Study on Strategic Evaluation on Transport Investment Priorities under Structural and Cohesion funds for the Programming Period 2007-2013

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Country Report Malta

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1 Introduction

1.1 Background

The recent enlargement of the EU to 25 Member States clearly creates a new challenge for its Cohesion Policy. Disparity levels within the EU have increased substantially and will further increase with the accession of Bulgaria and Romania in 2007. This is an explicit point of attention as the Treaty states that, in order to strengthen its economic and social cohesion, the Community shall aim at reducing the disparities between the levels of development of various regions and the backwardness of the least favoured regions or islands, including rural areas. This aim lies at the core of the Commission's regional policy.

One of the key elements of the cohesion policy of the Commission is the contribution of the development of new transport infrastructure to regional economic development. Extensive spending has taken place in this domain under ERDF, Cohesion Fund and ISPA.

One of the prominent initiatives in the European Union in this respect is the development of the Trans-European transport networks (TEN-T). In 2003 the Commission has identified the 30 priority projects of the TEN-T up to 2020.[1] The priority projects include: *"the most important infrastructures for international traffic, bearing in mind the general objectives of the cohesion of the continent of Europe, modal balance, interoperability and the reduction of bottlenecks"*.

For the new programming period 2007-2013 the Commission seeks to strengthen the strategic dimension of cohesion policy to ensure that Community priorities are better integrated into national and regional development programmes. In accordance with the draft Council Regulation (article 23), the Council establishes Community Strategic Guidelines for cohesion policy to "give effect to the priorities of the Community with a view to promote balanced, harmonious and sustainable development"[2].

To assess the impact of programmes in relation to Community and national priorities the Commission has indicated that evaluations on a strategic level should be undertaken. The present evaluation should be seen as one of these specific strategic evaluations. The strategic evaluation should feed in the process of determining transport investment priorities and the preparation of the national strategic reference frameworks and

[1] Decision 884/2004/EC of 29 April 2004. The total investment of the 30 priority projects amounts to € 225 billion at the 2020 horizon.
[2] COM(2004)492

operational programmes. As such, it should serve to enhance the quality, effectiveness and consistency of Fund assistance.

1.2 The Strategic Evaluation

The strategic evaluation is directed the transport sector.

Three specific objectives have been formulated for this strategic evaluation:

- To provide an analysis of the **situation** in selected fields relevant to transport, using structural indicators across Member States, plus Romania and Bulgaria;
- To assess the **contribution** of Structural and Cohesion funds relative to the current and previous programming periods and draw lessons of relevance for the purpose of the study in terms of identification of potential shortcomings in the development of transport priority projects that might have hampered the utilization of those funds or their expected benefits;
- To identify and evaluate **needs** in the selected fields and identify potential investment priorities of structural and cohesion funds for the programming period 2007-2013.

1.3 The Country Report

The strategic evaluation results in specific country reports for all 15 countries and a synthesis report. The current report is the Country Report for Malta. Its main aim is to give a more detailed indication of the strengths and weaknesses of the transport system in the country and to address areas for future intervention. Where relevant this accompanied by recommendations with respect to the overall transport policy of the country. The country reports feed into the joint programming effort with the Member States for the next period, as will be detailed in the National Strategic Reference Frameworks and the subsequent Operational Programmes.

1.4 Structure of the report

The report is structured around three building blocks.

- First a needs assessment is presented based on an analysis of the current transport systems and a modelling analysis which reveals the current (relative) level of accessibility per region. This leads to first conclusions strengths and weaknesses of the current transport system and related transport investment needs (Part A).
- Next an overview is presented of the transport investment priorities in the past period (Part B).
- Finally, future areas for priority transport investments are identified. This builds on the needs assessment in the first part but also addresses other factors such as the contribution to EU and national policy objectives, the availability of other sources of funding and the administrative capacity of the country (Part C).

Part A: Needs assessment current situation

2 Transport Sector: current situation

2.1 Introduction

This chapter describes the current transport situation and policy in Malta. After a brief introduction on the geographical and economic characteristics of the country, it describes the situation per mode of transport. The analysis of the current situation is summarized in a SWOT table on the main strengths and weaknesses. The assessment of the transport system is followed by an analysis of the key transport policy issues in Malta.

2.2 Malta

Source: CIA, World fact book

The Maltese archipelago - consisting of the islands of Malta, Gozo and Comino - lies at the cultural, financial and geographical crossroads of the Mediterranean Sea. Malta, with the capital Valletta, is the largest island of the group. Malta has 397,000 inhabitants and is considered as a city-state with one urban agglomeration, housing over 80% of the country's population.

The islands cover a total area of 316 km^2 of which Malta 246 km^2, Gozo 67 km^2 and Comino 3 km^2. Having a mild climate and very moderate temperatures, Malta provides a perfect living and working environment. This, coupled with a rich cultural heritage and trading and business traditions, makes Malta a stable centre for Mediterranean commerce.

Due to the small size of the Maltese islands, the relatively high urban density and the well developed road network (approximately 2,000 km), Malta's transport system provides accessible connections to all industrial, tourist and commercial centres. The road network on both Malta and Gozo is configured in a hub and spoke pattern with the capitals of both islands having direct connections with all outlying regions. The road network is the only inland transportation mode on Malta. All ports, the airport and Gozo are connected by a road (52 km) that is part of the TEN-T road network.

Located at the centre of the Mediterranean Sea, at the confluence of the major sea lanes linking Europe, North Africa and the Middle East, Malta's position affords easy access to these markets and beyond. In addition, Malta is readily accessible from major European and North African destinations and has direct air links to most major European and North African cities, Middle East and Arab Gulf States.

Malta's coastline is indented with natural harbours and established ports. Historically, these ports have established the islands as a centre for Mediterranean commerce, combining old world charm with modern port facilities. At the centre of countless shipping routes, these ports provide a wide variety of professional shipping services of value to major commercial entities.

The Grand Harbour of Valletta is Malta's main port, and one of the most spectacular natural deep water harbours in the Mediterranean. The Grand Harbour of Valletta offers a comprehensive service that takes care of practically all maritime requirements. The Malta Freeport (Marsaxlokk), situated at the southern tip of Malta, has become an important container transhipment centre in the Mediterranean.
Malta's GDP per capita (purchasing power parity) is comparable to Portugal and the Czech Republic and is among the upper third of the new member states.

Basic data

Population	0.4 million
Total area	316 km^2
Population density	1256 inh/km^2
Main cities	Valetta (210.000 inh), Birkirkara, Qormi, Mosta, Zabbar

Source: Eurostat

Economic data

GDP (2004)	4.3 billion €
Government debt as % of GDP (2004)	76.6%
Government deficit as % of GDP (2004)	-5.1%
GDP per capita (2004)	10,800 €
GDP per capita, EU15 (2004)	25,800 €
GDP per capita, EU25 (2004)	22,700 €

Source: Eurostat

2.3 Situation per mode of transport

2.3.1 Roads and road transport

Infrastructure

In the absence of railway or inland waterway links, domestic transport is carried out by road, with the exception of internal sea transportation between Gozo and Malta. In 2004 Malta had a total of 2,227 km of roads, including 1,166 km of urban and local access roads en 877 km of other roads. Major arterial and distributor roads extend over 183 km.

The road infrastructure is one of the densest in the EU, at approximately 617 km of road/1000km². This is largely due to the fact that Malta is almost a city-state, as more than half of the population lives in Valetta, and most of the other cities can be considered suburbs of Valetta. Tourism also exerts strong pressures on road transport. The road network is well developed, but nonetheless there are congestion problems.

Table 2.1 Motorways density in Malta

	Length motorway km/1000 km²	Length highways, main and national roads (km/1000km²)
Malta (2000)	0	617
EU15	16	84
EU25	14	91

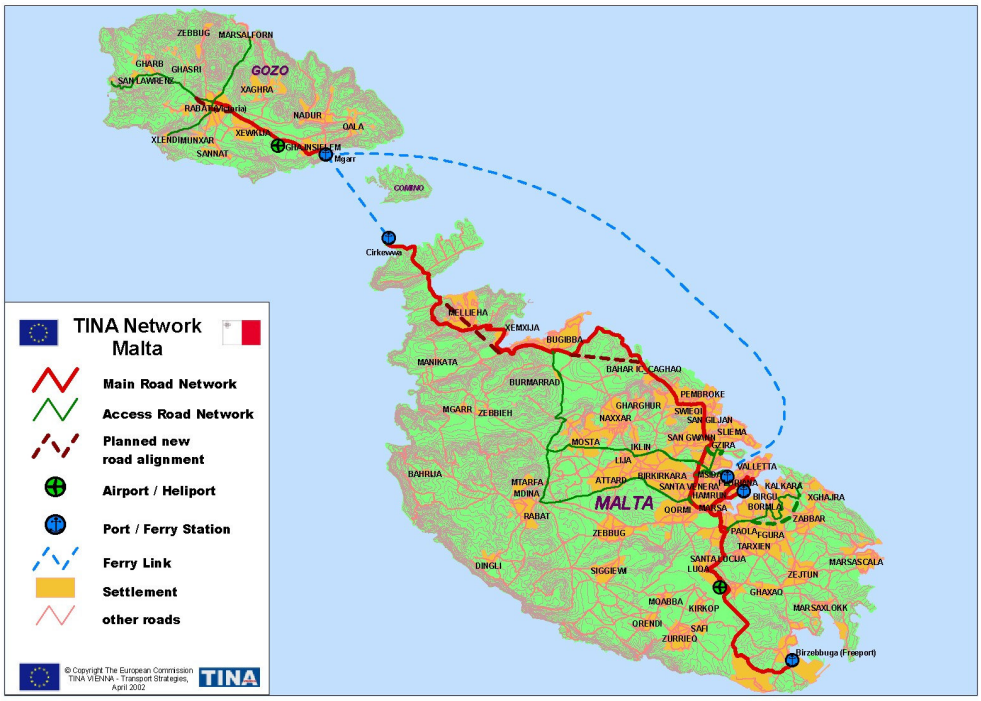
Source: Eurostat, National Statistics Office Malta

European Network

The TINA project (Transport Infrastructure Needs Assessment) aimed to initiate the development of a multi-modal transport network within the 12 EU candidate countries. In the case of Malta, the project resulted in the definition of a main road network and a network of access roads linking also the international ports with the airport. The specific transport links and nodes were determined in close collaboration with the Maltese authorities. This network was considered as a basis for the extension and financing of the Trans-European Transport Networks.

The backbone of the main network is composed of the following nodes from west to east (see also Figure 2.1): Victoria (capital of Gozo) – Mgarr (ferry station on Gozo) – Cirkewwa (ferry station on Malta) – Bugibba – St. Julian's – Marsa – Valletta (including the links to Grand Harbourand Passenger Sea Terminal) – Luqa (airport) – Birzebbugia (Freeport)

Figure 2.1 Major Road (TINA) network Malta



Source: TINA MALTA, 2002

Table 2.2 gives information on car ownership in Malta in comparison to the EU15 and EU25. It shows that car ownership in Malta, at over 500 per 1000 inhabitants, is relatively high. In the period between 1990 and 2000 car ownership increased by 75%. In all, approximately 77,000 additional registered private cars were introduced on the road network during this period. In 2004 about 211,000 private cars were registered in Malta. The average growth of car ownership exceeds GDP growth (1.5% per annum), as well as population growth (0.4% per annum) by far. On basis of the trend in the share of households that own a car in Malta (from 15% in 1992 to 75% in 2000) the growth in car ownership may flatten out in the near future.

Table 2.2 Car ownership Malta

	Malta (2002)	EU15 (2002)	EU25 (2002)
Cars/1000 inh	519	491	459

Source: Eurostat, National Statistics Office Malta

Road Freight

The number of commercial vehicles has doubled from 22,000 in 1990 to almost 50,000 in 2003, with a major increase during the early nineties. The Maltese freight transport sector is, considering the small surface and population of the country, quite diverse, counting 346 enterprises (2001). The national haulage sector is distinctively larger than in Cyprus, Latvia, Lithuania, Estonia and Slovenia (by vehicles registered in the country).

The sector is characterised by a majority of small and medium sized companies. Competition is intense in domestic transport, mainly because of the high number of

operators. Due to its island character and the small size of the market, Malta does not attract major international road haulage companies (except for the Dutch company De Haan). On the other hand, a few Maltese TIR companies have concentrated until now on supplying the island with products from the European mainland. Cabotage transport can only constitute an auxiliary business activity for these companies.

Table 2.3 Road freight vehicles Malta (2003)

	Number of vehicles	Road haulage (1000 tkm)
National road-haulage	50.000	3,700
International road-haulage	0	0

Source: Eurostat, National Statistics Office Malta

Road accidents

Malta had the lowest traffic death toll rate per million cars, as well as the lowest traffic death toll rate per million inhabitants among the new Member States in 2004.
About 1281 accidents involving personal injury took place in Malta in that year, with 13 fatalities and more than 1180 persons injured. The figures for accidents involving injured persons are much higher, though, and not among the best figures of the new Member States.

Table 2.4 General Road accidents statistics in Malta (2004)

	Persons killed	Persons injured	Total accidents personal injury
Accidents	13	870	1281

Source: CARE (EU accident database), Eurostat

Table 2.5 Fatal road accidents (fatalities per mln inhabitants)

Malta			EU25
1994	1998	2004	2002
16	45	33	110

Source: Eurostat, CARE

The Maltese Government has adopted a similar policy to that proposed in the EU White Paper, aiming at reducing road accident fatalities by 50% over a ten-year period. Malta in fact has one of the lowest per capita road accident fatality rates in Europe (approx. 4.4 fatalities per population head). The prevention of traffic accidents is given significant priority within national transport policy.

2.3.2 Urban transport

Means

The domestically operating passenger transport sector in Malta is, like the freight sector, characterised by a majority of small and medium sized companies. The national regular

bus service on the main island of Malta comprises about 400 different private owner-operators, with a total fleet size of 508 buses. The bus owners have organised themselves into a collective, the Public Transport Association. The Association is responsible for the day-to-day operational management of the service and for handling tickets sales.
There are 142 coaches operated by 74 individual owners or firms, some of whom have joined forces and set up their own cooperative, e.g. Koptaco. Coaches are used mainly by tourists, conference delegates and by schools.

The white taxi service has the privilege of picking up passengers from anywhere, except bus stops. There are 250 individually owned taxis in Malta and Gozo. Taxi owners are being assisted to purchase new vehicles through lower initial registration fees. Some of the taxi owners are represented by, and operate through, the White Taxi Services Amalgamated. Taxi services from the Malta International Airport to all localities in Malta are based on a fixed tariff scheme.

Demand

Patronage of the regular urban and suburban bus services decreased by over 10 million trips per year (from approximately 39 million to 29 million tickets). Recently this patronage has shown a small increase to 31.5 million tickets in 2004. During this period, the size of the bus fleet remained the same, but the network expanded from 64 to 91 bus routes. The share of buses and coaches in passenger transport in Malta in 2002 is about 20% of passenger-kilometres.

2.3.3 Railways

Malta has no railways and currently there are no government plans to invest in rail transport.

2.3.4 Inland waterways

Malta has no inland waterways.

2.3.5 Sea ports

Infrastructure

There are five ports on the Maltese Islands, two international ports (Grand Harbour - Cruise Liner Terminal and Ro-Ro and bulk cargo facilities; Freeport – container terminal) and three ports for internal inter-island transport (Cirkewwa – goods and passenger Ro-Ro ferry services; Mgarr – goods and passenger Ro-Ro ferry services; Sa Maison – freight ferry services only).

The transference of most container traffic and transhipment from the Port of Valletta to the Malta Freeport in Marsaxlokk increased the available capacity the Port of Valletta for Ro-Ro freight transport and bulk cargo. The Freeport is becoming an important node for international business, linking markets across continents, being strategically located on the main trade route in the Mediterranean between Gibraltar and the Suez Canal with minimal diversion distances.

Means

Malta has the second biggest merchant fleet in the EU, after Greece and before Cyprus, having a share of 16% of the EU tonnage (24.7 Mio tonnes). About 1,140 merchant ships operated under the Maltese flag in 2004. Many of these vessels are foreign owned.

Demand: freight

Malta's ports handle imported and exported cargo to and from the island, the transshipment of container traffic and passenger traffic, either as a port of call within a Mediterranean cruise or as cruise for tourists visiting Malta. Between the islands of Malta and Gozo there are a passenger and vehicle services all year-round.

In 2004 about 22 million tonnes of goods were handled in the ports of Malta. The port of Valetta handled nearly 7 million tonnes of freight and the port of Marsaxlokk handled 1.4 million of TEU or some 15 million tonnes of containerised cargo. The handling of containers plays an important role for the port of Marsaxlokk, with a growth of 1 million of TEU in 10 years. About 95% of container traffic in the port of Malta is transshipment.

Table 2.6 Cargo handled at the principal ports of Malta (mln tonnes)

Ports	1994	2004
Valetta	3,3	6,8
Marsaxlokk	0,5	15,0
Other ports	0,4	0,5
Total	4,2	22,3

Source: Malta Maritime Authority

The policy strategy at both the Malta Freeport and the Port of Valletta is to remove any bottlenecks through improved handling facilities, through the development of super-structures and equipment to load and off-load the ships, and to improve the use of the port area.

Demand: passengers

Passenger transportation by sea accommodates domestic mini cruise lines for tourists visiting Malta, internal inter-island passenger transport between the Malta and Gozo and international passenger cruise between countries. In 2004 the total arrivals and departures from the port of Valetta amounted to 487,000 passengers; an increase of almost 100% of passengers compared to 1994. About 290,000 passengers make use of the cruise liners. The inter-island passenger connection between Malta and Gozo transport about 3 million passengers per annum.

Table 2.7 Passengers arrivals / departures in the ports of Malta

Ports	1994	2004
Valetta	229.000	487.000
Cirkewwa		3.000.000
Mgarr (Gozo)		3.000.000

Source: Malta Maritime Authority

The current Maltese strategy for cruiser line passenger transportation is to encourage short-stay cruise liner tourism and fly and cruise tourism through provision of attractive berthing facilities and tour excursions in Malta. To meet the demand, a new cruise liner passenger terminal is being developed with increased capacity facilities, such as bunkering, ship repair, chandelling and other husbandry services.

Inter-island ports are currently being re-developed to increase the capacity of ferry services between Malta and Gozo. The port re-development will introduce better traffic management for vehicles and physical separation for passenger boarding from vehicle boarding, which shall increase the turnaround time for vessels, through faster loading and unloading.

2.3.6 Airports

Infrastructure

Air passenger transport is very important for Malta as an island state, and especially for the tourism-sector. The "Malta International Airport" (MIA) became fully operational in 1992. Together with Luqa, the previously biggest airport, Malta accommodated 2.65 million passengers in 2003. Being the only international airport, MIA plays a strategic role in the economic development of the country.

It is a national objective to increase the volume of passengers travelling by air to Malta by promoting tourism. However, a major constraint on the growth of air travel at peak-season is the capacity of the country's hotel sector (tourist-bed-capacity), and not the airport capacity. Therefore, sustainable growth through better distribution of tourism arrivals over the year is being encouraged.

The national airline started to act more competitive than before Malta's EU membership. Aircraft flying to Malta on scheduled and chartered services carrying passengers and cargo must meet the noise standards of the International Civil Aviation Organisation.

Means

Air Malta is the Malta's national air carrier, based at MIA. It was established in 1973 and operates 14 aircrafts. In 2003, Air Malta transported 1.55 million passengers, having a share of 58% of the market, which reached 2.68 million passengers. European air carriers also provide regular and charter flight to Malta. A domestic charter flight service between Malta and Gozo operates by helicopter.

Demand

Malta has experienced a decline in passenger air transportation of 6.7% from 2001 to 2003. Air passenger traffic in 2003 was almost back at the level of 1995. The current airport - Malta International Airport can easily accommodate the projected growth in passenger air traffic of 5 million passengers over the next 10 years and this growth will be environmentally sustainable.

Table 2.8 Passengers and freight movements air port of Malta

Air port	1995	2000	2003
Passengers	2.600.000	3.000.000	2.650.000
Freight (tons)			12.000

Source: Malta International Airport

2.3.7 Trends and indicators

Modal split

Because Malta has no railways or inland waterways, domestic freight transport is dominated by road. The sea ports and airports have an important gateway function in the international transport network.

Table 2.9 Modal split freight transport (share in tonkilometers, 2002)

	Road	Rail	Inland Waterways	Pipeline
Situation 2002				
Malta	100			
EU15	75.5	12.9	6.9	4.6

Source: Eurostat

Road transport is also the dominant mode in Malta in passenger transport with 80%, while buses and coaches have a 20% share in modal split. It can be expected that car ownership will further increase with economic development, which will further strengthen the position of road transport in future.

Table 2.10 Modal split passenger transport (share in passengerkilometers, 2002)

	Passenger cars	Buses	Railways	Tram & metro
Situation 2002				
Malta	80	20		
EU15	83.5	8.8	6.6	1.0

Source: Eurostat

Modal shift is necessary in Malta due to the high levels of congestion experienced on the Maltese roads. In order to shift passenger traffic from private cars to public transport, the government gives more emphasis in their policy and measures on encouraging the use of buses and taxis. Over the years, though, efforts have been unsuccessful in stimulating modal shift from private to public transport. New measures are planned to step-up modal shift which will require more 'hard policies' in terms of restrictions on car use.

2.4 Current Transport policy

This section summarizes some key issues with respect to the policy of Malta with respect to the transport sector and puts them in the light of EU policy objectives.

Improving road safety

The Maltese Government has adopted a similar policy to that proposed in the EU White Paper aiming at a reduction in road accident fatalities of 50% over a ten-year period. Since the mid-1990s, a number of road accident remedial measures have been introduced that specifically target reducing injury accidents and road deaths. The prevention of traffic accidents is given significant priority in national transport policy. The Government has adopted the following approach to achieve the targets:

1. Engineering - introduction of traffic calming, carrying out of safety audits, analysis of road accident data
2. Legal/enforcement - introduction of new legislation (seat belt, drink driving, compulsory use of helmets, roadworthiness tests and carrying out targeted enforcement with the assistance of technology e.g. speed cameras)
3. Education - awareness campaigns, more rigorous driver training and testing

Promoting transport by sea by developing seaports

The main objective of the Malta Government is the development of Valetta and Marsaxlokk port as safe and efficient places for transporting goods (containers) and passengers, within the framework of inter-European transport networks. The goal for the international ports is to remove any bottlenecks through improved handling facilities and to organise better the use of the port area. Moreover, short-stay cruise liner tourism and fly-and-cruise tourism will be encouraged through provision of attractive berthing facilities and tour excursions in Malta and by developing a new cruiser line passenger terminal. Inter-island ports are currently being re-developed to increase the capacity of ferry services between Malta and Gozo.

In 2001 a Transport Infrastructure Needs Assessment (TINA) study was carried out in Malta. It identified capacity constraints to the further development of the Malta Freeport as a container transhipment facility. As a result, a number of infrastructure projects have now been identified that would help Malta to become a major container transshipment hub in the central part of the Mediterranean.

The Malta Maritime Authority is actively involved in discussions to develop the *Motorways of the Sea* (TEN Priority Project number 6, Spain, France, Italy is of particular relevance to Malta). The development of short-sea shipping (intra-med) is also being actively pursued with a view to tapping possible funding under the Marco Polo initiative.

Controlling growth in air transport

According to the TINA projections, Malta International Airport can easily accommodate the projected growth in passenger air traffic over the next 10 years and this growth will be environmentally sustainable.

Developing high quality public transport

Modal shift is necessary in Malta due to the high levels of congestion experienced on the Maltese roads. Over the years, efforts have been unsuccessful in stimulating modal shift from private to public transport. Measures to promote modal shift included:

- vehicular restriction in the city – the *Valletta Charging Scheme* whereby cars are only allowed in the city upon payment of 40 Euro in addition to the annual licence.
- quality improvements of the public transport infrastructure, such as replacement of old buses and replacement of bus-stop infrastructure.
- introduction of new ticketing-machines in public transport and the introduction of concessionary fares for elderly and students.
- heavy taxes on the initial purchase of private vehicles (75% registration tax), increased annual road licence and an overall increase in the running costs of vehicles (through the Vehicle Roadworthiness Testing, fuel taxes and increase in the annual road tax).

Despite all these measures, the increase in car ownership continued. New measures are planned to step-up modal shift which will require more 'hard policies' in terms of restrictions on car use. They include:

- radical reform of public transport operations and services;
- encouraging multi-modal trips (such as the Park-and-Ride initiative);
- introduction of higher road-charges for access into the Valletta and Floriana peninsula;
- introduction of on-street-parking charges and parking management schemes (such as residential parking schemes) for sensitive urban areas;
- better integration of land-use and transport planning.

Improving quality urban transport system

As a small, urbanised island state with a very high motorisation rate, the main focus of Malta's traffic policy is on urban transport. It is one of the main aims of Malta to implement a high quality transport system in order to decrease the dependency on car transportation. The already existing charge on entering the urban agglomeration of Valletta will be reshaped into a more sophisticated system. Additionally, non-motorised transportation modes will be stimulated.

Building Trans European Network

The Maltese government recognises that the political openness and newly created access to transport infrastructure present an untapped potential for the development of efficient land transport corridors to the east. The combination of the available capacity for short-sea shipping in the Mediterranean Basin with the flexibility and speed of Euro-Asian land transportation corridors could be an excellent strategy for unitised cargo.

The TINA -network in Malta comprises 96 km of roads, 5 seaports and one airport. The outline of the Network has been finally defined; however, minor changes in its shape might occur, if future studies prove this necessity.

Security

Malta's ports and airports are in compliance with international security standards. Malta's ports are fully compliant with the International Ship and Port Facility Security (ISPS) Code since 1st July 2004. Airports are in compliance with the International Civil Aviation Organisation (ICAO) Annex 17 and EU regulation 2320/02.

2.5 Conclusions: SWOT analysis transport system

Strengths	Weaknesses
• Strategic location of Malta in the Mediterranean. • Competitive flag register • Private sector is active in transport facilities (MIA, Freeport). • The road network is well developed • Densely populated country, with short travel distances. • TINA study has already identified the transport sector needs.	• No IWT or rail available resulting in dominance of road transport • A very high motorisation rate contributing to urban congestion and negative impact on environment. • Limited use of road user charges to manage mobility • Weak and declining position of public transport • Environmental impacts of road upgrades
Opportunities	**Threats**
• Financing possibilities from EU funds • PSO for Malta Gozo Sea link can boost development in Gozo, leading to the sustainable transport connection with Malta Island. • TEN-T section on Malta, coupled with the motorways of the sea, improves accessibility of Maltese economic units to Europe and the Mediterranean.	• The prospect for development of new hub-ports in the east Mediterranean (Crete, Greece) • Rising congestion may hamper economic growth and endanger sustainability of the transport system

3 Accessibility analysis

3.1 Introduction

This chapter presents a more quantitative transport needs assessment on a regional level. It complements Chapter 2 in which the current situation of the transport system is described and potential deficiencies are addressed. The analysis on the current situation together with the analysis of transport needs from a cohesion perspective forms a basis for identifying possible investment priorities.

However, a quantitative needs assessment for a small island state has its limits. The methodology developed for the strategic evaluation of transport investments for the funding period 2007-2013 is designed for large countries with many regions. The analysis is based on interregional accessibility. Intraregional transport links are not taken into account. Malta, however, consist of three islands, so all road improvements are necessarily intraregional. Their quantitative evaluation would require a detailed local traffic model. Therefore only a subset of the evaluation indicators calculated for larger countries can be calculated for Malta.

In this chapter, first a description of the needs assessment methodology is presented. Especially the determination of the composite Accessibility Problem Index (API), which forms a central role in the approach, is explained. The higher the value of the index, the higher the need for intervention. This approach has been labelled as the “red flag” analysis.

This composite Accessibility Problem Index is a combined measure, which addresses transport network quality, population density and regional disparity (a more elaborate explanation is provided in Annex C). As such the accessibility analysis is much more linked to cohesion policy than a more traditional accessibility analysis. Next, results of the application for the specific country are illustrated and analysed. This analysis identifies main areas for intervention in rail and road transport for the current situation (2006).

3.2 Methodology: Accessibility Problem Index

To determine the need for transport investments, the SASI model has been used to assess the present situation of the road and rail systems in each country without the national transport projects to be examined later. For this the accessibility provided by the road and rail systems in each country was evaluated from both a national and a European perspective in order to identify regions with serious accessibility deficits that should be

addressed by European transport policy taking account of the stated EU goals competitiveness and territorial cohesion. In the SASI model accessibility, which is directly influenced by transport policy and investments, is judged to play a crucial role in promoting the realisation of the cohesion objectives.

To determine the appropriate assessment of transport investment need from the cohesion policy perspective an agreement on the indicator of accessibility to be used is required. Traditional accessibility indicators are not useful for this. They measure the total effect of both geographical location (periphery versus core) and quality of transport provided by the transport system. As a result they always show a steep gradation in accessibility from the core to the periphery. However, public policy cannot change the fact that some regions are central and some are peripheral, i.e. provide the same level of accessibility to all regions. Public policy can only alleviate disadvantages through unequal transport provision.

This distinction is relevant for European transport policy. To invest only in transport in the most peripheral regions with the lowest accessibility according to such an indicator would benefit only the relatively few people living there and would ignore the needs of the densely populated central regions to combat traffic congestion and so endanger the competitiveness goal of the Lisbon Strategy of the European Union. On the other hand, to invest only in transport in the most densely populated central regions with the greatest congestion problems would not only lead to ever more traffic but also widen the existing gap in accessibility between the central and peripheral regions and would so run counter to the territorial cohesion goal of the European Union.

The new accessibility indicator recognises transport network quality, population density and regional disparity

To avoid this dilemma, a new composite accessibility indicator was defined which distinguishes between geographical location and quality of transport. This indicator assumes that people in the peripheral regions cannot expect to enjoy the same level of accessibility (measured in traditional terms) as the central regions but that they can demand to be able to reach relevant destinations with the same **travel speed** ("as the crow flies") as the people in the central regions. In addition the indicator recognises the utilitarian principle of the happiness of the greatest number, i.e. that the transport needs of **densely populated regions** should be given more weight than those of regions with only few inhabitants. And finally, the indicator recognises that **economically lagging regions** with severe deficits in accessibility may offer greater potential for stimulating economic effects by transport investments than regions which enjoy already high accessibility.

These three principles avoid the pitfalls of both an extreme egalitarian view, which postulates that all regions in Europe enjoy the same level of accessibility and a purely efficiency-oriented view which postulates that accessibility in the already highly accessibly central metropolitan areas should be further strengthened because they bring the largest economic benefits. In other words, the three principles aim at a rational trade-off between the stated EU goals of competitiveness and territorial cohesion. Annex C gives a more elaborate description of the composite Accessibility Problem Index.

3.3 Transport needs

The composite Accessibility Problem Index takes account of the transport system quality (travel speed), population density and regional disparity. Figures 3.1 and 3.2 depict the population density and the regional distribution of income in Malta and southern Italy, Sardegna and Corsica and parts of the Balkan countries. In terms of population density, Malta's' main island with the capital city of Valletta has similar population density as the much larger cities Rome and Naples (Figure 3.1). However, in economic terms the GDP per capita in Malta is more similar to rural regions on Sicily and in the south of Italy (Figure 3.2).

Figure 3.3 shows the spatial distribution of the Accessibility Problem Index in the same region from a European perspective for the current situation (2006). Only the Accessibility Problem Index Road is shown, as Malta has no rail lines. The colour scale of the map resembles that of a traffic light: green shades indicate average interregional travel speeds above the European average, yellow values indicate speeds slightly above the European average and red shades indicate speeds significantly lower than the European average.

Not surprisingly the road accessibility of Malta is much lower than the European average indicated by its red colour. This is due to its island character, with ferry travel times to the next Sicilian ports Pozzallo (1.5 hours), Licata (2.5 hours) and Catania (10 hours) considerably slowing down average travel times. The comparison with the much higher road accessibility of the regions on Sicily and the Italian mainland makes it clear that for passenger travel to and from Malta air transport, and for goods travel to and from Malta short-sea shipping, are much more important than road.

Figure 3.1 Population density (population/sqkm), 2006

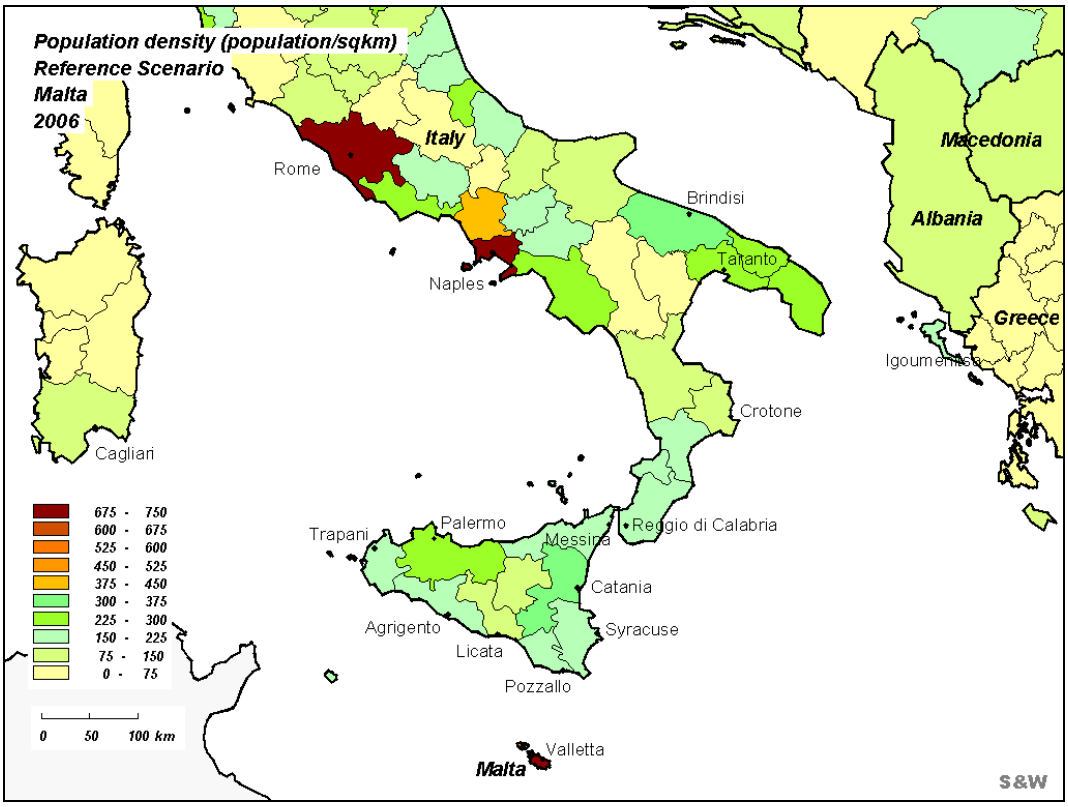


Figure 3.2 GDP/capita (Euro of 2005), 2006

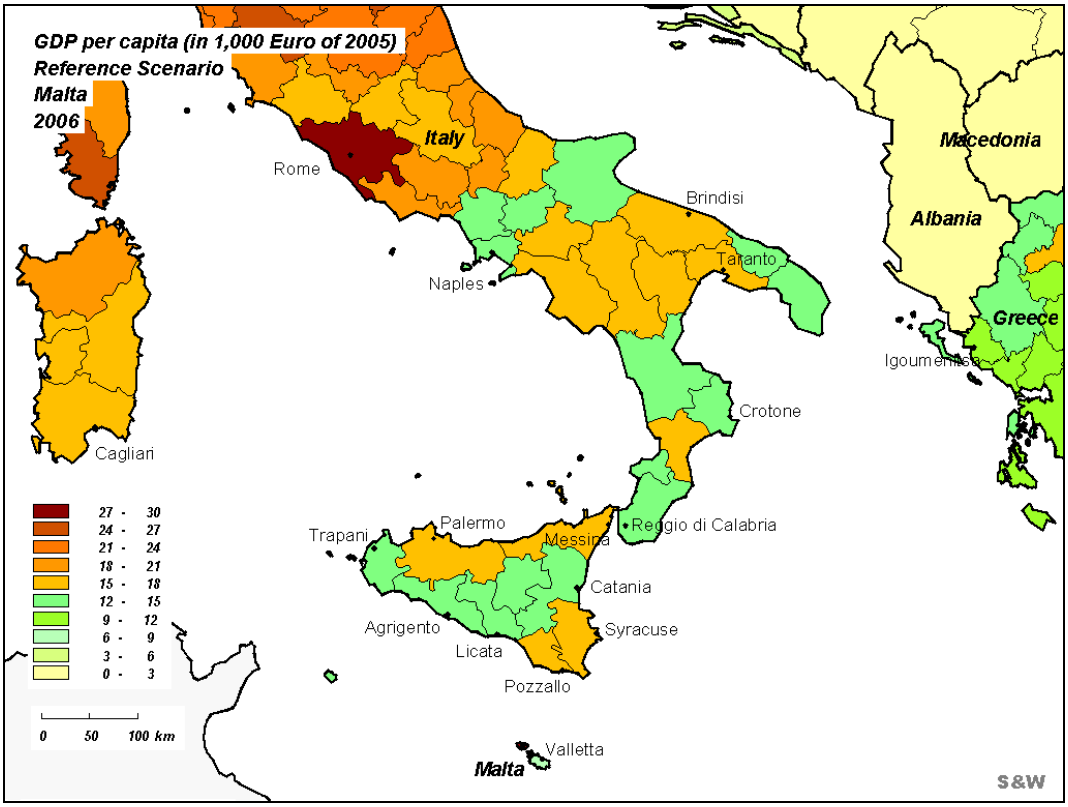
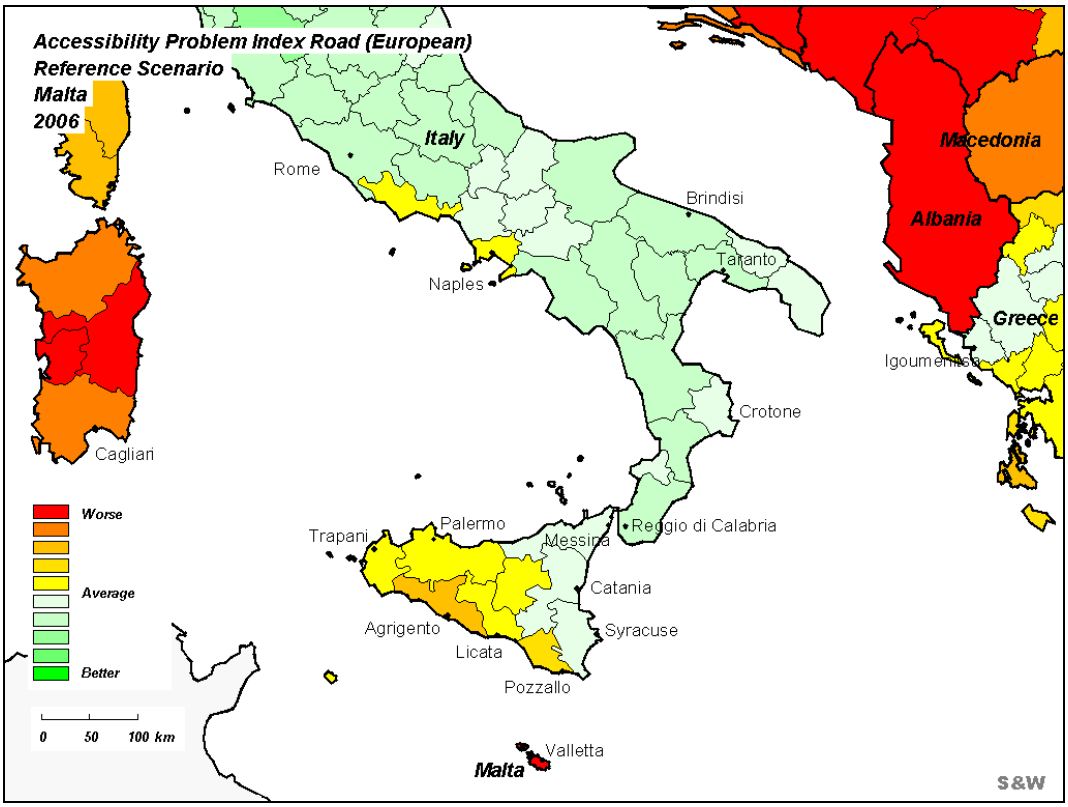


Figure 3.3 Accessibility Problem Index Road (European), 2006



Part B: Past transport investment priorities

4 Previous support programmes

4.1 National public funding for transport infrastructure

The following table shows the state capital expenditure for the years 1990-1999 on major road infrastructure projects. It appears that Malta has invested annually around € 11 million into its road infrastructure over the last decade.

Table 4.1 State Capital expenditure for major road construction projects for the years 1990-1999 (in million Euros)

	1990-1994	1995	1996	1997	1998	1999
Total expenditures	59,2	10,2	13,4	14,9	9,6	8,7

Source: Transport Topic Paper

Over the past years there haven been investments in public transport through a number of measures and government policies such as:

- public transport subsidy
- bus fleet replacement (an investment of approximately 10.4 million Euros)
- upgrade of bus stop and bus termini infrastructure (no financial data available)

4.2 EU funding

EU funding is concentrated in road transport and maritime transport. Phare funding has been limited to one institution building intervention for the maritime transport sector in 2002-2004. The EU contribution was 3.54 million Euro of a total eligible value of 4.43 million Euro.

One Maltese project has been co-financed in 2004 under the non-MIP envelope of the TEN-T budget line, namely the *Surveys and geotechnical investigations of existing and proposed marine and port structures in Malta* (including the island of Gozo). This project was allowed a grant of EUR 0.8 million.

Phare funding has also been used for upgrading road infrastructure in 2003. The EU contribution was 0.82 million Euro of a total eligible value of 1.47 million Euro.

Major transport infrastructure projects

The TINA study in 2002 identified the following transport infrastructure projects for Malta:

- six priority projects for different sections of the road network

- fifteen projects identified for the development of the seaport infrastructure. Nine of these projects refer to Valletta port, four refer to Marsaxlokk, whilst one project refers to each of the ports of Cirkewwa and Mgarr (ferry link)
- six projects relative to the Luqa airport.

The TINA report concludes that the network can be realised in the time horizon of 2015. In the period 2004-2006 six stretches (10 km) of road network including a bridge (mostly on the TEN-T) will be reconstructed using EU Structural (ERDF, 11 million Euro) and Cohesion Funds (11 million Euro). A further 14 km of main road are being constructed using funds provided under the 5th Financial Protocol with Italy.

The domestic ports of Cirkewwa and Mgarr are also being reconstructed.

The costs to realize the multi-modal TINA Main Network identified above was estimated at € 400 million. The additional costs to realise the Access Road Network has been estimated at € 91 million. The total costs to realize the total TINA network till 2015 would sum up to € 490 million (Source: TINA Malta , page 58, 2002).

Funding ports and air ports

The Malta Maritime Authority plans to upgrade freight handling facilities at the Port of Valletta with financial assistance from the EU, as this port is identified on the TEN-T network and it shall play an important role in the development of motorways of the sea. In 2001, the Government has entered into a 65 year concession contract with VISET Ltd., a private company which is responsible for the design, building and operation of the passenger handling facility at the cruise liner terminal in the Port of Valletta.

In 2004, the government sold all its shares in Malta Freeport Terminals Ltd. and entered into a 30 year concession contract to operate and develop the Malta Freeport with the CMA-CGA group. During the concession period, CMA-CGM will be solely responsible for all the necessary investment to improve the facilities and equipment and to introduce new machinery on site. This will ensure that Malta Freeport will remain a leader among the container terminals of the region

The national consolidated fund is the main source of finance for state institutions responsible for regulating air transport operation (Department of Civil Aviation), through the ministry responsible.

In July 2002 the Government of Malta sold 40% of its equity of Malta International Airport to the Malta Mediterranean Link Consortium Ltd., and a further 20% to the general public.

4.3 Other sources of financing

This section gives an overview of other sources of financing for transport infrastructure.

EBRD

EBRD has no direct involvement in Malta with loans in transport.

EIB

EIB involvement in Malta has been concentrated on the construction of a new airport terminal and upgrading of related facilities in 1988 (16 m€), air traffic services in 1993 (6 m€) and on the upgrading and development of port infrastructure of Valetta Harbour in 1979 (8 m€).

PPP financing

In Malta there is neither special legislation nor practices for Public Private Partnerships (PPP's) concerning road transport infrastructure. Also there are no road tolls and there is no intention to introduce them on the islands. Nevertheless, the Governement of Malta is examening the possibilities for cooperation of the private and public sector in financing infrastructure projects. Initiatives are the introduction of PPP for the operation of a Park-and-Ride system outside Valetta and a new system of road charging for access and parking in the city of Valetta.

For the construction of port infrastructure like passenger and container terminals some of these projects are expected to be funded by the private sector.

Part C: Future transport investment priorities

5 National Transport Strategy

5.1 Introduction

This is the first section of Part C which aims to determine transport investment priorities at a strategic level. This chapter deals with the current national transport policy and resulting investment priorities. In the next chapter these investment priorities are confronted with an analysis of possible sources of financing, and other factors such as their contribution to EU policy objectives, the administrative capacity of the country, the socio-economic impacts in relation to the costs of the projects, and the extent to which the projects contribute to the needs identified in Part A of this report. Finally the overall impact of the proposed investment priorities will be assessed.

5.2 Long term national Transport Strategy and Planning

One of the key challenges for Malta is the expansion and upgrading of basic infrastructures. The current and foreseen objectives of the national transport policy are described briefly per transport sector.

Road transport

As a small, urbanised island state, with a very high motorisation rate, the main focus of Malta's traffic policy is on urban transport. Regarding the Road transport sector, the main aim of the Malta Government is to implement a high quality transport system to decrease the dependency on car transportation. A summary of the main measures that have either been implemented or are being planned are listed below:

- Harmonised checking of the safety of vehicles
- Focus on *Road Safety* for the period 2005-2010 with the aim for increasing road safety and achieving the target of reducing the number of deaths and serious injuries by 50% in 2010
- New measures are planned to step-up modal shift which will require more 'hard policies' in terms of restrictions on car use (such as higher road charges for access into Valetta and encourage multimodal trips)
- Establishment of standards for road design and traffic management schemes
- Introduction of road safety schemes such as traffic control and calming measures
- Carrying out of safety audits and traffic impact assessment for new developments
- Strengthening the connection from Malta to Gozo via road transportation
- Discouragement of excessive use of private vehicles and promotion of urban public transport system

Maritime Transport

Malta has long been developing maritime transport strategies with respect to passenger hubs, transhipment facilities, distribution centres and other commercial and logistic services. Recent initiatives include:

- the increased private participation in port infrastructure and superstructures
- the development of cruise and ferry facilities in the port of Valletta
- the Malta Freeport has developed into a modal trans-shipment point for the distribution of European cargo.
- Within the TEN-T project n.21 *Motorways of the sea* the aim is to develop possibilities for a modal shift from road to maritime freight transportation – in a European context.
- Operate the Vessel Traffic Management System
- Improving the quality and efficiency of short sea shipping services between Malta and EU countries
- Reduce bottlenecks in local ports offering services to international shipping
- Improve interconnectivity between Mediterranean and EU.
- Encourage short-stay cruise liner tourism and fly and cruise tourism through provision of attractive berthing facilities and tour excursions in Malta (new cruise liner passenger terminal is being developed)
- Inter-island ports are currently being re-developed to increase the capacity of ferry services between Malta and Gozo

Malta has also taken several steps to promote the concept of 'mixed service' of freight and passengers on Ro-Ro ferries. Some of these services are already successful, linking Malta to Italian and French ports. Such services could be extended to cover ports in Spain and Greece. Moreover, Malta could serve as one of the nodal points between North Africa and Europe.

Air transport

Air passenger transport is very important for Malta as an island state and especially for the tourism-sector. It is a national objective to increase the volume of passengers travelling by air to Malta by promoting tourism. However, a major constraint on the growth of air travel at peak-season is the carrying capacity of the country (tourist-bed-capacity), and not the airport capacity. Therefore, sustainable growth through better distribution of tourism arrivals over the year is being encouraged. The national airline started to act more competitive than before Malta's EU membership. Aircraft flying to Malta on scheduled and chartered services carrying passengers and cargo must meet the noise standards of the International Civil Aviation Organisation.

Trends 2007-2013

The transport infrastructure in Malta has been assessed by the Malta Maritime Authority and Malta Transport Authority who contribute to Malta's National Development Plan. Based on TINA's report on priorities the Operational Plan for the Transport Sector is under preparation.

Proposals for projects have been received from the various bodies involved in transport infrastructure development and operation, and are evaluated to be submitted for approval

to the Government. The approved proposals will be included in the National Strategic Reference Framework and the operational plan for the transport sector, to request funds from E.U. for the period of 2007 – 2013.

5.3 Operational programme 2007-2013

The National Strategic Reference Framework (NSRF) has been drafted in an intensive dialogue process and based on an extensive assessment of the country's needs and challenges, strategic objectives for development for the medium and longer term. The NSRF provides the goals and the basic strategic framework for the operational programmes on the four Strategic Objectives of sustaining economic development:

1. Sustaining a growing and knowledge-based, competitive economy
   One of the sub-elements is improving and expanding the transport infrastructure (roads, inter-island sea ports and air services)
2. Improving the quality of life through environment protection and urban regeneration
3. Investing in human capital
4. Addressing Gozo's regional distinctiveness (e.g. accessibility issues, road and sea transport)

The strategic objectives provide the overall direction of Malta's economic development for the programming period 2007 – 2013. This strategic direction is supplemented by two Operational Programmes that outline the implementation of the overall strategic direction:

- Operational Programme 1: Investing in Competitiveness for a Better Quality of Life
  This Operational Programme will be co-financed by the European Regional Development
  Fund (ERDF) and the Cohesion Fund (CF). It will support investments in physical and social infrastructure and include possibly and axis for transport.
- Operational Programme 2: Development of Human Capital
  This Operational Programme will be co-funded by the European Social Fund (ESF).

5.4 Priorities in OP by sector

For transport infrastructure the following interventions have been proposed by the working groups to the Government, who will finally prioritise and approve their inclusion in the Operational Plan. Most of the priorities concerning the investments in road projects are according to the main (TINA) network.

Road Sector

In total, with regards to road transport, 13 projects, identified by TINA study, were submitted for approval to the Government, while two are still under consideration as they need further review of their impact on the ecology and environment. Of these 3 projects in Valletta urban area are considered by Malta Transport Authority as a priority. These are:

- The Kappara Junction interchange and regional road upgrading

- The Link to the Sea Passenger Terminal
- Re-alignment and grade separation of Triq Aldo Moro and Hamrun By-pass.

The Malta Transport Authority is also about to embark on a feasibility and EIA on the road network in Gozo.

Maritime sector

In Valletta port, the TEN-T project and TINA study include:

- creation of a new cargo terminal, primarily for the handling of containers coming from feeder vessels by the extension of Fuel Wharf to Laboratory Wharf.
- Improving port equipment & facilities
- developing of the hinterland of Valletta port
- development of Barriera wharf for cruise activities
- quay joining Deep water quay with Flagstone wharf
- development of Bridge wharf

In Malta Freeport to ensure the availability of spare capacity in the future under the expected growth of traffic, they intend to proceed with:

- Expansion of terminal one west quay
- Expansion of terminal two north-west side
- Dredging works to increase depth to 16.50 m

Investments are also foreseen in Mgarr port in Gozo Island to improve the services offered by the sea link connections between Malta and Gozo.

Aviation sector

For Malta's International Airport the priorities are:

- Extension of passenger terminal to achieve better separation of Schengen - Non Schengen traffic;
- Extension and upgrade of taxiway and apron systems, to increase aircraft movement capacity;
- Runway maintenance and resurfacing;
- Upgrading electric and electronic equipment

5.5 Consultants assessment of priorities

Identification and Initial Prioritisation Investment Priorities

The island character of Malta favours the further development of ports and airports, on the one hand to cater tourism development in the country and on the other hand to facilitate freight transport and play a role in logistic chains between EU and the world. An adequate road network which connects the ports and airport to the inland transport system is essential in this respect. Connecting the key ports in Malta to the rest of Europe by the motorways of the sea, Malta's position within the global maritime market will expand and thus contribute to economic growth in Malta.

The transport system of Malta is completely relying on roads. The focus of Malta in improving the road transport system should be on strengthening of more environmentally friendly transport modes (public transport, cycling, and walking) making the urban environment more attractive. To improve road safety and developing high-quality urban transport with improving public transport systems it will help to increase the quality of live for the inhabitants. At the same time it will help to preserve the nature in Malta and make the island attractive for tourism with respect for measures of a sustainable transport system.

Towards future investment priorities

The government of Malta has focused on a few infrastructure projects of which some are with help of EU funding to complete the road network in Malta and Gozo. Priority should be given to a limited scheme of possible investment projects and themes. Sustainable development of the transport system can contribute to the economy of Malta now and in future and keep the island attractive for its inhabitants and visitors.

On the basis of the preceding assessment, the following areas for investment priorities in Malta are foreseen in the coming period:

- Stimulate sustainable development of the transport system in Malta, especially within the urban environment by developing innovative transport systems.
- Improve road and transport safety by implement measures for Road Safety through actions on the human factor (training and education), legislation, engineering (intelligent transport systems), vehicles and the road environment.
- Develop interconnections of the main ports of Malta within EU (linking Malta to Italian and French ports. Such services could be extended to cover ports in Spain and Greece) or between EU and North-Africa.
- Develop high quality public transport to improve the quality of service in passenger transport and to reduce private car transport.

6 Prioritisation of Transport Investments (2007-2013)

6.1 Introduction

This chapter intends to identify the main areas for transport investments that would merit EU funding in the period 2007-2013. It should be emphasized that this is based on an analysis that has been carried out at **strategic level**. Although the areas identified are expected to result in high potential projects they should still be subjected to the regular **cost-benefit analysis at a project level** before being finally selected.

Community Strategic Guidelines

The context for identifying strategic investment priorities is set by the Community Strategic guidelines. In accordance with the draft Council Regulation (article 23), the Council establishes Community Strategic Guidelines for cohesion policy to "give effect to the priorities of the Community with a view to promote balanced, harmonious and sustainable development"[3].

These Strategic Guidelines form the basis for identifying investment priorities, which are then be elaborated in National Strategic Reference Frameworks at the Member State level, which are subsequently further detailed in Operational Programmes (OPs) for thematic areas. A Commission proposal on these Strategic Guidelines was published in July 2005[4]. In parallel, Member States have already started preparations for their National Strategic Reference Frameworks and OPs.

Additional factors influencing investment priorities

As indicated the Strategic Guidelines form the context in which investment priorities for Community financing should be identified. In addition to these strategic guidelines a number of other factor shape the eventual establishment of transport investment priorities. These other factors include:

- Cost-effectiveness of projects;
- Availability of other sources of funding;
- Appropriateness of transport policy
- Administrative capacity to adequately absorb and manage funds.

[3] COM(2004)492

[4] COM(2005)299 Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines, 2007-2013.

In the next section the Strategic Guidelines and the other factors are elaborated in more detail leading to a proposed prioritisation of areas for funding from Cohesion and Structural Funds.

6.2 Community Strategic Guidelines

The (draft) Community Strategic Guidelines set the scene for any future transport investment financed as part of the Commission's cohesion policy. According to the communication of the Commission (COM(2005)299) the guidelines with respect to the expansion and improvement of transport infrastructures for the period 2007-2013 determine clear guidelines for action (see text box 6.1)

Box 6.1 Community Strategic Guidelines: Guidelines for action

The Community Strategic Guidelines distinguish the following guidelines for action:

- Member States should give priority to **the 30 projects of European interest**, located in Member States and regions eligible under the Convergence objective[5]. Other TEN projects should be supported where this is a strong case in terms of their contribution to growth and competitiveness. Within this group of projects, cross-border links and those overseen by the specially designated European co-ordinators in the Member States merit special attention. Member States should make use of the co-ordinators as a means of shortening the time that elapses between designation of the planning of the network and the physical construction
- Complementary investment in **secondary connections** will also be important in the context of an integrated regional transport and communications strategy covering urban and rural areas, in order to ensure that the regions benefit from the opportunities created by the major networks.
- Support for **rail infrastructure** should seek to ensure greater access. Track fees should facilitate access for independent operators. They should also enhance the creation of an EU-wide interoperable network. Compliance and applications of the interoperability and the fitting of ERTMS on board and on track should be part of all projects financed.
- Promoting environmentally sustainable **transport networks**. This includes public transport facilities (including park-and-ride infrastructures), mobility plans, ring roads, increasing safety at road junctions, soft traffic (cycle lanes, pedestrian tracks). It also includes actions providing for accessibility to common public transport services for certain target groups (the elderly, disabled persons) and providing distribution networks for alternative vehicle fuels.
- In order to guarantee the optimum efficiency of transport infrastructures for promoting regional development, attention should be paid to improving the **connectivity** of landlocked territories to the Trans-European network (TEN-T) (…). In this respect, the development of secondary links, with a focus on inter-modality and sustainable transport, should be promoted. In particular, harbours and airports should be connected to their hinterland.
- More attention should be paid to developing the "**motorways of the sea**" and to short-sea shipping as a viable alternative to long-distance road and rail transport.

In addition the Guidelines give specific instructions with respect to the **territorial dimension** of Cohesion policy in stressing that Member States should pay particular attention to prevent uneven regional development and improve territorial integration and cooperation between and within regions.

[5] Decision n°. 884/2004/EC of the European Parliament and of the Council, 29 April 2004.

6.3 Additional factors for the prioritisation of transport investments

As indicated in the introduction a number of other factors determine the eventual prioritisation of transport investment priorities under the Commission's cohesion policy instruments. These will be subsequently elaborated.

Cost-effectiveness

Cost-effectiveness or value for money stands at the core of any sound investment programme. It is also fully embedded in the procedures and structure of the cohesion policy of the Commission in which cost-benefit assessments of proposed projects are standard procedure. Also EIB applies CBA as standard assessment methodology before granting new loans.

The cost-effectiveness criterion is especially important if budget resources are limited. In this case cost-benefit analyses can be used to phase foreseen transport investment in time or to seek alternatives with a similar functionality that offer a higher value for money.

Availability of other sources of financing

A can be observed from the previous investment programmes other sources of finance should not be overlooked with respect to future transport investments Apart from public financing by the country itself important potential sources are:

TEN-T budget

The Commission recently reached an agreement with the EP on future TEN-T financing. Total budget available is 7 billion € for the coming programming period. Financing can be up to 20%. It should be noted however that this financing is only a fraction of total cohesion financing (e.g. Cohesion Fund financing for transport approximates 45 m€), while TEN-T funds are valid for all EU members. It is expected that TEN-T funds will be focused on cross-border TEN-T projects.

EIB

EIB financing is another source of financing available for transport investment.
EIB involvement in Malta has been used in the past for airport and port investments. For new investments in construction and maintenance of regional road infrastructure EIB loans can be used for the development of the road network in Malta.
The only restriction for EIB financing is the government debt ratio of 76%.

EBRD

There has been no involvement of EBRD for transport issues, but in future it can be used for regional and urban projects that contribute to the environment and sustainable development of Malta for its inhabitants and visitors.

PPPs

PPPs are explicitly mentioned in the Community Strategic Guidelines as a possible appropriate method of financing investment when there is significant scope for involving the private sector. Apart from the financial leverage positive impacts are expected on implementation and management of projects.

Experience with private involvement in transport infrastructure in the form of PPPs has been limited until now. However, based on the experience in other countries logical sector for a more intense private sector involvement are: ports, airports and logistics centres. Also motorways sometimes figure as typical PPP models.

In Malta PPP constructions are not common in the road sector. For the financing of port infrastructure (like Malta Freeport) partnerships with the private sector are needed and used for terminal building and upgrading of the quays and wharfs in Malta. Also in Malta Government institutions are concentrating on their regulatory roles and through PPP or concession contracts, the private sector is becoming involved in the management of operation of transport services and infrastructures. The current business climate in Malta is expected to be sufficiently open not to hamper PPPs.

Both EBRD and EIB can also get involved if PPP constructions are considered through direct equity participations.

In summary, other financing sources are expected to be relevant for the following areas:

Table 6.1 Potential financing sources and expected destination of funding

TEN-T	TEN project SSS, motorways of the sea
EIB	Urban Transport
EBRD	Sustainable transport systems
PPP & private capital	Income generating transport investments: ports, airports, logistic centres

Appropriateness of the transport policy

Malta aims at modernising the national strategic road network to international standards with a view to improving road safety, accessibility and mobility within the broader context of socio-economic development. Investment for the medium and long-term is earmarked to include programmes for the road network and the seaport infrastructure.

The improvement of the accessibility of Malta is focused on the sustainable development of mobility, both for freight and passenger transport and reducing the environmental effects of transport. The ports and airports of Malta are the main international connections for Malta and links to the Trans-European Network. The actions on the Motorways of the Sea, short sea shipping and modernization of the airports are very important for the transformation of the ports and airport of Malta into the gateway and transit hubs of Europe in the region. PPP for transport infrastructure, especially port infrastructure has high priority.

To achieve a reduction in private mobility without compromising accessibility, the Government is looking at improving the national network of public passenger transport services. A primary objective of the Government is to improve the public passenger transport system in Malta through a process of operational reform including the introduction of new technology to improve bus service reliability and passenger information and the provision of quality public transport infrastructure for passengers. Implementation of traffic safety actions is also of high priority and the government has presented measures to reduce accidents and injuries/deaths on the roads of Malta.

Administrative capacity

Malta's programming for the 2007-2013 period is based on the experiences gained in implementing EU funded programmes and projects during the period 2004 – 2006 and the capacity of the Maltese administration to implement initiatives and to absorb the available funds. Also the experiences of the road projects financed under the fifth Italian Protocol can be used for improvements of the administrative capacity for the implementation of large projects under CF/ SF funds.

The Government has set up a framework for regional policy and co-ordination of structural instruments. The framework respects the mandates of Ministries with regards to their explicit or implicit sectoral responsibility, by consolidating and building on existing competencies, while expanding the traditional role of the social partners. At a political level, the Cabinet will set strategic priorities and ensure overall policy co-ordination.

The Ministry of Transport and Communications and the Ministry for Resources and Infrastructure will be the respective Intermediate Bodies responsible for transport and communications projects and environment infrastructure projects.
Because of the changes in the institutional framework, the three transport sectors air (Department of Civil Aviation), sea (Malta Maritime Authority) and land (Malta Transport Authority) fall under different Ministries. So cooperation between the transport sectors and the implementation and evaluation of priority investment projects should be given attention.

The focus on the improvement of the technical and administrative capacity is the interaction of the government with the municipalities for the development of the urban infrastructure and services. Also priority should be given to evaluate the programme 2007-2013 so lessons can be learned for the management of SF/CF funds.

7 Assessment of Impacts

7.1 Introduction

This chapter assesses a possible investment scenario with respect to its impacts on three different (EU) policy objectives:

- Economic competitiveness
- Territorial cohesion
- Environmental sustainability

In addition the impacts are assessed on the Accessibility Problem Index (see Chapter 3).

However, a quantitative impact assessment for a small island state has its limits. The methodology developed for the strategic evaluation of transport investments for the funding period 2007-2013 is designed for large countries with many regions. The modelling is to a large degree based on interregional accessibility. Intraregional transport links are not taken into account.

Since Malta consists of one NUTS III region, all road improvements are necessarily intraregional. Their quantitative evaluation would require a detailed local traffic model. Therefore only a subset of the evaluation indicators calculated for larger countries can be calculated for Malta.

First the methodological approach is described, including the SASI model that has been used to assess the impacts. Next the scenario is described, followed by a presentation of the impacts.

7.2 Methodology

The SASI model

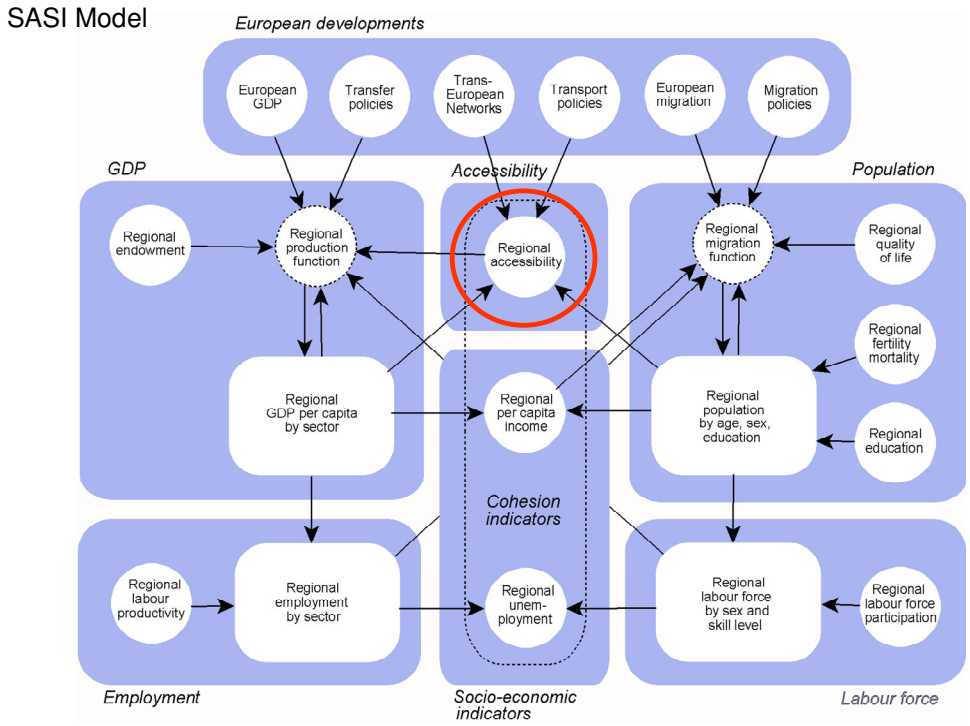
The impacts are assessed with the support of the SASI model. The SASI model is a recursive-dynamic simulation model of socio-economic development of 1330 regions in Europe. The model was developed to assess socio-economic and spatial impacts of transport infrastructure investment and transport system improvements. Is has been applied and validated in several large EU projects including the IASON and ESPON projects.

The SASI model differs from other forecasting models of regional development by modelling not only production (the demand side of labour markets) but also population (the supply side of labour markets). Regional production by industry is forecast by regional production functions containing production factors capital, labour, regional

endowment and accessibility. Regional population is forecast by a demographic model including fertility, mortality and migration.

The SASI model is specifically relevant for projects that serve a function on a European level (e.g. the TEN projects). Such projects cannot be adequately evaluated using traditional cost-benefit analysis on a national scale, since they are less able to capture the international effect and the indirect effects occurring in non-transport sectors[6].

Figure 7.1 Main structure of the SASI model



The reference network

To assess the impacts of new transport investments a reference scenario has been prepared. This mainly implies an adjustment of the transport network in the SASI model[7]. The dynamic network database of SASI is based on highly detailed pan-European transport networks with respect to:

- Roads (including short-sea shipping)
- Rail (including ferries)
- Air (including regional airports).

Network calculations are based on travel times or generalised costs including border waiting times and (political, economic cultural and language) barriers.

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6 See e.g. Rothengatter, The relevance of Transeuropean Transport Networks for Integration and Growth in the Extended European Union.

7 Which relies on the trans-European transport network database developed by IRPUD (2003) and now maintained and further developed by RRG (2005)

The reference network has been updated based on the most recent information from the countries on implementation schedules and alignment with respect to TEN and national transport projects (also information on toll is included). The reference network includes all projects that are already under construction and will be operational in 2007 at the latest.

In addition, the reference scenario assumes the further development of the European integration with the accession of Bulgaria and Romania to the European Union in 2007. Further European integration results in reductions in waiting times and lower barriers between countries.

7.3 Scenario

As indicated, the road projects that could be included in the priority projects are all intraregional and cannot be modelled with the SASI model. The only projects for Malta that affect the travel times and travel costs between Malta and the rest of Europe are the improvements of passenger terminals and container ports in its port cities Valletta, Cirkewwa and Mgarr.

Therefore only one policy scenario has been modelled with the SASI model for Malta. The scenario assumes effects of the port projects and estimates the resulting impact on the three types of indicators. This **Port** Scenario assumes that:

- the travel times of passenger and lorry ferries between the Sicilian ports Licata, Pozzallo and Catania and the ports of Valletta, Cirkewwa and Mgarr on Malta are reduced by 30 minutes through the improvement of passenger terminals
- the container transshipment times in the port of Valletta are reduced by one hour through improvements of the container facilities.

It should be stressed that whether such reduction can indeed be realised with the projects has not been studied in detail. The following impact assessment, therefore, should be seen as a possible result of investments in ports.

7.4 Impact assessment

The impacts of the Port Scenario are measured as differences between the Port Scenario and Reference Scenario in 2031. These impacts are evaluated with respect to the strategic objective of economic competitiveness (efficiency) only.

The following indicators have been identified to describe the impact on the economic efficiency objective:

Table 7.1 Strategic objective economic competitiveness and related indicators

Objective	Indicator	Level
Economic competitiveness	Average speed of interregional road trips (kph)	National, regional average
	GDP per capita (Euro)	National, regional average

It should be realised that these spatial impacts are long term effects, as:

- Location decision of firms result in changes in economic activity and employment only after some time;
- Secondary effects of economic activity (i.e. attraction of other firms) take even longer.

This is accounted for in the SASI model by time delays of one to five years. In order to take due account of the long-term spatial impact of transport infrastructure investments in the period 2007-2013, the target year for the model simulations is set at 2031.

Table 7.2 presents the impacts of the port improvements on the above indicators. For each indicator the table shows the value of the indicator in 2006 and the indicators values of the Reference Scenario and the Port Scenario in 2031. The numbers in italics are the differences between the indicator values of the Port Scenario compared with those of the Reference Scenario in 2031 in percent.

Table 7.2 Strategic objectives and related indicators (2031 impacts)

Objective	Indicator		Scenarios	
			Reference	Port
		2006	2031	2031
Economic competitiveness	Average speed of inter-regional road trips (kph)	29.2	29.3	30.7 *+4.7%*
	GDP per capita (Euro)[8]	10,677	21,657	21,725 *+0.3%*

Table 7.2 indicates that the economic impacts of the Port Scenario on Malta are not very large, but also not negligible. The port improvements of the Port Scenario increase the average income in Malta by up to 70 Euro per capita per year.

Figure 7.2 shows the spatial distribution of GDP per capita in 2031. Because of the general growth in GDP per capita, a different colour scale than in Figure 3.2 had to be used. It can be seen that Malta's GDP per capita is still lower than that of regions in southern Italy.

Figure 7.3 shows the effects of the Port Scenario on GDP per capita as percentage differences in GDP per capita between the Port Scenario and the Reference Scenario. The more intense the green shade, the higher the impact. The positive effects of the port improvements also benefit regions in Sicily and southern Italy.

[8] The GDP per capita value for 2006 is not an official statistic but a result of the SASI model based on regional GDP per capita statistics for 2001 by Eurostat. Regional GDP is forecast in the SASI model in terms of international exchange value; in purchasing power standards all GDP figures for Malta would be higher.

Figure 7.2 GDP per capita (in 1,000 Euro 2005), Reference Scenario, 2031

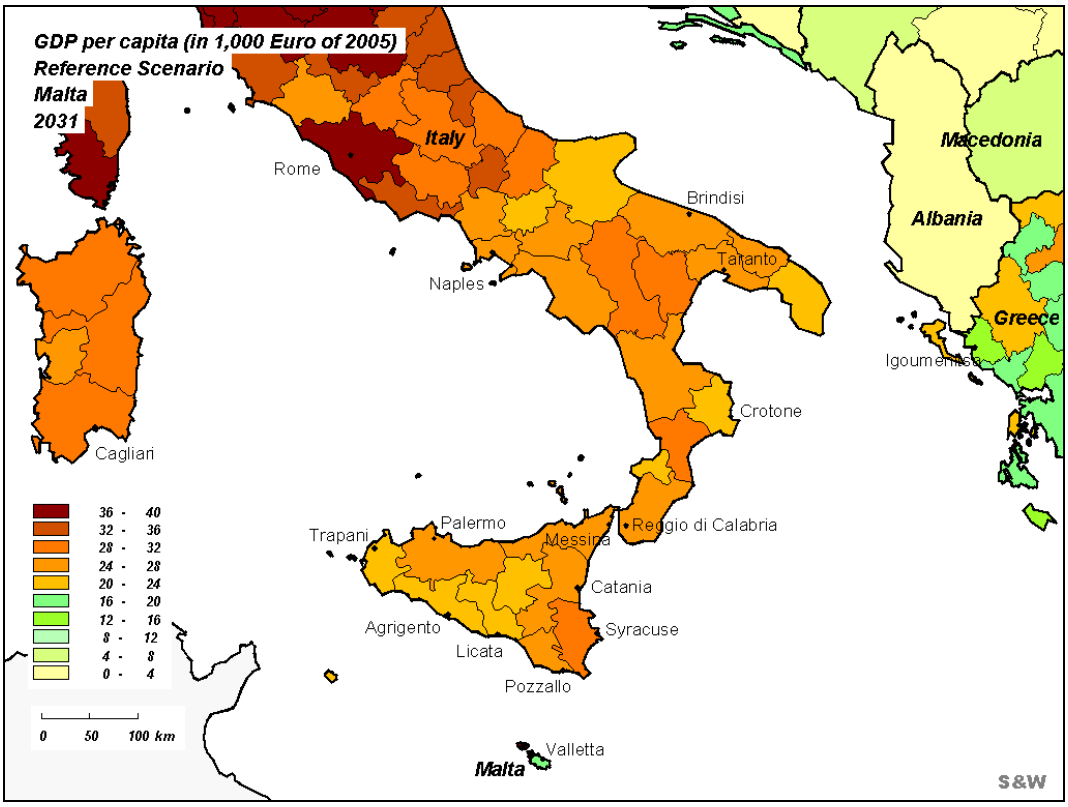
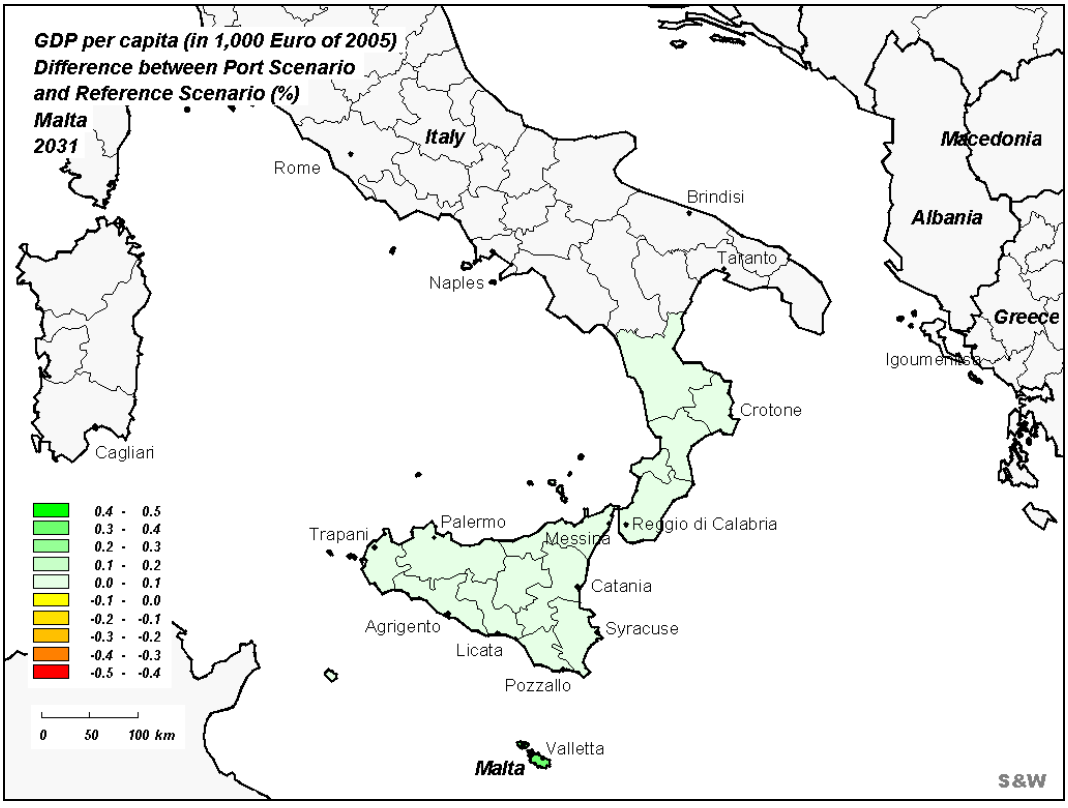


Figure 7.3 Impact on GDP per capita, Port Scenario, 2031



Finally the impacts of the policy scenarios on the composite Accessibility Problem Index Road (see Chapter 3) are shown to examine to what extent the transport projects contribute to solving the accessibility problems identified in the red-flag analysis. As it was noted in Chapter 3, road accessibility in Malta is much lower than the European average due to its island character (Figure 3.4). Table 7.3 summarises the effects of the Port scenario on the Accessibility Problem Index Road from a European perspective: index values above one indicate accessibility problems, whereas index values below one indicate above-average performance.

Table 7.3 Accessibility Problem Index, Malta, 2031

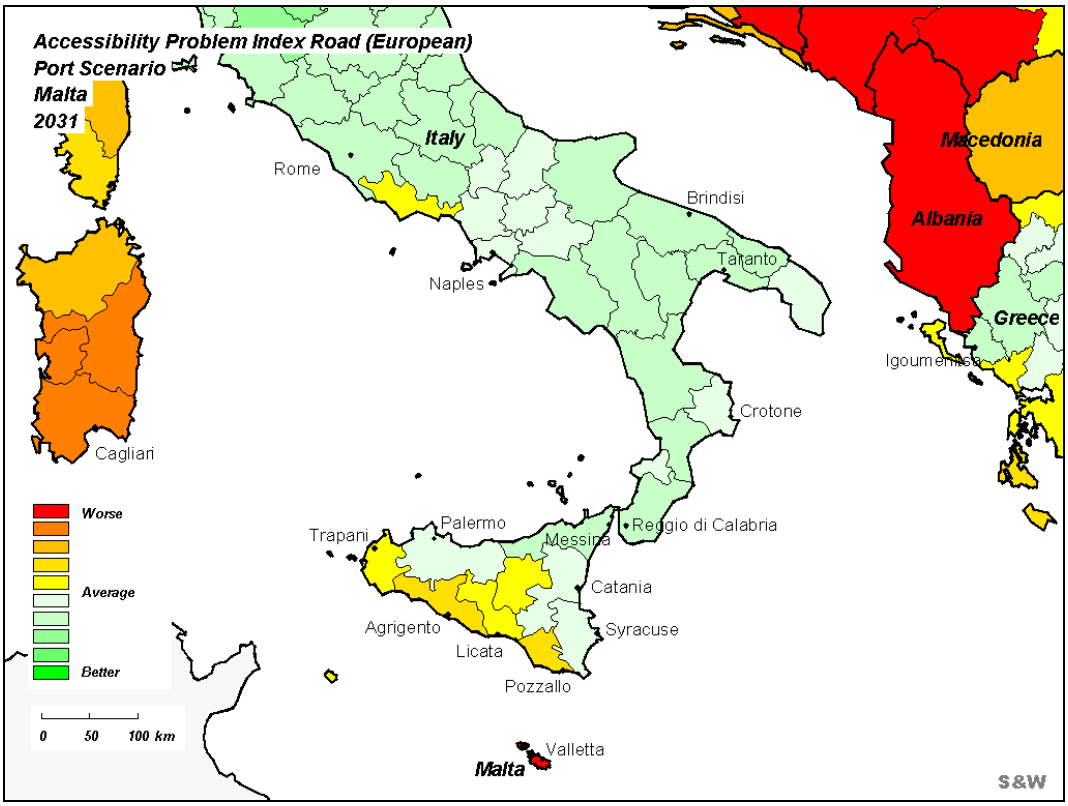
Mode	Level		Scenarios	
			Reference	Port
		2006	2031	2031
Road	European	1.880	1.797	1.701 *-5.3%*

The high value of the problem index in 2006 reflects the insular isolation of Malta. There is a significant improvement in road accessibility between 2006 and 2031 already in the Reference Scenario, through the effects of European integration in the form of reduced waiting times and other barriers. There is a significant further improvement through the port improvements in the Port Scenario. However, the final value of the problem index signals that the accessibility of Malta remains very poor compared to the European average.

Figure 7.4 shows the Accessibility Problem Index Road 2031 in the Port Scenario from a European perspective. The comparison with Figure 3.3 shows that accessibility has improved in many regions in Italy. This is mainly due to the ongoing European integration, which has led to shorter border waiting times and reduced trade barriers. However, despite the port improvements, European road accessibility of Malta remains much below the European average.

The small effect of the reductions in travel time through the port improvements is no surprise. The average travel time by car or lorry between Malta and central Europe, including ferry or short-sea shipping, is in the range of 33 hours. Even from central and northern Italy it is about 22 hours. Compared to these long travel times, a time saving of 30 minutes for ferries and one hour for short-sea shipping is not a great change.

Figure 7.4 Accessibility Problem Index Road (European perspective), Port Scenario, 2031



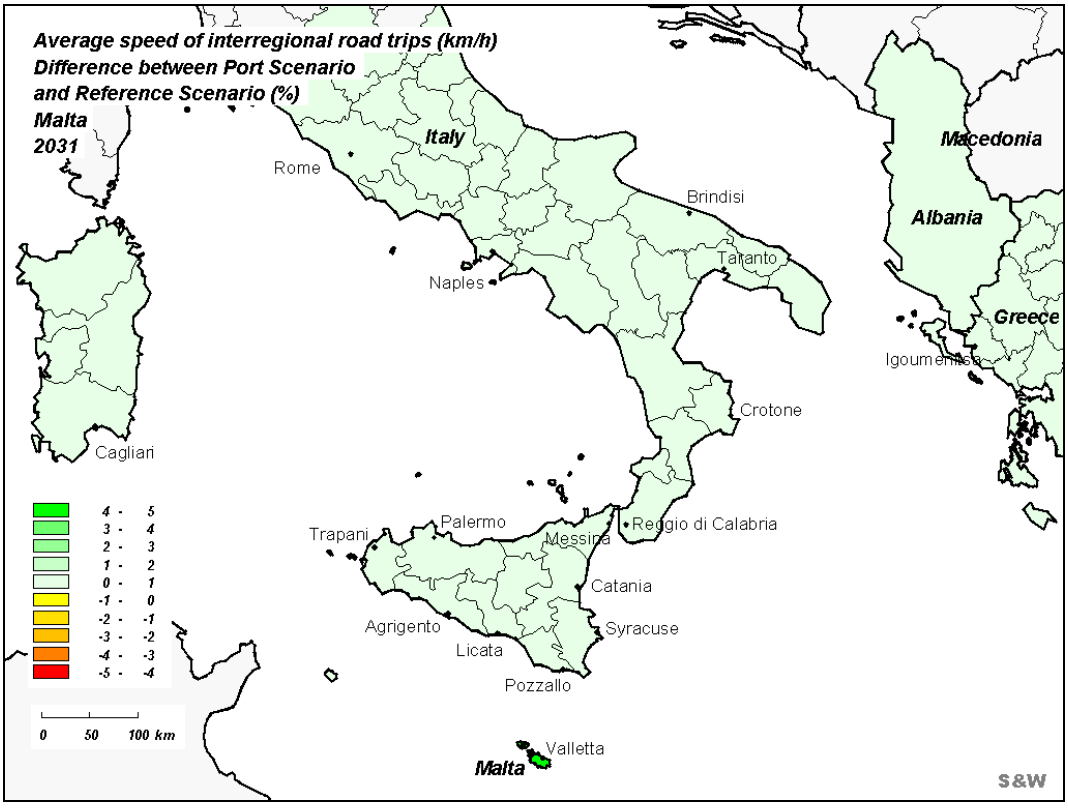
7.5 European effects

The effects of transport infrastructure improvements are not confined to the country in which the construction work actually occurs, but reach across borders into neighbouring countries. The SASI model forecasts these effects.

The following map (Figure 7.5) demonstrates this, using average interregional road speed as example. The map is again a difference map showing the percent difference in average interregional road speed between the Port Scenario and the Reference Scenario: the darker the green the larger the difference. The impacts of the port improvements in Malta on average interregional road speed, though marginal, spread into Sicily, Sardegna, southern Italy, Greece and the Balkan countries.

Figure 7.3 already showed the European effect for GDP per capita. In this case the European effects appeared lower as the effects of the port improvements in Malta on regional GDP per capita are confined to Sicily and Calabria.

Figure 7.5 Average speed of interregional road trips: European impacts, Balanced Scenario, 2031



8 Conclusions on investment priorities

8.1 Introduction

Based on the previous analysis the main areas for transport investments that would merit EU funding in the period 2007-2013 have been identified. It should be emphasized that this is based on an analysis that has been carried out at **strategic level**. Although the areas identified are expected to result in high potential projects, they should still be subjected to the regular **cost-benefit analysis at a project level** before being finally selected.

8.2 Transport investment priorities 2007-2013

The identified priority areas are described per sub-sector. These sub sectors are assessed on a number of criteria:

Table 8.1 Priority areas for investment

Sub sector	Cost-effectiveness	Accessibility	Sustainability	Territorial Cohesion	Safety	Other sources of finance
Roads:						
- completion missing sections motorway network (port and airport connections TINA network)	+	+	-	0	0	0
- reconstruction / maintenance regional roads (Gozo and Malta)	+	+	-	0	0	+
Ports						
- developing motorway of the Sea	+	0	0	0	0	0
- sea link connections of Mgarr port (Gozo)	+	0	0	0	0	+
- upgrading quays/ wharfs Valetta	+	0	0	0	0	+
Urban Transport						
- promotion urban public transport system (road safety, charge system, quality public services)	0	0	+	0	+	+

Legend: + positive score; 0 neutral score; - negative score on criterion

Roads

Malta needs a further expansion of the primary road network with connections and links to the ports and airport. The upgrading and construction of highways to and from the ports in Valetta (Grand Harbour and Passenger terminal), Marsaxlokk (Malta Freeport), Mgarr and the airport in Luqa are important for its international connections. Priority is recommended with respect to completing the missing links in the motorway network.

Also the government of Malta should be focused on the maintenance of the regional roads and improve the accessibility between the regions. For the regional projects and also for some national projects, it is not expected that traffic volume fully merit these investments in the coming programming period. This should be revealed by cost-benefit analyses. Priority in the main network will only have impact on the economy of Malta itself. The program of the road network can be financed under CF/ERDF conditions.

Ports

A main objective of the Malta Government is the development of Valetta port and Marsaxlokk port as safe and efficient places for transporting goods (containers) and passengers within the framework of inter-European transport networks. The goal for the international ports is to remove any bottlenecks through improved handling facilities and to organise better the use of the port area. In Valetta port the development of the Wharf areas for logistic and cruise activities should be performed within an integrated vision on the area (quay, water, logistic centers, port equipment and facilities and hinterland infrastructure). The development of the port of Valetta could be financed under PPP construction. The expansion of the terminals of the Malta Freeport in Marsaxlokk is also a private and public partnership.

Domestic ports are currently being re-developed to increase the capacity of ferry services between Malta and Gozo. Investments in the accessibility to and from the port of Mgarr in Gozo by upgrading infrastructure will improve the services offered by the sea link connections for passengers and freight between Malta and Gozo.

Malta is actively participating in the priority project ‘Motorway of the Sea’. The positive effects of the port improvements can also benefit regions in Sicily and Southern Italy. Although the impact of the port investments is small in terms of reductions in travel time, for Malta the ports are the gateways to Europe.

Urban transport

The improvement of the public passenger transport system in Malta is needed and one of the highest priorities in transport policy. Despite the measures taken (like Valetta charging Scheme), the increase of car ownership continued and urban areas are highly congested. In order to encourage the modal shift from cars to public transport, the Government will reform the public transport operations and services and introduce new technology to improve bus service reliability and passenger information and the provision of quality public transport infrastructure for passengers. Also the introduction of higher road charges for access to Valetta is planned. The Government of Malta is also aiming to reduce road accidents fatalities by 50% in 2015. The program for measures in the field of urban transport can be possibly financed under EBRD conditions.

Annex A: TEN-T priorities

Table A.1. TEN priority projects and major Swiss projects

No.	TEN project	Completion
1	Railway axis Berlin-Verona/Milan-Bologna-Naples-Messina-Palermo	2015
	- Halle/Leipzig-Nurnberg (2015)	
	- Nurnberg-Munich (2006)	
	- Munich-Kufstein (2015)	
	- Kufstein-Innsbruck (2009/2012)	
	- Brenner tunnel (2015)	
	- Verona-Naples (2007)	
	- Milan-Bologna (2008)	
	- Rail/road bridge over the Strait of Messina-Palermo (2015)	
2	High-speed railway axis Paris-Brussels/Brussels-Cologne-Amsterdam-London	2007
	- Channel tunnel-London (2007)	
	- Brussels/Brussels-Liege-Cologne (2007)	
	- Brussels/Brussels-Rotterdam-Amsterdam (2007)	
3	High-speed railway axis of south-west Europe	2015
	- Lisbon/Porto-Madrid (2015), including:	
	- Lisbon-Porto (2013)	
	- Lisbon-Madrid (2010)	
	- Aveiro-Salamanca (2015)	
	- Madrid-Barcelona-Figueras-Perpignan (2009)	
	- Perpignan-Montpellier (2009)	
	- Montpellier-Nimes (2015)	
	- Madrid-Vitoria-Irún/Hendaye (2010)	
	- Irún/Hendaye-Dax (2015)	
	- Dax-Bordeaux (2020)	
	- Bordeaux-Tours (2015)	

No.	TEN project	Completion
4	High-speed railway axis east	2007
	- Paris-Baudrecourt (2007)	
	- Metz-Luxembourg (2007)	
	- Saarbrücken-Mannheim (2007)	
5	Betuwe line	2006
6	Railway axis Lyon-Trieste-Divača/Koper-Divača-Ljubljana-Budapest-Ukrainian border	2018
	- Lyon-St Jean de Maurienne (2015)	
	- Mont-Cenis tunnel (2018)	
	- Bussoleno-Turin (2011)	
	- Turin-Venice (2011)	
	- Venice-Ronchi Sud-Trieste-Divača (2015)	
	- Koper-Divača-Ljubljana (2012)	
	- Ljubljana-Budapest (2015)	
7	Motorway axis Igoumenitsa/Patra-Athens-Sofia-Budapest	2010
	- Via Egnatia (2006)	
	- Pathe (2008)	
	- Sofia-Kulata-Greek/Bulgarian border (2010)	
	- Nadlac-Sibiu motorway (branch to Bucharest and Constanza) (2007)	
8	Multimodal axis Portugal/Spain-rest of Europe	2015
	- Railway La Coruña-Lisbon-Sines (2009)	
	- Railway Lisbon-Valladolid (2015)	
	- Railway Lisbon-Faro (2006)	
	- Lisbon-Valladolid motorway (2010)	
	- La Coruña-Lisbon motorway (2005)	
	- Seville-Lisbon motorway (completed 2001)	
	- New Lisbon airport (2015)	
9	Railway axis Cork-Dublin-Belfast-Stranraer	completed 2001
10	Malpensa Airport	completed 2001
11	Öresund fixed link	completed 2001

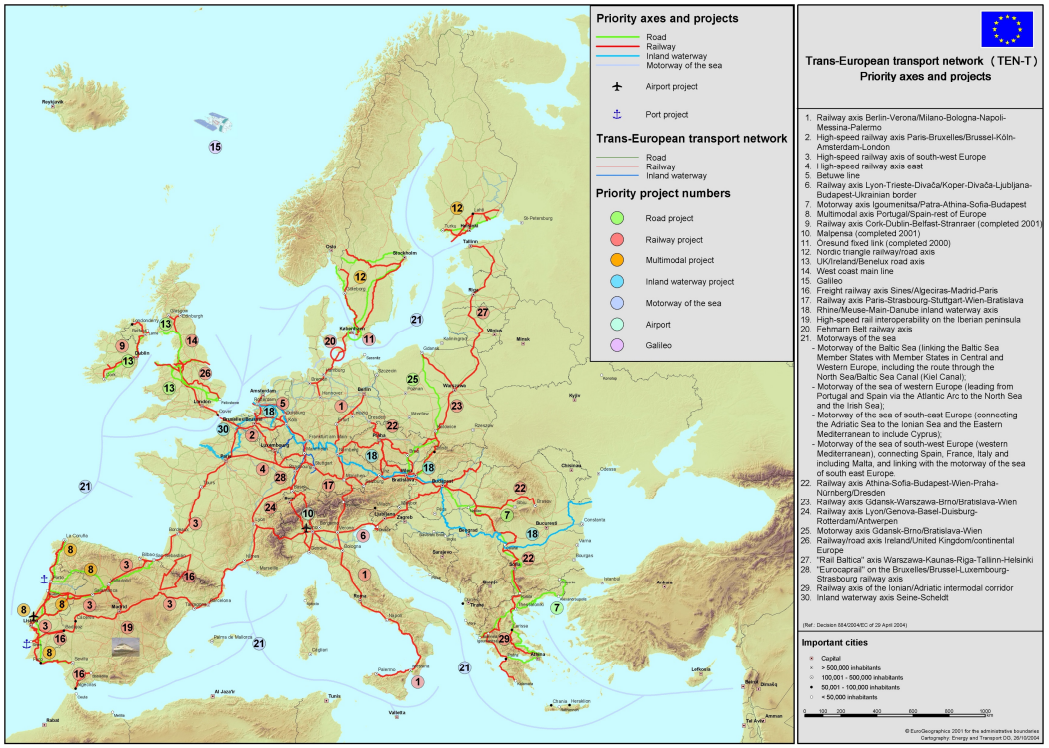
No.	TEN project	Completion
12	Nordic triangle railway/road axis	2015
	- Road and railway projects in Sweden (2015)	
	- Helsinki-Turku motorway (2009)	
	- Railway Kerava-Lahti (2006)	
	- Helsinki-Vaalimaa motorway (2015)	
	- Railway Helsinki-Vainikkala (Russian border) (2015)	
13	UK/Ireland/Benelux road axis	2013
14	West coast main line	2008
15	Galileo (not included in reference scenario, only mentioned here for consistency)	2010
16	Freight railway axis Sines/Algeciras-Madrid-Paris	2020
	- New high-capacity rail axis across the Pyrenees (2020)	
	- Railway Sines-Badajoz (2010)	
	- Railway line Algeciras-Bobadilla (2010)	
17	Railway axis Paris-Strasbourg-Stuttgart-Vienna-Bratislava	2015
	- Baudrecourt-Strasbourg-Stuttgart (2015)	
	- Stuttgart-Ulm (2012)	
	- Munich-Salzburg (2015)	
	- Salzburg-Vienna (2012)	
	- Vienna-Bratislava (2012)	
18	Rhine/Meuse-Main-Danube inland waterway axis	2019
	- Rhine-Meuse (2019)	
	- Lanaken lock (2011)	
	- Vilshofen-Straubing (2013)	
	- Wien-Bratislava (2015)	
	- Palkovicovo-Mohács (2014)	
	- Bottlenecks in Romania and Bulgaria (2011)	
19	High-speed rail interoperability on the Iberian peninsula	2020
	- Madrid-Andalusia (2020)	
	- North-east (2020)	
	- Madrid-Levante and Mediterranean (2020)	
	- North/North-west corridor, including Vigo-Porto (2020)	
	- Extremadura (2020)	

No.	TEN project	Completion
20	Fehmarn Belt railway axis	2015
	- Fehmarn Belt fixed rail/road link (2015)	
	- Railway for access in Denmark from Öresund (2015)	
	- Railway for access in Germany from Hamburg (2014	
	- Railway Hannover-Hamburg/Bremen (2015)	
21	Motorways of the sea	2010
	- motorway of the Baltic Sea (2010)	
	- motorway of the sea of western Europe (2010)	
	- motorway of the sea of south-east Europe (2010)	
	- motorway of the sea of south-west Europe (2010)	
22	Railway axis Athens-Sofia-Budapest-Vienna-Prague-Nürnberg/Dresden	2017
	- Railway Greek/Bulgarian border-Kulata-Sofia-Vidin/Calafat (2015)	
	- Railway Curtici-Brasov (towards Bucharest and Constanta) (2013)	
	- Railway Budapest-Vienna (2010)	
	- Railway Břeclav-Prague-Nürnberg (2016)	
	- Railway axis Prague-Linz (2017)	
23	Railway axis Gdansk-Warsaw-Brno/Bratislava-Vienna	2015
	- Railway Gdansk-Warsaw-Katowice (2013)	
	- Railway Katowice-Břeclav (2010)	
	- Railway Katowice-Zilina-Nove Mesto n.V. (2015)	
24	Railway axis Lyons/Genoa-Basel-Duisburg-Rotterdam/Antwerp	2018
	- Lyon-Mulhouse-Mülheim (2018)	
	- Genoa-Milan/Novara-Swiss border (2013)	
	- Basel-Karlsruhe (2015)	
	- Frankfurt-Mannheim (2015)	
	- Duisburg-Emmerich (2015)	
	- 'Iron Rhine' Rheidt-Antwerp (2010)	
25	Motorway axis Gdansk-Brno/Bratislava-Vienna	2013
	- Gdansk-Katowice motorway (2011)	
	- Katowice-Brno/Zilina motorway (2010)	
	- Brno-Vienna motorway (2013)	

No.	TEN project	Completion
26	Railway/road axis Ireland/United Kingdom/continental Europe	2020
	- Ireland road/rail modernisation (2010)	
	- Road/railway axis Hull-Liverpool (2020)	
	- Railway Felixstowe-Nuneaton (2014)	
	- Railway Crewe-Holyhead (2012)	
27	Rail Baltica axis Warsaw-Kaunas-Riga-Tallinn-Helsinki	2018
	- Warsaw-Kaunas (2010)	
	- Kaunas-Riga (2014)	
	- Riga-Tallinn (2018)	
28	Eurocaprail on the Brussels-Luxembourg-Strasbourg railway axis	2013
	- Brussels-Luxembourg border (2012)	
	- Luxembourg- French border (2013)	
29	Railway axis of the Ionian/Adriatic intermodal corridor	2014
	- Kozani-Kalambaka-Igoumenitsa (2012)	
	- Ioannina-Antirrio-Rio-Kalamata (2014)	
30	Inland waterway Seine-Scheldt	2016
	- Navigability improvements Deulemont-Gent (2016)	
	- Compiègne-Cambrai (2016)	
CH1	Gotthard axis	2015
	- Zimmerberg tunnel (2011)	
	- Gotthard tunnel (2015)	
	- Ceneri tunnel (2015)	
CH2	Lötschberg tunnel	2015

Source: EC (2005) Trans-European transport network: TEN-T priority axes and projects 2005; Spiekermann & Wegener (Swiss projects)

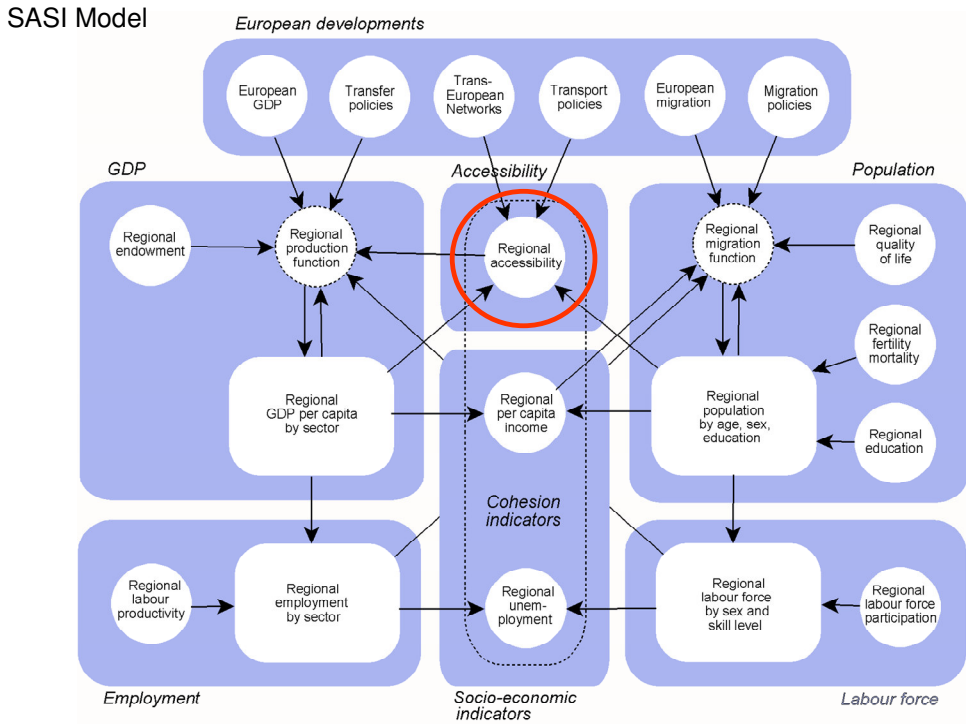
Figure A.1. The TEN priority projects



Annex B: Accessibility "red flag" analysis

To determine the need for transport investments, the SASI model was used to assess the present and future situation of the road and rail systems in each country without the national transport projects to be examined later. For this the accessibility provided by the road and rail systems in each country was evaluated from both a national and a European perspective in order to identify regions with serious accessibility deficits that should be addressed by European transport policy taking account of the stated EU goals competitiveness and territorial cohesion. In the SASI model accessibility, which is directly influenced by transport policy and investments, is judged to play a crucial role in promoting the realisation of the cohesion objectives.

Figure B.1 Main structure of the SASI model



To determine the appropriate assessment of transport investment need from the cohesion policy perspective an agreement on the indicator of accessibility to be used is required. Traditional accessibility indicators are not useful for this. They measure the total effect of both geographical location (periphery v. core) and quality of transport provided by the transport system and so always show a steep gradation in accessibility from the core to

the periphery. However, public policy cannot change the fact that some regions are central and some are peripheral, i.e. provide the same level of accessibility to all regions. Public policy can only alleviate disadvantages through unequal transport provision.

This distinction is relevant for European transport policy. To invest only in transport in the most peripheral regions with the lowest accessibility according to such an indicator would benefit only the relatively few people living there and would ignore the needs of the densely populated central regions to combat traffic congestion and so endanger the competitiveness goal of the Lisbon Strategy of the European Union. On the other hand, to invest only in transport in the most densely populated central regions with the greatest congestion problems would not only lead to ever more traffic but also widen the existing gap in accessibility between the central and peripheral regions and would so run counter to the territorial cohesion goal of the European Union.

To avoid this dilemma, a new accessibility indicator was defined which distinguishes between geographical location and quality of transport. This indicator assumes that people in the peripheral regions cannot expect to enjoy the same level of accessibility (measured in traditional terms) as the central regions but that they can demand to be able to reach relevant destinations with the same travel speed ("as the crow flies") as the people in the central regions. In addition the indicator recognises the utilitarian principle of the happiness of the greatest number, i.e. that the transport needs of densely populated regions should be given more weight than those of regions with only few inhabitants. And finally, the indicator recognises that economically lagging regions with severe deficits in accessibility may offer greater potential for stimulating economic effects by transport investments than regions which enjoy already high accessibility.

These three principles avoid the pitfalls of both an extreme egalitarian view, which postulates that all regions in Europe enjoy the same level of accessibility and a purely efficiency-oriented view which postulates that accessibility in the already highly accessibly central metropolitan areas should be further strengthened because they bring the largest economic benefits. In other words, the three principles aim at a rational trade-off between the stated EU goals of competitiveness and territorial cohesion.

The Accessibility Problem Index

The indicator to be developed should have a number of properties to make it easy to understand and communicate to policy makers and stakeholders:

- It should be a "problem indicator", i.e. high values should indicate large deficiencies in regional accessibility, whereas low values of the indicator indicate above-average levels of accessibility.
- It should be standardised in order to be comparable between regions and countries, i.e. should not reflect the size or affluence of regions or countries.
- It should be independent of the arbitrary or historically subdivision of the territory into regions, i.e. its magnitude should not change if a region is subdivided into two or more regions or if two or more regions are consolidated to one region.
- It should be scalable, i.e. it should be possible to vary the impact of the weighting by population and inverse GDP to reflect different political priorities.

- It should allow to measure the development of accessibility over time.

Based on these requirements, an indicator called Accessibility Problem Index was developed. The calculation of the Accessibility Problem Indicator proceeds in three steps:

Average regional airline speed

The first step in the development of the Accessibility Problem Index is the calculation of average regional airline speed. Average airline speed v_{rm} of all trips f_{rsm} from a region r to all other regions s in Europe by mode m in year t is defined as

$$v_{rm}(t) = \frac{\sum_s P_s(t) \exp\left[-\beta f_{rsm}(t)\right] d_{rs}}{\sum_s P_s(t) \exp\left[-\beta f_{rsm}(t)\right] c_{rsm}(t)/60} \quad (1)$$

where $P_s(t)$ is regional population in year t, $c_{rsm}(t)$ is travel time in minutes between regions r and s by mode m in year t, β is the impedance parameter and d_{rs} is airline distance in km between the central cities in regions r and s calculated from their geographical coordinates x_r, y_r and x_s, y_s by

$$d_{rs} = \sqrt{(x_s - x_r)^2 + (y_s - y_r)^2} \quad (2)$$

Standardisation

Next average regional airline speed, regional population and regional GDP are standardised as fractions of the average of all regions in the country (national perspective) or the average of all regions in Europe (European perspective). To neutralise the effect of region size, population is replaced by population density and GDP is replaced by GDP per capita. The benchmark for the standardisation of average regional airline speed is always the average of the base year t_0 = 2006 to show changes in accessibility:

$$v'_{rm}(t) = \frac{v_{rm}(t) \sum_r P_r(t_0)}{\sum_r v_{rm}(t_0)\, P_r(t_0)} \quad (3)$$

$$p'_r(t) = \frac{P_r(t) \sum_r A_r}{A_r \sum_r P_r(t)} \quad (4)$$

$$g'_r(t) = \frac{G_r(t) \sum_r P_r(t)}{P_r(t) \sum_r G_r(t)} \quad (5)$$

where A_r is the area of region r and $G_r(t)$ is the GDP of region r. The $v'_{rm}(t)$, $p'_r(t)$ and $g'_r(t)$ then are the relative airline speed, relative population density and relative GDP per capita of region r in year t, respectively. Values below one indicate below-average airline

speed, population density and GDP per capita and values above one indicate above-average airline speed, population density and GDP per capita of the region.

Index

With these relative indicators, the Accessibility Problem Index $q_{rm}(t)$ of region r by mode m in year t can be formulated:

$$q_{rm}(t) = \left[v'_{rm}(t)\right]^{-1} \left[p'_r(t)\right]^{\alpha} \left[g'_r(t)\right]^{-\gamma} \quad (6)$$

where α and γ are weights indicating the relative importance of population density and GDP per capita, respectively. Note that average regional airline speed and GDP per capita have negative weights, i.e. the Accessibility Problem Index expresses deficits in average regional airline speed relative to the national or European average weighted by population and economic weakness. The index has the following properties:

- The higher the index the more severe is the deficiency in accessibility.
- The influence of weights of population density and GDP per capita can be changed by changing α and β: values below one imply less influence, zero no weighting.
- Regions with average airline speed, population density and GDP per capita have an index value of one.
- Index values are independent of region size and are therefore comparable between regions and countries.
- The index shows improvements in airline speed over time (and not only relative shifts between regions).

Sensitivity tests with different values of α and γ showed that $\alpha = \gamma = 0.05$ gave the most plausible results and a reasonable level of responsiveness of the Accessibility Problem Index to changes of accessibility due to European integration and European transport projects over time.

The application of the Accessibility Problem Index for the evaluation of accessibility deficits in the country policy briefs use these values of α and γ throughout. The regions analysed were the NUTS-3 regions or equivalent regions in the 25 countries of the European Union plus the accession countries Bulgaria and Romania. The overseas regions of France and the island regions of the Azores and Madeira of Portugal and the Canary Islands of Spain were excluded from the analysis.

The spatial distribution of the resulting values of the Accessibility Problem Index are presented in maps using a colour scale resembling that of a traffic light: green shades indicate average regional travel speeds above the national or European average, yellow values indicate speeds slightly above the national or European average and red shades indicate speeds significantly lower than the national or European average. Regions shaded in red are the targets of the "red-flag" analysis.

For each country first for road and then for rail the national and the European perspective are presented for the current situation (2006) and for 2016. The situation in 2016 is based

on a base scenario of the SASI model without the national projects, i.e. only with the TEN priority road and rail projects and selected transport projects in Switzerland. The assumed opening times of the individual projects are those of the 2004 TEN guidelines (European Union, 2004) which in a few cases differ from the dates notified by the individual countries (European Commission, 2005).

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