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Transport sector research environment in Montenegro

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1. Purpose of the national background report and methodology/summary of the consultation process

The aim of this report is to provide a short overview of the current situation in Montenegrin transport sector with its Research & Development (R&D) environment. This report is a country-specific synthesis of the available statistical information. The main source of information was various public available documents, presented on official webpages of governmental institutions, research institutions, universities, private and public companies in the field of transport. The most statistical data were collected from Montstat (Montenegrin Statistical Office) and Ministry of Maritime Affairs, Transportation and Telecommunication. Interviews and questionnaires were performed in order to identify key elements of transport research position in Montenegro. At the end, transport research, strengths, weaknesses, opportunities and threats were identified, together with transport research priorities for Montenegro.

2. The Transport S&T system in Montenegro

2.1 The Montenegrin Transport policy framework

2.1.1 The overall Transport policy framework

Modern, functional, rational and efficient transport system is a prerequisite for faster economic development. Development and quality of transport networks, its technical condition and availability of the means of transportation can be taken as a reliable measure of economic development and the standard of living of the population.

Ministry of Maritime Affairs, Transportation and Telecommunication is responsible for transport policy. It has set 6 general strategic goals (2008) for development of transport sector, which corresponds to real needs and possibilities of the Montenegro. Bearing in mind the key commitment is integration into the European Union, transport strategy is coordinated with the European transport policy and study of regional transport infrastructure in the Balkans (REBIS).

Next are the main strategic goals:

GOAL 1 - Safe and secure transport;

Transport system in Montenegro will be developed to ensure a secure and safe transport for all participants, the goods and the environment.

- Safe and secure transport in all sectors.
- Ensuring transparent use of funds for transportation infrastructure.
- Achieving financial sustainability and, in the sectors where it is possible, achieving self-sustainable transport infrastructure.

GOAL 2 - Quality and responsible maintenance of transport infrastructure;

Transport system in Montenegro will be developed in a way that will monitor the quality maintenance of transport infrastructure.

- Quality and responsible maintenance of transport infrastructure.
- Shorter time of travel to the most important economic distances in Montenegro.

GOAL 3 - Effective transportation;

Transport system in Montenegro will be developed in a way to be effective.

- Efficient and effective system of state institutions.
- Privatized public enterprises that provide transport services.
- Commercialization of activities that follow the maintenance and construction of transportation infrastructure.
- Responsible use of transport infrastructure.

GOAL 4 - Economic development;

Transportation system in Montenegro will be developed so it can contribute to the economic development.

- Functional and modern traffic economy able to face competition in the region.
- Maximizing development potential of different regions in Montenegro through the improvements of transport services.

GOAL 5 – Environmental protection;

Transport system in Montenegro will be developed to minimize the negative impacts of traffic on the environment.

- Preserved area of Montenegro, protected environment of the negative impact of traffic.

GOAL 6 – Integration of Montenegro into the European Union;

Transport system in Montenegro will be developed to facilitate integration into the European Union.

- Stimulant legal and institutional framework for the functioning and development of transport system.
- Montenegro's transport network integrated into the Trans-European transport network.

These general goals, arranged by transport sectors are defined as follows:

Railway: Providing a secure and safe transport in the whole railway network, to put an end to the critical point at which the transfer slowed due to poor technical conditions on the railway; restructure railway, coordinate activities with the railways of Montenegro and prevent further decay of the network. Promote international traffic on the Bar-border with Montenegro route and fight for the inclusion of railway Bar-Belgrade into Trans-European transport network; ensure intensification of transport between Podgorica - border with Albania; attract new carriers.

Roads and road traffic: Providing high-quality use, management, maintenance, reconstruction and construction of road network in order to increase the efficiency of traffic, improving safety, security, and reducing the number of traffic accidents. Regulate the road traffic in accordance with international standards and to create adequate conditions for the suppression of the gray economy in this sector. Achieving conditions for the integration of traffic in Montenegro into TEN-T.

Civil aviation: Implementation of required standards in this segment, to form the legal framework in terms of raising the safety and security standards, to provide capacity development and quality service in the acceptance of passengers through the concept of "Open Skies" and through the implementation of multilateral and horizontal agreements in the field of air traffic, to complete separation of functions of infrastructure, air authorities, air traffic regulators and air traffic control.

Maritime: Rising security and safety of waterways in territorial waters to the level of international standards, functioning of the Directorate for maritime security, Office for rescue and search at sea, Office for environmental protection of sea, revitalize maritime economy, develop a maritime line traffic and increase attractiveness of port of Bar, separate management of infrastructure from the commercial operations at the port, restructuring port's economy, privatize some functions at the port, provide the conditions for greater participation of private capital in shipping.

2.1.2 The elements of Transport research policy making

The government of Montenegro is fully aware of the importance of science and technology and, accordingly, established a strategy for scientific research.

In 2005, Montenegro introduced Law on Scientific-Research Activities (Official Gazette of Montenegro, No.71/2005) which has become the most important legislation in this area. According the Law the National Council for Scientific-Research Activities was established. Also, the Strategy for Scientific-Research Activities was prepared which defines annual budgetary increase, as a % of GDP, allocated to R&D until 2016. Under this law, the Strategy for Scientific-Research Activity should determine the following: priorities in scientific-research activity; indicative amount of resources for funding priorities; financial resources plan, the need for scientific-research infrastructure and the system of scientific informing. Strategy needs to be implemented during the period of eight years 2008-2016.

The most important bodies that are in charge for science and research activities, according the Law, are: Academies, Universities, other institutions in area of high education, research institutes and other private and public institutions.

Apart from the Law on Scientific-Research Activity the Law on Montenegrin Academy of Sciences and Arts («Off. Journal of RoM«, No 24/93, 30/94) and the Higher Education Law («Off. Journal of RoM«, No 60/2003) are of particular importance, as well as a number of strategic documents of Montenegro such as Development directions of Montenegro as an Ecological State, National Strategy of Sustainable Development of Montenegro, Physical Plan of Montenegro, etc.

Association of Montenegro to the biggest European programmes for science and research is opening big opportunities to Montenegrin scientists, universities, institutes and companies.

Montenegro has increased the number of bilateral S&T cooperation agreements and/or research projects, mainly with regional partners. Montenegro had (under the Program FP6) limited access for participation and was defined as 'third country', but today that status is changed. In 2008 Montenegro has joined to FP7 Program for research and technological development as participant with equal rights as other EU countries. Joining to FP7 Program, which represents the most important pre-accession document, Montenegro got a great chance to participate in this program. There are lots of possibilities under this program not just for the state, but for all researchers and academic institutions within Montenegro, which gives a great possibility for exchange of people and knowledge from EU countries.

Since February 2007, Montenegro has also been a full partner in the NATO science for peace and security (SPS) programme, with a representative from the Ministry of Education and Science on the SPS Committee.

2.2 Overview of Transport research activities

2.2.1 Transport research projects

In the past, transport research in Montenegro was underdeveloped, mostly due to lack of experts in this field and non-existence of Faculty for transport and traffic engineering. Research projects in this field are led by four research institutions: University of Montenegro - Maritime Faculty in Kotor, University of Montenegro - Faculty of mechanical engineering in Podgorica, Port of Bar and Institute for transportation from Podgorica. Next are realized or ongoing projects in this sector:

1. University of Montenegro - Faculty of mechanical engineering has one finished project. Leader of the projects was Prof. dr Božidar Nikolić. Project was financed by the faculty itself. Next is the project:

- State of in-use motor vehicles in Montenegro, with respect to energy efficiency and environmental pollution.
2. University of Montenegro - Maritime Faculty in Kotor has one finished and one under realization project. Leader of both projects was/is Prof. dr Branislav Dragović. The Ministry of Education and Science financed both projects. Next are the projects:
 - Definition and optimization parameters for the valorization and development of transportation systems and tourist destinations in their mutual cohesion. Case Study: Montenegro and its Transport - Tourist orientation
 - Optimum connections of marine and continental transportation systems
 3. The Port of Bar in Bar has financed two own projects in period between 2007-2009. The leader of projects was Dr Deda Đelović. Next are the projects:
 - PORTUS Project. Creating a common strategy of Adriatic ports in order to create conditions for attracting flows of goods from the Far East
 - APLOMB Project. Formation of the Adriatic logistic network operators.
 4. Institute for transportation in Podgorica, has financed their own research projects. All these projects are under realization. Leader of projects are Prof.dr Danilo Nikolić and Đorđije Vučeljić.
 - Possibilities of biodiesel, made from waste cooking oil, application in motor vehicle fleet in Montenegro, and its influence on exhaust emission.
 - Current state of gasoline and diesel oil quality in Montenegro, and its influence on conditions of exhaust gasses aftertreatment equipment as well on total vehicle fleet.
 - Possibilities of traffic accidents prevention in Montenegro.

The main reason for such low research interest in this field is deficiency of transport research experts, mainly due to absence of Faculty for transportation and traffic in Montenegro.

2.2.2 Key competencies in Transport research fields

Among eight research projects in transport four are related to road traffic (topics are mainly on influence of motor vehicles on the environment), while other four are interdisciplinary ones involving all types of transport (marine, air, road, rail).

2.2.3 Transport research infrastructure

In Montenegro state owned institutions and one private business were identified as organizations that conduct transport research:

The **Ministry of Education and Science** (<http://www.gov.me/eng/minprosv/>) represents official body in charge for research activities in transport area in Montenegro. Namely, special department for Science represents the body which is giving all necessary information related to research projects (FP6, FP7 Programs). The Ministry of Education and Science has established a network of National Contact Points (NCP) which are in charge for defined thematic fields under FP7 Program and which can help to Montenegrin researchers and scientists to find a way how to

participate in this program and how to present their projects in it. In order to help to connect Montenegrin research capacities with EU research capacities under this program it was established web portal www.mneresearch.ac.me which helps researchers and research institutions in Montenegro to get all necessary information that are important for participation in transport projects. More information is available on the web site.

The **University of Montenegro** (www.ucg.ac.me) as the most important academic institution is involved in research projects related to transport development in Montenegro. It comprises of seventeen faculties, three scientific institutes, the library and several specialist departments. Transport related projects are limited to Maritime faculty (www.fzpkotor.cg.yu) and Faculty of Mechanical engineering (www.mf.cg.ac.yu). More information is available on the web site.

The **Port of Bar**, (www.lukabar.cg.yu) is the largest port in Montenegro which is state owned company. Transport related research projects are financed by themselves. More information is available on the web site.

The **Institute for transportation**, (www.intra.cg.yu) is the only private company which is dealing with field of transport research. The most important activities under the Institute for transportation are researchs on improving of energy efficiency of road vehicles, lowering exhaust emission from road vehicles, road accident reconstructions, quality of motor fuels, production of biodiesel from used cooking oil and its implementation in older vehicle fleet. Institute has accreditation as control institution in transport sector according ISO 17020 and is preparing laboratory accreditation according ISO 17025, and is the a single institution of such kind in Montenegro. Institute for transportation took a part in the project under FP6 Program (CARDS). More information is available on the web site.

2.3 Key drivers of Transport research

2.3.1 Main Transport sector trends in Montenegro

Transportation infrastructure and organisation of transport substantially contribute to mobilisation of the economic potential while transport sector contributes a significant share to one country's GDP. At the same time, transport is the source of significant pressures on the environment – pollution of air and other environmental media (through emissions from the process of combustion of fossil fuels and creation of waste), creation of noise, and pressures on biodiversity, land and coastal zone due to the construction of transportation infrastructure.

The transportation infrastructure in Montenegro in the last 20 years did not gain adequate treatment primarily because of weak economic situation and always missing funds in the budget. Numerous problems and limiting factors facing Montenegrin transport sector hinder more rapid and more efficient development of important economic sectors such as tourism, agriculture and trade. These primarily include specific land configuration, accumulated problems in the organisation of participants in the transportation chain, financing and management, and insufficient use or bad condition of transportation infrastructure.

Increased intensity of economic activity in the last few years has raised the issues of state transportation infrastructure and the limitations that the infrastructure can have on economic development.

EU assistance in institutional and legislative reforms has provided the necessary platform for launching major investment in transport infrastructure. Extensive support has been provided during the process of identifying and preparing infrastructure projects to address the priority needs. Project Implementation Units (PIUs) have been established within the Roads Directorate and the Railway Company, with EU support, to manage the implementation of road and rail construction contracts funded by the EU and other bilateral donors and, more recently, by the major international financing institutions, the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD).

Montenegro has made good progress with the development of the trans-European transport networks. It is continuing to participate in development of the core regional transport network and in the south-east Europe transport observatory (SEETO) and has approved a five-year multi-annual plan, covering 2007-2011 (MAP). Implementation of the priority projects, coordination of investments and the annual revisions of the MAP require continued cooperation in the framework of SEETO.

According to official statistics, the contribution of Transport, storage and communications sector to Montenegro's GDP is considerable. This category of services contributed with 13.3% to Montenegro's GDP. In 2007 this sector employed more than 11.358 people.

2.3.1.1 Railway traffic

➤ Railway Infrastructure

The length of the train tracks in Montenegro is 250 km, representing only 0.07% of the total rail network of Europe. There are 47 train stations. Rail tracks pass over 122 long bridges (total length 8.863 m), over 330 small bridges and through 121 tunnels, with total length of 58 km. Therefore, more than a quarter of railway is situated on the bridges, in tunnels and other artificial objects.

The main rail routes are:

- The Bar - Vrbnica railway with length of 169,03 km. This represent montenegrin part of the Bar - Belgrade railway. It was built in 1976, and at that time was a state-of-the art railway, with features such as Mala Rijeka viaduct (highest railway viaduct in the world) and the 6,2 km long tunnel Sozina. It is the only railway corridor in Montenegro that is fully electrified. Permitted axle load is 22,5 t per axis. It runs daily from 5 passenger trains on the route Bar - Belgrade during the winter, up to 15 trains during the summer, as well as 20 to 25 local trains in the inner traffic. About one-third of the Montenegrin part of the railway is in tunnels or on viaducts. On its length rail has 106 tunnels, 107 bridges and 9 galleries. This is from the standpoint of maintenance the most complicated and the most expensive railway in Europe. There are 12 sites where is, due to security reasons, driving speed reduced, from projected 70 km/h to 55 km/h. The railway suffered from chronic underfunding in the 1990s, resulting in it deteriorating and becoming unsafe. This culminated in the 2006 Bioče train disaster, when a passenger train derailed, killing 47 passengers. Because of its invaluable importance, it is necessary to fully reconstruct this railway.

- The Podgorica - Nikšić railway with length of 56,6 km. It was built in 1948 as a narrow gauge railway, and upgraded to standard gauge in 1965. Since 1992, it has been used solely for freight traffic, particularly bauxite ore from the Nikšić mine to the Podgorica Aluminium Plant, with the maximum speed on the railway reduced to 30 km/h. That is about to change, as this part of the railway is currently undergoing complete reconstruction and electrification. Passenger traffic is set to start in 2009, with maximum speeds reaching between 75 and 100 km/h.
- The Podgorica - border with Albania railway with length of 24,74 km. This represent Montenegrin part of the Podgorica - Shkodër railway. It was built in 1986, with the permitted axle loads of 22,5 t per axis and the highest speed limit of 80 km/h. It has been used exclusively for freight traffic for some time. In the Montenegrin railway network this railway is in the best condition. Although the operational characteristics are relatively satisfactory ones, the use of this railway in the previous period was negligible.



Figure 1. Map of Montenegro with all current railway lines.

Figure 1 shows map of Montenegro with all current railway lines. Most of the terrain on which rail tracks are placed is hilly-mountain. Parts of tracks are affected with slides and avalanches, especially in the winter months, which reflects negatively on the security and regularity of traffic.

Geological composition of the terrain with some bridges built on it causes their movements, which requires frequent, urgent and very expensive renovation, in order to have safe movement of traffic.

Due to the lack of financial resources and very little investment in maintenance and modernization, it is basically characterized by: a very high degree of economic obsolescence and poor technical features - the disparity with the requirements of modern transport. The main reason for this very poor state of rail infrastructure is delayed capital reconstruction, as well as insufficient volume of current and investment maintenance.

In the last several years, with the help of international financial institutions some funds have been provided for reconstruction and modernization of existing infrastructure, table 1.

Table 1. Funds from international financial institutions for railways [6].

	Source	Amount (mil euros)	Note
Bar-Vrbnica railway rehabilitation	EIB	15	2003-2006

Funds which are spent in millions of euros from the budget are shown in the table 2.

Table 2. Funds from budget for railways, mil euros [6].

	2002	2003	2004	2005	2006
Rail	2,79	3,05	4,4	6,85	8,1

Table 3 shows projects of strategic importance for Railways according Ministry Maritime Affairs, Transportation and Telecommunication (2007).

Table 3. Projects of strategic importance [8].

	Amount (mil euros)	Note
Reconstruction of the railway line Bar-Beograd	33	4 years
Reconstruction of the railway line Podgorica-Nikšić	57	3,5 years
Rehabilitation of the railway line Podgorica-Skadar	3	2 years
Construction of the terminal for Inter-modal transport on the railway stations in Bar and Bijelo Polje	3,2	2 years

➤ Railway transport

Montenegrin railway company owns next transportation means:

- 16 electric-locomotives
- 4 electric multiple unit sets
- 17 diesel-locomotives

There are also:

- Passenger cars:
 - 40 passenger coaches
 - 1 buffet car
 - 29 sleeping and couchette cars
 - 10 car-carrier wagons
- Freight cars:
 - 803 wagons

Total capacity of railways is estimated at about 8 million tons per year. Rail is currently transporting about 1,2 million cargo per year and about 1,3 million passengers, table 4. The relationship of passengers in the local and remote traffic is fairly constant from year to year and range in comparison 43% to 57%.

Table 4. Transported passengers and goods in railway transport [1].

	2001	2002	2003	2004	2005
Transported passengers, mil.	1,2	1,5	1,4	1,1	1,1
Goods carried, tons	656.000	656.000	718.000	1.006.000	1.169.000

Limiting component in railway transport is a consequence of undeveloped railway infrastructure, as well as the lack of freight and passenger cars with satisfactory technical and operational characteristics.

2.3.1.2 Roads and road traffic

➤ Roads

Road network in Montenegro consists of about 850 km of main roads, 950 km of regional roads and about 5.100 km of local roads. From a total of 1.847 km of regional and main roads 92% are asphalted. From about 5100 km local roads about 50% are paved ones.

Density of main and regional roads is 13 km on 100 km². Over 66% of regional and main roads is older than 30 years. On the main and regional roads there are 312 bridges and 136 tunnels.

Road network development in Montenegro, measured as total length of roads (km) to the surface of the land (km²) is one of the least developed countries, while according to the number of inhabitants (in 1000) belongs to the medium developed countries. However, from the aspect of development of motorway network, as well as from the aspect of exploitation of technical characteristics of existing roads, Montenegro belongs to the most undeveloped countries in Europe, table 5.

Table 5. Relative development of road network of Montenegro in relation to some European countries (2004 year data) [4].

Country	Hihgways		Total roads	
	(km/1000 km)	(km /10000 inhabitants)	(km/km ²)	(km/1000 inhabitants)
Austria	19,16	20,29	1,54	16,30
Bulgaria	2,83	3,56	0,33	4,16
Croatia	5,62	6,69	0,48	5,74
Czech Republic	5,36	4,11	0,70	5,39
France	17,24	16,45	1,62	15,45
Germany	31,67	13,90	1,77	7,79
Greece	0,89	11,23	3,56	4,51
Hungary	4,51	4,13	1,71	15,61
Italia	31,53	16,62	1,04	5,55
Macedonia	5,17	6,04	0,34	3,95
Poland	0,80	0,67	1,20	9,78
Romania	0,47	0,49	0,66	6,90
Slovakia	4,39	4,03	0,36	6,86
Slovenia	11,41	11,85	0,73	7,65
Serbia	4,79	4,66	0,36	4,71
Montenegro	0	0	0,13	10,65

All roads in Montenegro are two-laned only. In recent years roads between connection of Podgorica and the coastal towns have improved significantly with the completion of Sozina tunnel, which shortened the journey from Podgorica to Bar and made the trip significantly safer.

In the north, the road from Podgorica to Kolašin through Morača canyon to Montenegro is considered one of the most dangerous routes in Europe, especially during the winter. Preparatory work has begun on a bypass for the canyon, by building Bar-Boljare motorway which will span from the coast to the border with Montenegro, and will continue to Belgrade. This project is of strategic importance to Montenegro, as this corridor is currently the weak link in Montenegro's road network.

The Montenegrin part of motorway will be 185,5 km long, and by far the most expensive one, with an estimated cost of around 2 billion euros. The rugged mountainous terrain requires building a large number of tunnels and bridges along the section.

The main road routes are:

- E65/E80/Route 2 (Border with Montenegro - Kotor - Budva - Petrovac - Golubovci - Podgorica - Kolašin - Mojkovac - Berane - Rožaje - border with Kosovo), 368 km.
- E762/Route 18 (Border with Albania - Božaj - Tuzi - Podgorica - Danilovgrad - Nikšić - Plužine - Ščepan Polje - border with Bosnia & Herzegovina), 163 km.
- European route E 763 is a road part of the International E-road network. It begins in Belgrade, Montenegro and ends in Bijelo Polje, Montenegro, 22 km.
- European route E 851 is a road part of the International E-road network. It begins in Petrovac, Montenegro and ends in Priština, 72 km.

In the current situation through Montenegro does not pass any multimodal Pan-European Transport Corridor, or direction from the TEN-T network.

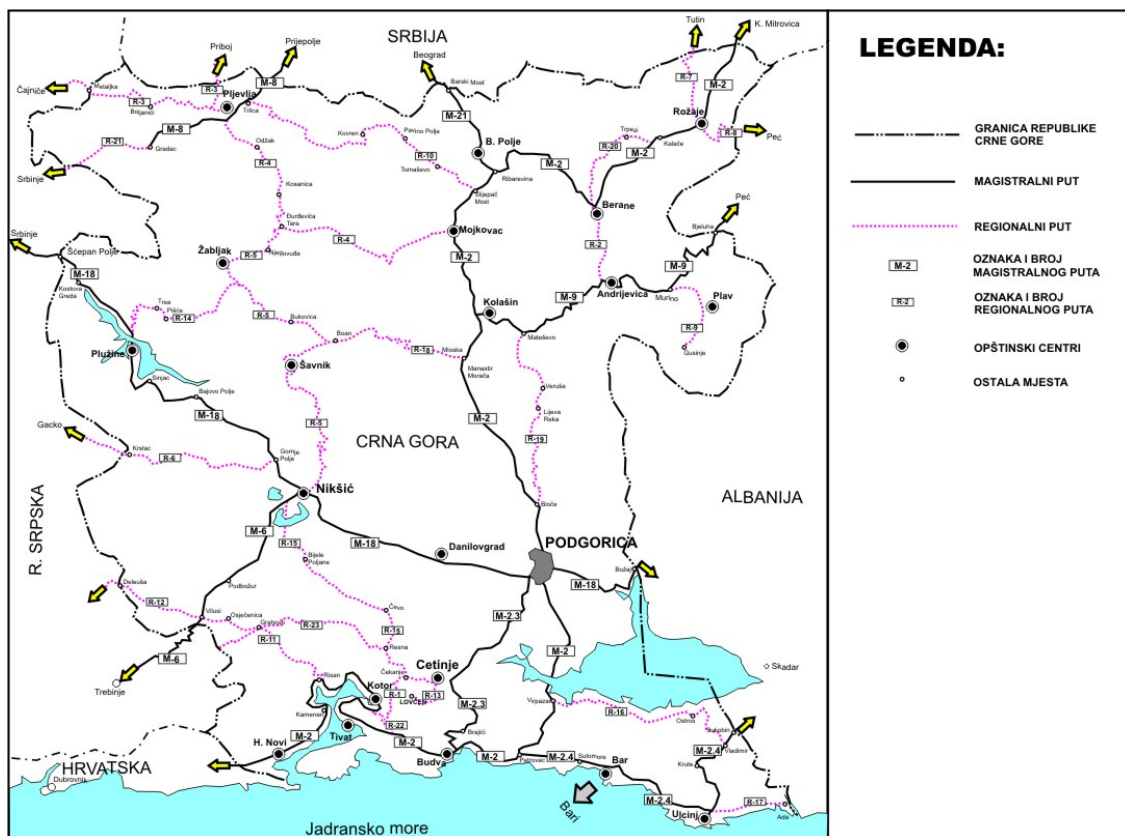


Figure 2. Main and regional road network in Montenegro.

According to the guidelines and practice parameters in developed countries parameters for providing funds for maintenance of roads are about 2% of the total value of road network, or 8.000 euros per km road, which would in case of road network in Montenegro be from 15 to 40 million euros per year. In the last 15 years in Montenegro investments ranged from 2,5 to 8 million euros. As a consequence, we have accumulated a large number of problems on the network.

In the last several years, with the help of international financial institutions some funds have been provided for reconstruction and modernization of existing infrastructure, table 6.

Funds which are spent from the budget are shown in the table 7.

In addition to funds in the Ministry of transportation, maritime affairs and telecommunications, designated for investment in transportation infrastructure, significant funds are planned for the work of the Directorate of Public works and to the Directorate for the construction of motorways, which was responsible for the construction of the tunnel Sozina and access roads, as well as a road Mateševo-Kolašin.

Table 6. Funds from international financial institutions for road infrastructure [6].

	Source	Amount (mil euros)	Note
Reconstruction of roads in south	EIB	10	2001-2002
Tunnel Sozina	EIB	24	2005
Reconstruction of roads in north	EIB	10	2004-2005
Reconstruction of tunnel Lokve, and construction of third line near Mojkovac	KfW	7	2002-2005
Rehab. and improvements of road infrastructure (Bakovića klisura, third lanes in south...)	EAR	13	2001-2005 donation
Third line Obzovica and reconstruction of Mioska-Kolašin road	EBRD	11,5	2006-2007
Meintenance	EIB	10	2006

Table 7. Funds from budget for road infrastructure, mil. euros [6].

	2002	2003	2004	2005	2006
Roads	5,22	2,36	6,8	14,4	15,2

Table 8 shows projects of strategic importance for road infrastructure according Ministry Maritime Affairs, Transportation and Telecommunication (2007).

Table 8. Projects of strategic importance in road infrastructure [8].

	Amount (mil euros)	Note
Construction of Adriatic-Ionian highway through Montenegro	770	6 years
Construction of Bar-Boljare highway	2000	5 years
Construction of mini by-pass Podgorica	25	2 years
Construction of the terminal for Inter-modal transport on the railway stations in Bar and Bijelo Polje	3,2	2 years
Reconstruction of coastal road-Podgorica-border with Serbia	35	3 years
Construction of by-pass Bijelo Polje	12	3 years
Reconstruction of road Niksic-border with BiH	93	9 years
Construction of road Risan-Žabljak	93	9 years
Construction of road Gusinje/Plav-Veruša	35	4 years
Construction of road Cetinje-Nikšić	85	5 years
Construction of by-pass Rožaje	14	2 years
Construction and reconstruction of road Herceg Novi-Trebinje, section Meljine-Petijeviči	14	3 years
Construction of Verige bridge over Boka Kotorska Bay	87	2,5 years
Reconstruction of Adriatic road	59	5 years
Reconstruction and modernization road Podgorica-Nikšić border BiH	18	3 years
Construction of by-pass Golubovci	10	2 years
Upgrading transport activity within Šavnik and Žabljak with arterial Montenegrin roads	9	2 years

➤ Road traffic

There are 186.730 passenger cars, 2.348 busses, 13.529 trucks, 1.767 trailers and some 2.000 special type vehicles registered in Montenegro.

The auto ownership rate (cars per thousand inhabitants) is influenced by the economic status of the population and the availability of alternative modes of travel. This rate in most developed countries in the world is over 400 cars per 1.000 inhabitants. In the countries in transition auto ownership varies from 50 to 400 cars per thousand inhabitants, figure 3. The level of motorization in Montenegro is approximately 300 cars per 1,000 persons, which is high for the country with a similar GDP per capita, but notably below the EU average.

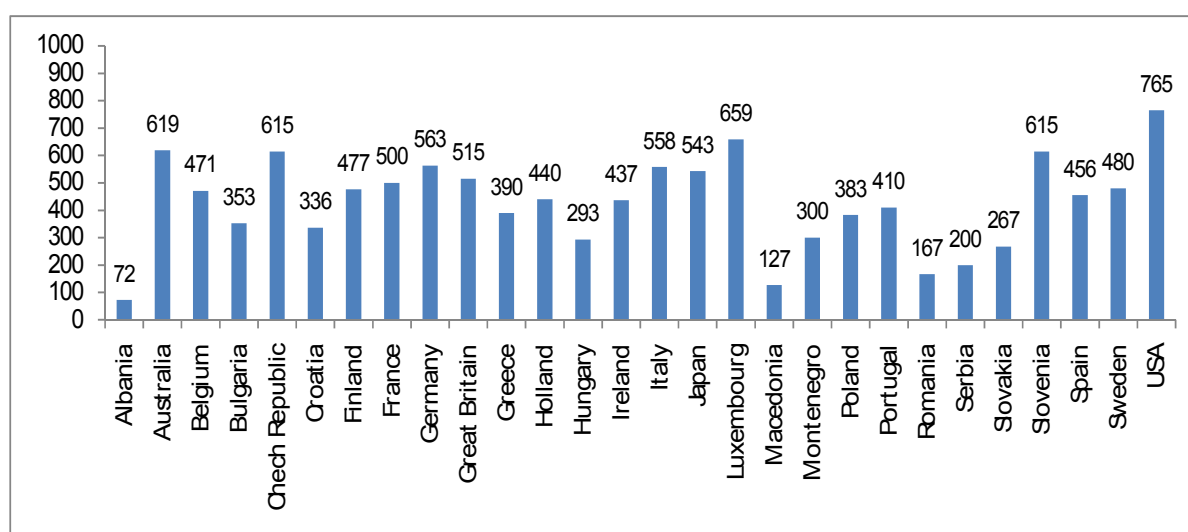


Figure 3. Motorization rate in 2008 [9].

The motor vehicle fleet is quite old, especially when trucks and buses are considered (e.g. average age for busses is 18 years). The control of vehicle load in freight transport is inadequate, and excess loads significantly contribute to the damages of the road network.

Table 9 shows transported passengers and goods in road transport.

Table 9. Transported passengers and goods in road transport [1].

	2003	2004	2005	2006	2007
Transported passengers, thous.	4600	4488	4302	4845	5800
Goods carried, thous. tons	1871	1638	1846	1962	2003

2.3.1.3 Civil Aviation

Bearing in mind that the state of road and railway traffic do not meet the needs of Montenegro for a quality connection in the world transport system as well as the fact that, due to, geographic, topographic and infrastructure conditions in the revitalization and modernization of these systems need large investment funds, the Government of Montenegro took a direction toward development of their own air network.

Montenegro has started to implement the first transitional phase of the Agreement establishing the European Common Aviation Area (ECAA), including the market access rules. It has started to develop its administrative capacity, in particular by setting up the Directorate for Civil Aviation, but this capacity must still be further

reinforced. Legal approximation has not yet started on air traffic management and a national supervisory authority has yet to be set up. Preparations in this sector are at an early stage.

➤ **Infrastructure**

Montenegro has two international airports, with their IATA Airport Codes:

- Podgorica Airport - TGD
- Tivat Airport - TIV

Podgorica Airport has a new and modern terminal building, and Tivat Airport underwent terminal expansion.

There are also airports at Berane, Žabljak and Nikšić, but those are used mostly for general aviation, and are not equipped to handle larger aircrafts.

In the last several years, with the help of international financial institutions some funds have been provided for reconstruction and modernization of existing infrastructure, table 10.

Table 10. Funds from international financial institutions for road infrastructure [6].

	<i>Source</i>	<i>Amount (mil euros)</i>	<i>Note</i>
Podgorica and Tivat airports reconstruction	EIB & EBRD	23	

Table 11 shows projects of strategic importance for airport infrastructure according Ministry Maritime Affairs, Transportation and Telecommunication (2007).

Table 11. Projects of strategic importance in road infrastructure [8].

	<i>Amount (mil euros)</i>	<i>Note</i>
Activation of airport Berane	22	2,5 years

➤ **Air carriers**

Montenegro Airlines d.o.o. is the national carrier airline of the country of Montenegro, and it is based at Podgorica Airport. It operates scheduled services in Europe, as well as charter flights throughout Europe during the summer months. Its second base is at Tivat Airport. The airline was founded on October 24 1994, by the government of Montenegro. The Montenegro Airlines fleet consists of the aircrafts (at June 2008) shown in table 12.

Table 12. Montenegro Airlines fleet.

Aircraft	Total	On Order/Options	Passengers
Fokker 100	4	0	102
Embraer 195	1	2 (1 option)	116

Vektra Aviation is a VIP airline based in Podgorica, Montenegro. Its main base is Podgorica Airport. The airline was established in 2006, and is catering to needs of Vektra Corporation, as well as providing services of air charter. The company owns a hangar at Podgorica Airport sufficient to hold all aircraft currently in fleet. The Vektra Aviation fleet includes the aircrafts shown in table 13.

Table 13. Vektra Aviation fleet.

Aircraft	Total
Bombardier Challenger 300	1
Beechcraft Hawker 400XP	1
Gulfstream IV	1
Agusta A109	1
Eurocopter Colibri	1

Table 14 shows transported passengers and goods in air transport.

Table 14. Transported passengers and goods in air transport [1].

		2003	2004	2005	2006	2007
Transported passengers	Departed	337.170	336.906	350.481	399.076	520.630
	Arrived	296.453	325.741	347.259	434.639	513.089
Goods carried, tons	Dispatched	214	186	812	377	580
	Received	406	459	199	690	594

2.3.1.4 Maritime traffic

In October 2006, Montenegro became a member of the International Maritime Organisation and in February 2007 it accepted the relevant conventions and protocols. However, the law on maritime navigation has not yet been adopted and special attention is to be paid to safety and security issues, including flag state conditions and port state control facilities. Preparations in this sector are starting.

➤ Infrastructure

In Montenegro, there are 4 ports open to international traffic Bar, Kotor, Risan, and Zelenika. Port of Budva is open to international traffic during the 4 months of the tourist season. There are also a number of harbors and marinas for nautical vessels. Montenegro's rivers are generally not navigable, except for tourist attractions such as rafting on Tara River. Total length of navigable waterways of Montenegro is 160 km.

The most important port in Montenegro is port of Bar, which performs about 95% of all port activities in Montenegro. The port is in the past 3 years had about 680 stops of cargo ships a year and about 220 stops of passenger ships. Port can accept ships up to 80.000 tons of capacity. It is capable of handling about 5 million tons of cargo. Maximum reloading accomplished was 2,7 million tons in 1989, while in recent years makes reloading of about 2 million tons. Also, it is a port for ferries to Bari and Ancona in Italy. With Montenegrin market being too small to fully utilize its capacity and make it a profitable port, it is generally accepted that Port of Bar has to acquire new markets to which it would cater. The announced building of Belgrade–Bar motorway and proposed reconstruction of Belgrade - Bar railway would thus mark a breakthrough in attracting the Montenegrin, and thus the Central European market.

With much smaller capacities in Montenegro work ports of Kotor, Risan and Zelenika, while port of Budva is primarily intended for tourist activities. Port of Kotor realized from 50.000 to 100.000 tons of reloading per year, as Risan and Zelenika. Since 2005 port of Kotor does not serve for freight traffic any more. Restrictive elements of the development of these ports are related to the sensitivity of the pollution of the Bay of Boka on cargo ships and its orientation towards tourism, as well as the lack of modern roads that would connect the ports with the hinterland.

In the last several years, with the help of international financial institutions some funds have been provided for reconstruction and modernization of existing infrastructure, table 15.

Table 16 shows projects of strategic importance for road infrastructure according Ministry Maritime Affairs, Transportation and Telecommunication (2007).

Table 15. Funds from international financial institutions for marine infrastructure [6].

	Source	Amount (mil euros)	Note
Pier rehab. In port of Bar	EIB	6	2002

Table 16. Projects of strategic importance in road infrastructure [8].

	Amount (mil euros)	Note
Construction and reconstruction of infrastructural facilities in the port of Bar	34,7	8 years
Finalization of construction of Marine in Bar	1,5	1,5 years
Revitalization Revitalization of maritime economyf the Port of Virpazar	36	2 years

➤ Shipping fleet

In the last 20 years problems which Montenegro has passed through had hit the most shipping industry. From a total of 42 overseas ships, with capacity of about 1,3 million DWT, the Montenegrin fleet had at the end of 1980's, came to number of 0 of overseas ships. Just 2 Ro-Ro ships survived of Prekookeanska plovdba from Bar, whis now operate inside Barska plovdba. In the meantime there has been purchased another ship through a joint venture with Italian partners, which also maintains a transportation line between Bar and Italian ports, and the Italian port and Durres. Annually, Barska plovdba carries out about 90.000 passengers, 16.000 cars, 5.000 trucks and about 2.000 trailers.

Beside this state owned company, there are private companies such as NIMONT which has 4 ships of total capacity 15.000 DWT, NORMONT as a joint Norwegian-Montenegrin company with 2 ships of total capacity 12.000 DWT and "Pomorski saobraćaj" a company for the transport of vehicles and passengers has four ferryes with total capacity of 120 passenger cars with ferry transport on the Kamenari-Lepetane-Kamenari route as their primary activity.

In addition, there is a significant volume of naval transportation in the Montenegrin territorial seas, and there are also a large number of yachts and smaller vessels during the tourist season.

Table 17 shows transported passengers and goods in maritime transport.

Table 17. Transported passengers and goods in maritime transport [1].

	2003	2004	2005	2006	2007
Transported passengers	63575	66187	78281	89855	90872
Goods carried, thous. tons	70	63	60	75	689

2.3.2 Main socio-economic challenges in Montenegro

Key The key commitment of the Country is integration into the European Union. Key dates in Montenegro's path towards the EU are:

23 April 2008

-The Council invites the Commission to submit its opinion on Montenegro's application.

15 December 2008

- Montenegro submits its application for EU membership

- 27 May 2008** - European Commission presents roadmap setting out a number of benchmarks for visa liberalisation with Montenegro.
- 21 February 2008** - Visa liberalisation dialogue launched.
- 1 January 2008** - Interim Agreement on Trade and Trade-related issues and Visa facilitation and readmission agreements enter into force.
- 15 November 2007** - The Framework Agreement of the Instrument of pre-Accession Assistance is signed between the Government of Montenegro and the EC.
- 1 November 2007** - The European Commission Delegation in Podgorica starts to function.
- 19 October 2007** - The Parliament of Montenegro adopts by 2/3 majority the Constitution which was proclaimed officially on 22 October.
- 15 October 2007** - The Stabilisation and Association Agreement (SAA) is signed in Luxembourg.
- 18 September 2007** - Visa facilitation and readmission agreements with the EU signed.
- 15 March 2007** - The Stabilisation and Association Agreement (SAA) is initialled in Podgorica.
- 22 January 2007** - The Council adopts a European Partnership for Montenegro.
- 26 September 2006** - SAA negotiations with Montenegro are launched: First Official Round and First technical Round.
- 24 July 2006** - The EU Council adopts a negotiating mandate for a Stabilisation and Association Agreement (SAA) with Montenegro.
- 12 June 2006** - The EU Council declares the will to develop further the relations with Montenegro as a sovereign, independent state. Bilateral recognitions by Member States follow.
- 3 June 2006** - The Montenegrin Parliament declares independence.
- 21 May 2006** - A referendum on independence results by the vote of a majority of Montenegrin voters to the independence of Montenegro.

During its third year as an independent country, Montenegro has proved to be a politically stable and economically viable state, which has the potential to grow rapidly over the medium term. The country has had some success already in creating a favorable business climate and in attracting reputable foreign investors, who can play a crucial role in signaling to others that Montenegro is an attractive investment destination.

Montenegro is in the process of joining the World Trade Organization (WTO), and has joined the Central Europe Free Trade Agreement (CEFTA), which was expanded in late 2006 to include the countries of South East Europe, and which guarantees free trade for approximately 90 percent of industrial products.

The Montenegrin economy has recently started to grow strongly, following a weaker performance in the early part of the decade. GDP growth accelerated from 4.2 percent in 2005 to 10.7 percent in 2007. Growth has been driven by very strong foreign direct investments (FDI), particularly in the tourism and real estate sectors.

Employment and wages have grown strongly, while registered unemployment has decreased from 20 percent in 2005 to 12.1 percent in 2007, with 7 percent of the population living below the poverty line. Table 18 shows main economic indicators for period 2005-2007.

Table 18. Main Economic Indicators 2005-2008 [11].

	2005	2006	2007
GDP market prices, at current prices, mill.EUR	1.815,0	2.148,9	2.807,9
Population (in thous.) mid year estimate	623,3	624,2	626,2
GDP per capita in EUR	2.919,0	3.443,0	4.484,0
GDP growth rate (%)	4,2	8,5	10,7
Unemployment rate (%)	19,7	14,5	12,1
Inflation (cost of living, %)	2,4	2,3	7,6
Wage growth (%)	7,8	15,5	14,2

However, boom also generated large macroeconomic imbalances (structural, trade, account deficit) making the country highly exposed to impacts of global recession.

Global financial and economic crisis will have substantial adverse impact on public confidence, credit growth, industry, FDIs and cause financial, external and fiscal vulnerabilities.

In the first ten months of 2008, the Montenegrin foreign trade deficit was 18 percent higher than in the same period 2007 and amounted €1.7 billion. This is expected to further worsen in this year. The majority of exports were raw materials and semi-finished products including aluminium, steel, alcohol beverages, tobacco, and processed lumber, while the largest category of imports were machinery and motor vehicles.

GDP growth is likely to decline in 2009–2010 due to global recession:

Banking sector. Public confidence remains fragile and bank deposits are declining. Central Bank imposed restrictive monetary measures which will downsize domestic investment potential

Industry sector. Industrial production in Montenegro, records a decrease for the period January-February this year compared to the same period the previous year 12.5%. Price decrease of raw goods on world markets and drop in demand will endanger production plans of big exporting companies (KAP aluminum plant in Podgorica, Steel smelter in Niksic, Bauxite Miners). The KAP production is already halved, and it could shut down completely. Supporting and depending industries will suffer also.

Construction sector. Significant decline in private investments on real estate market is evident (drop of 30% for the last months of 2008).

Tourism sector. Revenue decrease expected due to global economic crisis impact and lower disposable income. In April number of guest was 16% lower than in the same period last year (on Budva Riviera even 46% lower). Prediction is app minus 25-30% YOY.

More information about socio-economic challenges in Montenegro is available in reference 11.

3. Integration of Montenegro in the European Research Area in the field of Transport

Participation in the EU's framework programmes and integration into the European Research Area is a priority of Montenegro's science and technology strategy.

On 25 January 2008 Montenegro signed a Memorandum of Understanding with the European Commission which allowed full access to the EU's 7th Research Framework Programme (FP7) which runs from 2007 to 2013. This "associated status" allowed Montenegro to participate in all calls for proposals and compete on an equal footing with the EU Member States for research co-operation and support actions funded by FP7, from 1 January 2008.

The FP7 supports scientific research in the EU and the broader European Research Area with a budget of almost 55 billion Euros over a time span of 7 years (2007-2013). It allows funding of collaborative research in strategic areas among whom is transport.

In preparation for its participation in FP7, Montenegro has set up a network of National Contact Points (including for transport sector) and organised information days to inform the country's research community about the opportunities offered by FP7. This programme allows Montenegrin scientists, universities and companies to create links with their counterparts across Europe and build up their scientific expertise.

4. SWOT analysis of the Transport research capacity in Montenegro

<u>Strengths</u>	<u>Weaknesses</u>
<ul style="list-style-type: none"> • Possibility to participate into EU research programmes • Experience in maritime transportation and traffic 	<ul style="list-style-type: none"> • Insufficient number of experts and researchers • Poor research infrastructure • Small number of realized research projects • Small financial resources for research • No strategy for development of R&D in transport sector.
<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> • International cooperation of researchers from the country; 	<ul style="list-style-type: none"> • Non-existence of the Faculty for transportation and traffic engineering (road, rail and air) • Monopoly • Global economic crisis • Very long period to refund invested money into transport infrastructure

5. Transport research priorities for Montenegro

5.1 Transport Research priorities on the basis of the country's readiness

- Research on traffic safety.
- Research on transport originated emissions of pollutants and noise.
- Research on sustainable urban mobility, developing new mobility schemes in cities, which rationalise the use of the private car, promote public transport and conceive innovative non-polluting urban vehicles.
- Research on alternative motor fuels. Integration of alternative motor fuels into the transport system, particularly into clean urban transport, the cost-effective and safe production, storage, and distribution of alternative motor fuels, the optimal utilisation of alternative fuels in new concepts of energy efficient vehicles, strategies and tools to manage the market transformation process for alternative motor fuels.
- Research on modal shift and decongesting transport corridors - promoting the use of cleaner transportation modes and eliminating extra pollution caused by traffic congestion.
- Research on ballast waters management in closed seas.

5.2 Transport research priorities on the basis of future potential

- Planning for transport in the future. Making the most of the existing transport network, and planning for future investment, requires integrated planning across the sector. Integrated planning will improve the ease with which goods and people are moved throughout Montenegro.
- Research on influence of transport on public health. Transport sector accounts for highest emission of pollutants in the air in Montenegro, while marine transport pollutes sea waters.

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