and hand-over of the project to local beneficiaries. Data collection is to continue throughout the project duration.

3.1 The Multimodal Traffic Forecasting Model

3.1.1 The model will concentrate on inter-urban movements of goods in the international multi-modal corridors of interest to the Region. The modes of primary interest are road/rail/maritime (including Inland Water Transport, or IWT). It must consider passenger traffic to the extent that such traffic competes for use of infrastructure and vehicles.

3.1.2 The architecture of the links for data flows between regional centres is to be proposed by the Consultant. The following functional requirements should be taken into account.

Computers and software must be supplied and the model set up at one or more regional centres (see also section 3.6 Local Participation).

The sources of data are dispersed (eg in the National Regional capitals and industrial centres). During the duration of this project the free availability to other related projects of data collected is to be assured. On-line data exchange is not a requirement.

It is considered useful for regional transport planning that the data collection and other activities established under this project be continued after its completion, possibly with on-going external Technical Assistance support.

3.1.3 The structure of databases should closely follow present European reporting practice, and be designed to serve as input to standard software packages for transport modelling. For reference, the main elements of the CETIR database are reproduced below:

1. Inventory of transport problems, projects, investments, studies, agencies
2. General socio-economic data (zonal)
3. Networks by mode
4. Services by mode
5. Vehicle types and characteristics
6. Foreign trade statistics
7. Domestic trade
8. Origin-Destination (OD) data
9. Logistics of large enterprises
10. Environmental parameters

11. Structure of the public transport sector
12. Structure of the private transport sector
13. Unit/infrastructure/operating/user costs, tariffs and revenue parameters
14. Macro-economics and national accounts

All of these exact elements, their sub-sets and attributes, which may be found in CETIR and EUROSTAT documentation, are not imposed on this project. Databases and eventual processing for the project must be designed to achieve the Objectives as defined above. These however include eventual compatibility with the CETIR structures.

The Consultant should describe in his proposal the data structures that he intends to set up and exploit, notably the commodity classification system, as well as the level of zoning to be applied. External zones should be established for international trade and transit. He should also describe his data collection methodology, including local staff recruitment, training, monitoring, control and validation mechanisms.

Seasonal effects on traffic are to be considered. Data collection should start early in the project, and continue throughout.

Local staff in all TRACECA states should be extensively involved and provided with intensive instruction. Well before the end of the project, local staff should be in a position to continue the work autonomously. The Consultant will be responsible for ongoing data collection for maintenance of the database until the end of the project, and to facilitate any permanent implementations (see Section 4.4 Progress Report I).

The validity of existing data is not to be taken for granted.

A schematic plan of multi- and uni-modal road/rail corridors is attached to these TOR to give an order of magnitude to the density of the network. The Consultant will propose the existing network to be modelled in his Inception Report. Changes may be required during the course of the project, as new and detailed traffic and OD data becomes available.

Maritime links (eg. Caspian Sea, Black sea, and IWT) are to be taken into account. Air links and pipelines may need to be taken into account, but only to the extent that they significantly influence demand on modes of primary interest.

3.1.4 An established or standard transport modelling software package (eg. generation-distribution-modal split-assignment, or simultaneous,...) is to be calibrated to the existing transport flows. This implies determination of present transport costs, congestion areas present and future, and socio-economic input for generation and distribution vectors and functions.

It should be made clear in the Methodology that the modelling package proposed is:

- well suited to the projects Regional environment, with proven references of applications in equivalent circumstances
- output robust enough to stand up to critical examination by International Financial Institutions (IFI)

- well documented (manuals are to be made available in Russian, translated by local staff if necessary)
- guaranteed with long-term support and updating at reasonable cost
- multi-modal/multi-product
- interactive graphics input-output, with GIS interface
- able to estimate incremental time/cost savings, and deviated traffic under the wide range of scenarios that might be applied

Zonal growth sub-models are to be proposed.

The model will require calibration with valid current link flow and OD data, to be procured within this Scope of Work. Recent variations in tariff levels, and seasonal trends which might not be reflected in measured flow data, must be considered. The use of proxy, derived, or simulated data is to be avoided.

3.1.5 All hardware and software to be provided should be fully specified in the proposal.

3.1.6 Based on his experience gained during the opening phase of the project, the Consultant is to suggest options and make recommendations for the permanent establishment of the database and model in the Region (see Section 4.4 - Progress Report I).

The users licence(s) for software should eventually be ceded to the TRACECA Working Groups, or permanent regional trade and transport committee, or possibly to a Regional Institution. The model should in any case be constructed using a licence which can be transferred to a local entity. The possibility of multiple licences and dispersion of data collection and processing, is an option for the Consultant to consider. This scope of work is not limitative in this respect.

3.1.7 During visits to TRACECA capitals the Consultant is to arrange small (eg. half-day) seminars with senior officials. He is to explain state-of-the art transport modelling techniques, and the objectives of this present application.

3.1.8 The model should be developed concurrently with the data collection. The Consultant should actively collaborate with other projects, sharing data and running network simulations, as case-studies and training exercises.

In furtherance of the know-how transfer objectives of this project, and to stimulate interest in its end-products and perpetuation, the Consultants staff and activities should be widely accessible to local transport authorities and Institutions.

3.2 Scenarios

Given the radical economic changes underway, a detailed traffic analysis based on extrapolation of trends is not sufficient. Scenarios are to be formulated, refined by iteration on the model, and in consultation with the TRACECA management team and National authorities. Detailed Scenario propositions for approval will be contained in Progress report II.

Scenarios will take into account:

- demand vectors comprising
 - several product categories
 - variations in Regional tariffs
 - other factors considered relevant
- macro-economic and socio-economic projections compatible with IFI expectations (which must be determined)
- a full range of realistic transport system (infrastructure, vehicles, organisation) development, including completely new links, already planned, or suggested by the Consultant
- short (five year), medium (ten year) and long-term (fifteen year) situations
- emergency eventualities, such as closing of a corridor by natural disaster or conflict

The competition among corridors is to include the Transasia and Eurasian routes North and South of the Caspian, and traffic distributed according to realistic techno-economic criteria.

3.3 Synoptics

3.3.1 The Consultant will present a quantitative overview of the transport system, current flows, and costs of transport, on the international multi-modal corridors defined in the Inception report and accepted by TACIS.

He will present forecasts, based on simulations of the response of the system to the different scenario to be considered.

The Consultant will identify and catalogue options for investment or redeployment of assets which best address the needs illustrated by the model. All modes should be considered.

3.3.2. Traffic flows on new or enhanced links are to be predicted. Revenues under varying tariff levels are to be estimated.

3.3.3 Port traffic is to be forecast by product category (Poti, Batoumi, Aktau, Baku, Krasnovodsk)

3.3.4. The best positioned centres for multi-modal transfer nodes are to be highlighted. The volume of flows through these nodes is to be forecast.

3.3.5. Cost estimates to pre-feasibility accuracy, of the various options for investment proposed, are to be presented. These may be derived from existing reports for TACIS and IFI, where available and appropriate, or worked up by the Consultant if not. Indicators of cost-benefit and other criteria are to be calculated, taking account of the model forecasts.

Shadow costing should be used as appropriate.

The results of these studies are to be compiled in the Progress report III. The essential presentations should be included in summary tables and graphics.

3.4 Implementation

Subsequent to the issue of Progress Report III, containing the Synoptics, at the end of month 15, a three month period is foreseen for the Consultant to maintain a Project Manager and local staff in the field, for the final phase of permanent implementation and hand-over of the database and model.

Implementation will be planned and carried out progressively after the issue of Progress Report II (see Section 4.4) containing the Consultant's recommendations for implementation, and receipt by the Consultant of comments by the TRACECA management team and Regional authorities.

3.5 Other Related Projects

Several related reports prepared by Western consultants precede this project. They include:

Road Development Study	Republic of Kazakhstan	EBRD
Armenia Highway Study	Republic of Armenia	TACIS
Roads & Road Transport Study	Russia, Ukraine, Kazakhstan & Bielorussia	EBRD
Azerbaijan Road Project	Azerbaijan	TACIS
Central Asia Outline Transport Strategy	Kazakhstan, Kyrgyzstan, Turkmenistan, Uzbekistan	EBRD/TACIS
Caspian and Black sea Port Studies	Georgia, Azerbaijan, Turkmenistan, Kazakhstan	EBRD/TACIS/OTHERS
ESCAP studies	Asia	UN

At the time of writing the following TRACECA projects, sharing certain domains of interest with this one, are expected to commence shortly:

- Implementation of Pavement Management Systems
- Trade Facilitation, Customs Procedures, Freight Forwarding
- Infrastructure Maintenance - Railways
- Inland Terminals - Railways
- Legal and Regulatory Framework
- Forwarding, Multi-modal Transport Systems
- Rolling Stock Maintenance-Railways
- Inland Terminals
- Improvement of Roadside Services
- Port Network Plan and Improvement Programme
- Human resources Training - Maritime

Other related projects are or may be expected to commence within the timeframe of this present one.

The Consultants appointed to carry out this project are to co-ordinate their work closely with all other related activities within the TRACECA region. Analysis of other TRACECA projects in the rail, road and maritime sectors would benefit greatly from the global approach of the present

exercise. However, certain of them have been designated urgent, and must be managed in parallel, rather than sequentially. A full collaboration with such projects will be required (see section 3.1.7.).

The preceding listing of related projects must not be considered limitative.

3.6 Local Participation

National consultants should be deeply involved in all aspects of the project. All TRACECA countries have Institutions specialising in various aspects of transport planning and engineering. It is a firm requirement that Organisation and Methodologies include local experts and Institutions to:

- make full use of local experience, antecedent projects and data bases
- promote the emergence of a financially viable local consulting sector
- ensure the effective transfer of know-how to the Beneficiary states
- ensure the enduring effect of project output

Consultants should base their activities largely in the TRACECA region, carrying out the project in collaboration with a local technical organisation(s), and employing both senior and junior professional staff, from several TRACECA states.

As training and know-how transfer is a prime objective of this project, the Consultants Methodology should fully explain his proposals in this respect. This should allow local organisations to maintain, update and modify the database, and to recalibrate and run the model autonomously.

Consultants must make amply clear in their proposal the arrangements they have made to work with local entities.

3.6 Foreign Expertise

The Consultant is free to compose his expatriate Team for this project as he sees fit. The following domains of expertise should be clearly visible in his proposed staff list:

- project management
- transport planning,
- transport databases, GIS, modelling
- transport economics
- modal specialisations

3.6 Logistics

The Consultant shall be responsible for arranging necessary living accommodation, transportation, telecommunications, equipment (IT and other), surveys, investigations, document reproduction, printing, secretarial services, interpretation, translation, office space and all other input required for the purposes of the work.

4. Time Table and Reporting

4.1 The project is to be completed within a period of eighteen months.

Task durations and staff assignments are to be clearly shown on planning schedules in the proposal. Milestones for output and key dates for data acquisition are to be indicated.

4.2 It is important that reports should not be considered the principal project output, and should not distract from the achievement of all of the defined project Objectives. Reports may be considered as management tools.

4.3 All reports are to be delivered in the numbers, languages and locations as follows:

	Bound		Loose-leaf		Diskette (Eng.+Rus)
	English	Russian	English	Russian	
TACIS Brussels	5	1	1	1	2
TRACECA CU (per state)	1	5	1	1	0

The word processing programme to be used will be agreed with TACIS (and DOS compatible).

4.4 Reporting is to be in accordance with standard TACIS Guidelines and foresee:

Project inception report

An Inception Report shall be issued within 2 months of the commencement of the project. It shall summarise initial findings and propose any modifications to the methodology and work plan. In particular it will adapt the work plan to the needs of each individual TRACECA state taking into account the parallel activities of other Technical Assistance programmes, avoiding duplication of effort, and addressing unfilled needs.

It will recommend the multi-modal links and nodes to be modelled, and confirm or modify the data structures upon which the model will depend. It will report upon initial data collection activities, and the utility of existing databases.

Project progress report I

This report will be submitted at the end of month 8, which should be approximately half way through the first twelve month cycle of data collection.

It is to be a key report, as the Consultant must suggest options and make recommendations for the permanent establishment of the database and forecasting modelling system to Regional entities.

Project progress report II

This report will be submitted at the end of month 13.

It will describe for discussion purposes the scenarios which the Consultant proposes.

It will report on progress in the implementation of the model.

It should be accompanied by a full twelve months record of data acquisition.

Project progress report III

This report will be submitted at the end of month 16.

It will contain the Synoptics.

Final Report

The Draft Final Report will be submitted at the end of month 18.

It will contain a full review of project implementation, and recommendations for the development of the database and model.

Any comments on the Draft Final Report will be issued by TACIS Brussels within six weeks of its receipt. The Final Report incorporating any modifications will be issued one month thereafter (2,5 months after issue of the Draft Final)

Each of the progress reports, and the final report will be issued with a separate digest of the database, in tabular form and on diskette.

The Consultant is to describe in his proposal the instruction or operational Manuals for local staff which he intends to use.