KEY ISSUES IN ECONOMIC SUSTAINABILITY OF ROAD TRANSPORT IN BULGARIA

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ABSTRACT

The stable economic conditions are fundamental for the sustainable development of transport. For this reason the contribution of transport, respectively road transport, to GDP per year and to the gross value added (GVA) are the main indicators for assessment of economic sustainability of road transport presented in the paper. Along with the indices such as share of transport in GDP, the consumers' expenditure on transport, the volume of freight and passenger transport by modes, share of road transport, traffic volumes and transport infrastructure capacity, the analysis provides a base for the assessment of the economic sustainability of road transport in Bulgaria. Comparisons with the relative indicators in the EU-27 are made in order to clarify the Bulgarian position on the European market. Furthermore, the level of infrastructure provision is evaluated through the analysis of investments on new infrastructures. Thus the long term sustainability of road transport is assessed too and some opportunities for the future development based on an economic sustainability are outlined. As a result of the analysis the opportunities for improving transport services and for decrease in road transport costs in Bulgaria have been revealed.

INTRODUCTION

Sustainability in transport has different implications and it has a key role for economic and social development. Transport sector generates growth by facilitating trade of industrial and agricultural goods and by increasing access to health and education facilities as well as local and national amenities. At the *macroeconomic* level, investments in transport raise growth by increasing the social return to private investments. At the *microeconomic* level, improvements in transport help to lower input prices of different goods and hence production costs, they increase access to markets and diversification of outputs, and indirectly they facilitate the development of the economy. Transport infrastructure has a significant meaning for the economic growth, the mobility of labour, the opportunities for tendering transport services and the competitiveness of the economy as whole. The quality of transport infrastructure and public transport service affects the location decisions made by firms and individuals.

Economic, social and environmental sustainability are often mutually reinforcing. Transport system that falls into disrepair because it is economically unsustainable fails to serve the needs of the society and often have environmentally damaging consequences. Hence, there are some policy instruments which serve all of the dimensions of sustainability in a synergistic way, generating "win-win" solutions. These include measures to improve asset maintenance, charging for external effects, raising technical efficiency of supply, safety, contract design and administration. On the other hand, road transport is the key enabler for the free movement of people and transport of goods in Europe at local and regional levels. It has a major impact on the daily lives of European citizens as a primary means of their access to employment, services and social activities. Road transport creates links and these links have a

major role in developing social, regional and economic cohesion in Europe. Road transport impacts the environment and general quality of life of every European citizen (ERTRAC, 2007). During the last decades there is an increasing demand from European citizens for individual mobility, but at the same time the society as a whole must reduce the environmental impact of road transport and increase its efficiency. Europe wants a clean, energy-efficient, safe and intelligent road transport system and a highly competitive road transport industry is essential to the business community. With regard to that, the goal of the Sustainable transport policy is to ensure that the EU's transport systems meet the citizen's economic, social and environmental needs, as highlighted by the mid-term review of the 2001 White Paper, 'Keep Europe moving '[1]. The EU Sustainable Development Strategy (SDS), which was renewed in June 2006, sets out a coherent approach to how the EU will more effectively live up to its long-standing commitment to meet the challenges of sustainable development. The main aim is achieving continuous improvement of the quality of life and well-being of the society as whole, through the creation of sustainable economy able to manage and use resources efficiently and to tap the ecological and social innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion.

Increased mobility, particularly private motorized mobility, typically increases measured gross domestic product (GDP) but damages the environment. Global sourcing of manufacturing industry and just-in-time logistics reduce product costs (Black&Nijkamp, 2002). However, expenditures on road transport tend to increase as many more goods are transported throughout the European continent. Shifts to movement by faster modes (air transport) or in smaller batches with greater flexibility in frequency of schedule and variety of routes (road ones) also have potentially adverse environmental implications. More efficient production of transport services in a competitive framework may involve loss of jobs, imposing some social costs and restructuring of prices and services which may hurt some users.

However, the mobility is crucial for the prosperity of the national economies and for the freedom of movement within the European Union. Along with the traffic growth during the recent years, the pollution of the environment and the number of accidents are growing too. On the other hand, the main aim of the national transport policy in Bulgaria as a member state of the EU is to ensure sustainable development of all modes of transport and to raise their energy and ecological efficiency. With regard to that, it is necessary to distinguish between the positive and negative effects of the growing mobility. The technical innovations and the orientation towards less polluting and energy efficient modes of transport – especially when talking about the urban transport and long distance haulage – will contribute to a higher level of sustainability of transport system in the country (Jeon&Amekudzi, 2005). In this context it is very important to assess the sustainability of road transport which is the most used mode within the country as well as for the carriages from Bulgaria to the other countries in Europe.

NATIONAL POLICY FOR SUSTAINABLE DEVELOPMENY OF ROAD TRANSPORT

For achieving the goals of sustainable development and as a consequence of the engagements taken on the international level, Bulgarian government developed a project for National Strategy for Sustainable Development (NSSD). It is based on the updated Strategy for Sustainable Development of the EU and on the updated Lisbon Strategy. A part of the project for NSSD is the Strategy of Ministry of Transport for Sustainable Development of the Transport System of Bulgaria towards 2020 launched in 2007. Six priority areas are presented in it and every one of them is directly connected with the development of road transport.

First measure is related to *encouraging the use of more environmental friendly vehicles*. The main goals in this area are related to modernisation of national motor fleet with vehicles

answering to all European ecologic standards and stimulation of innovations as well as preparation of legislative and institutional measures for restriction of old vehicles import. The actions envisaged are fiscal, administrative and organisational.

Second measure is relevant to the *use of environmentally friendly fuels and energy in transport*. The goals imposed are: enhancing the use of alternative fuels and adopting fiscal measures for encouraging the production and distribution of bio-fuels for transport in order to achieve the market share of 5,75% in Bulgaria towards 2010[2]; stimulation of the use of railway transport together with raising the level of electrification; encouraging public transport services in urban areas in the place of the private car usage as well as enlarging the use of the urban electro transport.

Third, *modernisation of road infrastructure*. This is one of the most important tasks to be fulfilled along with modernisation of stock of vehicles in road transport. The main aims are for further building of the highways in the country, reconstruction and rehabilitation of separate sections on the main roads which are part of Trans-European Transport Corridors and within the TINA network[3] (Transport Infrastructure Needs Assessment); improvement and standardisation of the technical and operational parameters of the main roads, parts of national road network through reconstruction and rehabilitation.

For each and every of the priorities outlined separate projects are suggested and they have been included in the Operational Programme on Transport 2007-2013 (Ministry of Transport, 2007) and in the Strategy for the Development of the Transport Infrastructure of the Republic of Bulgaria by 2015 (Ministry of Transport, 2006).

Forth, *further development of public transport*. This process imply clarification of the engagements of the country towards the public transport services alongside with optimisation of big cities' transport schemes in order to enhance the access of people with disabilities to transport services. The achievement of these goals is envisaged to be fulfilled mainly by better planning procedures based on research, analysis and assessment of the traffic volumes and the quality of public transport services. Besides, the development of a legislative base, improvements in controlling functions of state administration are necessary.

Fifth, *implementation of contemporary schemes for traffic control*. This priority area is mainly directed towards modernisation of the railway and road network and the rolling stocks; building new railway junctions and road by-passes and raising the quality of services tendered in order to encourage the freight customers to use railway transport; development and implementation of management controlling systems for the traffic and improvement of the access to transport infrastructure in the country;

Sixth, *lessening the number of transport accidents*. The defined objectives in this area are: modernisation of passenger rolling stocks and better technical maintenance of road vehicles through development and execution of legislative, fiscal, administrative and control measures and procedures for security improvement; modernisation of road and urban transport infrastructure; better initial and following-stage training of drivers; increasing the efficiency of the events held by road traffic police; improving the behaviour and culture of participants in the transport process.

The achievement of the sustainability of road transport is connected to the fulfilment of a plenty of measures on national, regional and sector level as well as with the implementation of programs for launching operational measures by infrastructure managers and services' operators. In this context it should be clarified that the social and enterprises' interests are not always identical. This fact hamper to the great extend the fulfilment of the measures envisaged and the achievement of the goals.

KEY INDICATORS FOR ASSESSING ECONOMIC SUSTAINABILITY OF ROAD TRANSPORT IN BULGARIA

The European Commission (EC) developed detailed indicators in order to monitor progress with regard to each particular challenge of sustainability (Litman, 2008). The sustainable development indicators' (SDI) framework outlined by the EC is based on ten themes, reflecting the seven key challenges of the strategy, as well as the key objectives of the economic prosperity, and guiding principles related to good governance. The themes follow a general gradient from the economic, to the social, and then to the environmental and institutional dimensions. They are further divided into sub-themes to organise the set in a way that reflects the operational objectives and actions of the sustainable development strategy. Regarding the economic sustainability of transport the most important indicators are contribution of transport to GDP, GVA and employment. Following the logic of these indicators prepared by EC in the present paper an approach to assess economic sustainability of road transport is suggested.

Growth in transport compared to the growth in GDP

Main policy objective of the EU is to "bring about a significant decoupling of transport growth from GDP growth" (EC, 2001). An operational objective of the renewed EU sustainable development strategy is 'decoupling economic growth and the demand for transport with the aim of reducing environmental impacts'. The volume of freight transport to GDP ratio measures the decoupling of freight transport growth from real GDP growth. Rising volumes of traffic can damage the environment and economic growth through rising levels of congestion, noise and pollution. The full internalisation of the social and environmental costs of transport should promote a significant decoupling of transport growth and GDP growth. Efficient freight transport systems are essential for both the European economy and people's quality of life. With regard to the objectives of individual systems, the priority of transport policy is to ensure mobility of service users.

The GDP generated in all member states of the European Union (EU-27) tends to increase constantly and this increase is followed by the growth in transport (see figure 1). The average annual growth in GDP in EU-27 is 2,5%, the respective growth in passenger traffic is 1,7% and in the freight traffic – 2,7%.

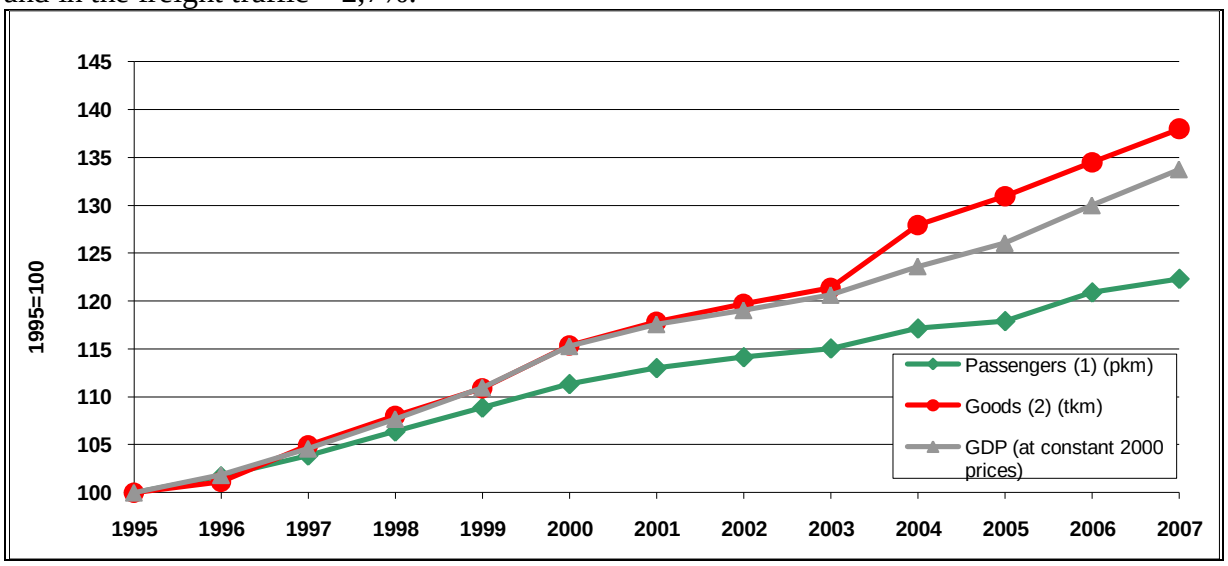

Figure 1 Volume of passenger and goods transport compared to GDP, EU-27

Source: EUROSTAT

With its population of 7,64 million people and territory of 110,9 square meters Bulgaria generated almost 0,2% of the GDP produced in the whole EU. As a consequence of economic

reforms and stability after the transition period in the recent 10 years the annual average growth in GDP in the country is 5,1 %. But the trends in transport performance, especially those of freight transport don't follow the economic developments. In contrast to the EU's trends, in Bulgaria while GDP (measured at 1998 prices) grew at an average annual rate of 5,1 % from 1998 to 2007, freight traffic, measured in tonne-kilometres vary from -12,1% to +16,4% (see figure 2).

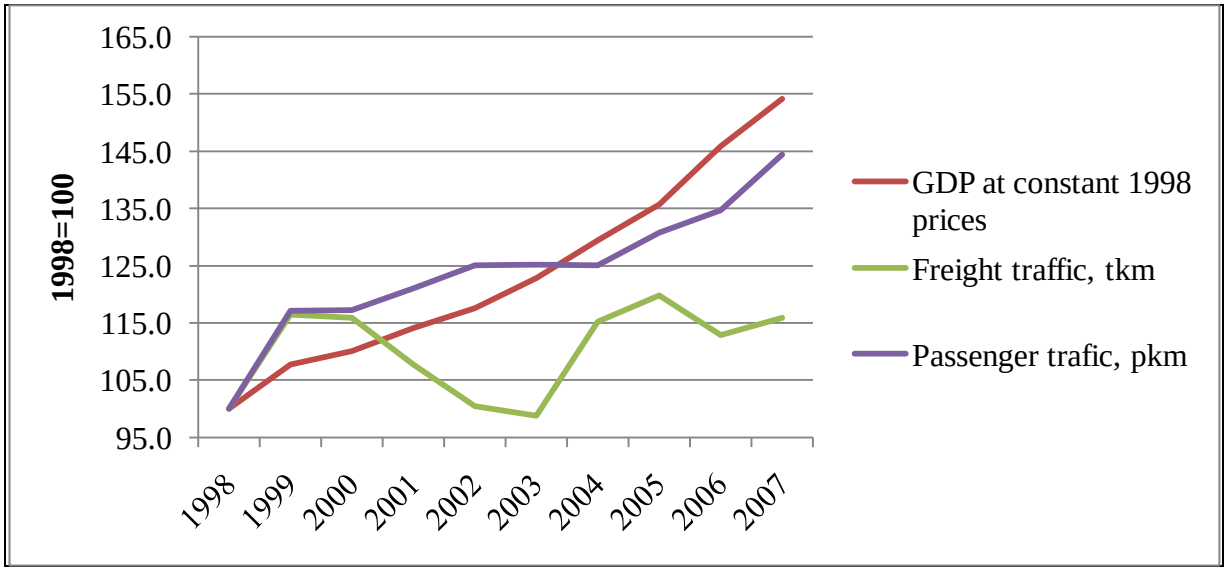

Figure 2 Volume of passenger and freight transport relative to GDP in Bulgaria, 1998 to 2007 (index 1998 = 100)

Source: National Statistic Institute (NSI)

The average annual growth in freight traffic in Bulgaria is 0,59% yearly. Over the period, passenger transport performance, measured in passenger-kilometres, grew at an average yearly rate of 4,04% which is higher than the rate of the growth in EU-27. It should be notated that the traffic generated by private cars is included in the total passenger traffic. The volume of transport relative to GDP expresses the ratio between transport performance in tonne-kilometres and passenger-kilometres and GDP indexing on reference year 1998. Changes in the structure and location of manufacturing industries, especially processes of privatization and economic restructuring as well as the changes in production methods and distribution channels, influenced by the desire of the country for EU membership are at the root of these trends. On the other hand, growing requirements for staff mobility in the services' sector and the increase in private car ownership influence the overall development in transport sector in the country.

Growth in road transport compared to the growth in GDP

Comparing the trends in GDP growth and trends in road transport it is obvious that the economic growth of 5,1% annually is not supported by a constant growth rate in road passenger and freight transport by road (see figure 3). The average growth rate of road passenger traffic is 5,7% per year and respectively 6,8% for the freight traffic. Having in mind the big fluctuations in freight traffic from -36,4% in 2000 comparing to 1999 to 31,4% in 2001 comparing to 2000, it could be concluded that the development of road transport depends to the big extend on the other factors that the economic activity. The reasons are first and foremost related to the big institutional changes in this mode of transport during the reviewed period and enforcement of new legislative and regulative acts.

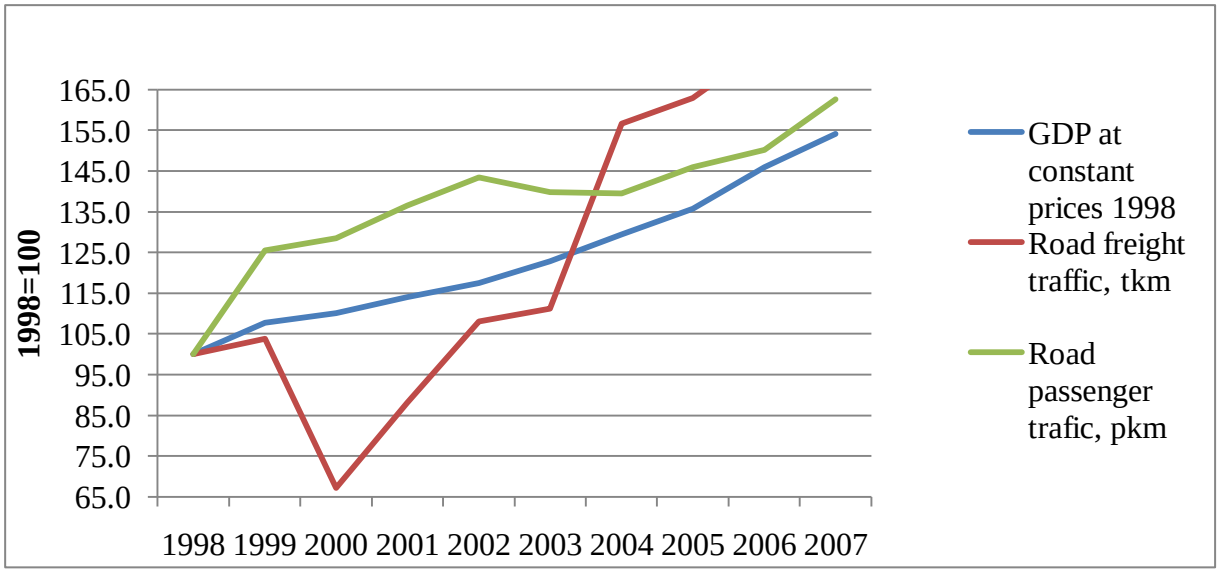

Figure 3 Volume of passenger and freight transport by road relative to GDP in Bulgaria, 1998 to 2007 (index 1998 = 100)

Source: National Statistic Institute

Gross value added (GVA) in transport compared to GVA in the economy

The other very important indicator of the development of transport is the contribution of transport to the gross value added. During the period 1998-2007 transport has average share of 6,4% of the GVA. On the other hand, the growth rate in gross value added at basic prices in the economy during the period 1998-2000 is not constant and vary from lowest level of 3,6% in 1999 to the highest level of 17 % in 2001. The average growth rate for the period is 10,4% which shows a stable trend towards increase in the value added in the country. The tendencies in traffic volumes are the same as the tendency in the economy as whole. The average growth rate of GVA in transport is 14,9%, changing between – 6,5% in 1999 and 53,8% in 2001 (figure 4).

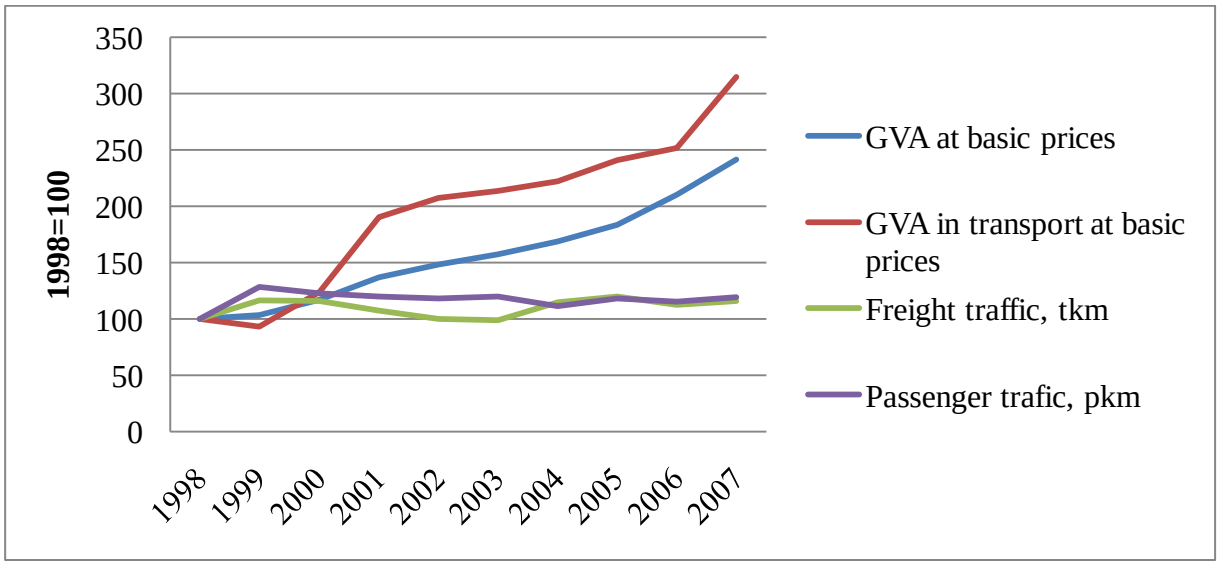

Figure 4 Gross value added in transport relative to GVA in Bulgaria, 1998 to 2007 (at basic prices)

Source: National Statistic Institute

When the traffic volume is added in this model, then we could obtain a clearer view on how is the efficiency in transport influencing the overall economic efficiency. As it is shown

on the figure 3, the rate of growth in freight and passenger transport is comparatively slow and it reflects the lower level of efficiency in the sector. The efficiency of freight transport calculated is averagely 5% for the period and the respective efficiency of passenger transport is 1%. Having in mind that the efficiency is a measure for the return of product factors and on the other hand, it is an important indicator for the economic development of the country, then it shouldn't be assumed for a simple measure even in a separate sector. The reason is that there are some comparative factors influencing this indicator such as transport technology in use. Further analysis of the key indicators for economic development of transport and especially of road transport will contribute to the complete "picture" of sustainability of this sector.

In addition to the estimation of GVA in transport and having in mind that transport services in Bulgaria accounted for 6,4 % of the value added in non-financial business economy[4], it could be concluded that the productivity in road transport sector is estimated at lower level than in the other EU-member states.

Modal Split

EUROSTAT defines the modal split as a key indicator for assessment of the economic sustainability of transport (EUROSTAT, 2009). The objective and the relevance of this indicator are argued to be very good as the indicator gives a view on the balance between transport modes used in the country and its impact on the economy, energy consumption and greenhouse gas emissions.

As the road transport sector contribution is not reported separately in national statistics its contribution could be evaluated using the share of this mode on the transport market. Comparing the trends in road transport development and its share on the transport market in the country it is obvious that this mode of transport clearly plays a predominant role in passenger transport. Busses and coaches together with passenger cars accounted for more than 85% of total passenger traffic averagely in the period 1998 – 2007 (see figure 5).

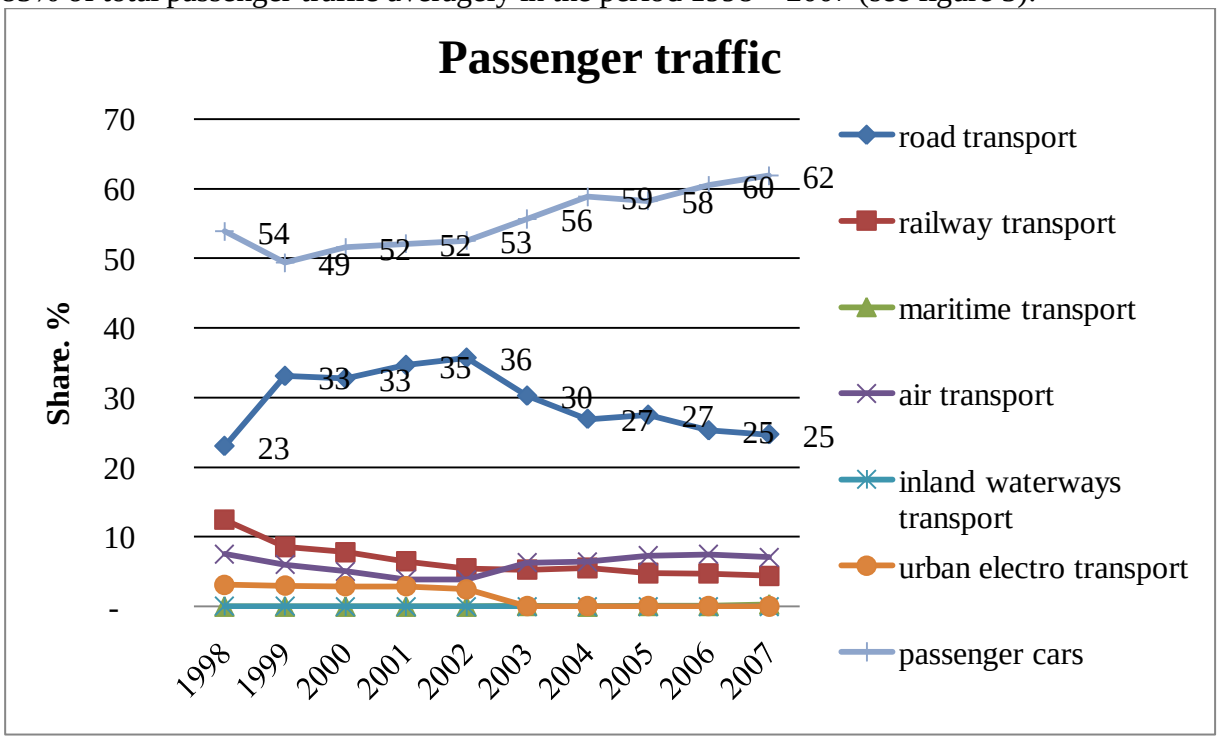

Figure 5 Modal split in passenger transport in Bulgaria

Source: National Statistic Institute

An important issue when analyzing the modal split is the extent of the prevalence of road transport by cars which is considered the least sustainable passenger transport mode. It determines considerable environmental and social impacts, such as pollution, global warming, etc. as well as a higher accident rate, thus producing negative economic impacts. The value of this indicator in Bulgaria (averagely 55,5%) shows low effectiveness of the national transport policy whose aim is to achieve a shift towards more energy efficient and environmentally friendly modes of passenger transport.

This indicator is also related to the renewed EU Sustainable Development Strategy's overall objective on transport: 'to ensure that transport systems meet society's economic, social and environmental needs whilst minimising their undesirable impacts on the economy, society and the environment'. More specific targets are to direct a shift from road to rail, water and public passenger transport. Obviously in the case of Bulgaria this target is not achieved. Finally, the indicator is partially related with the aim of reduction of transport greenhouse gas and pollutant emissions. Estimating the average road transport share of 84,8% of passenger traffic, it is absolutely clear that this aim is far away from the present performance of the transport system.

The modal split of freight traffic is an indicator that measures the balance between different transport modes in total inland transport of goods. An important policy issue is the extent of the prevalence of road based transport which is considered the less environmental friendly means of transporting goods. Road transport is the least energy-efficient mode and it produces more emissions per tonne-kilometre than either rail or inland waterways transport. It has also the highest accident rate and a great economic impact. The main aim of the European Transport Policy as well as the Bulgarian one is to shift the balance between road transport and other modes thereby removing the existing coupling of economic growth with increased road traffic.

Analyzing the modal split in freight transport it could be noted that while maritime transport made up the largest share of total freight transport performance (79 % average annual share), road transport which is an internal for the country and an important mode for intra-EU transport was second with average share of 9 % of the Bulgarian market (Figure 6).

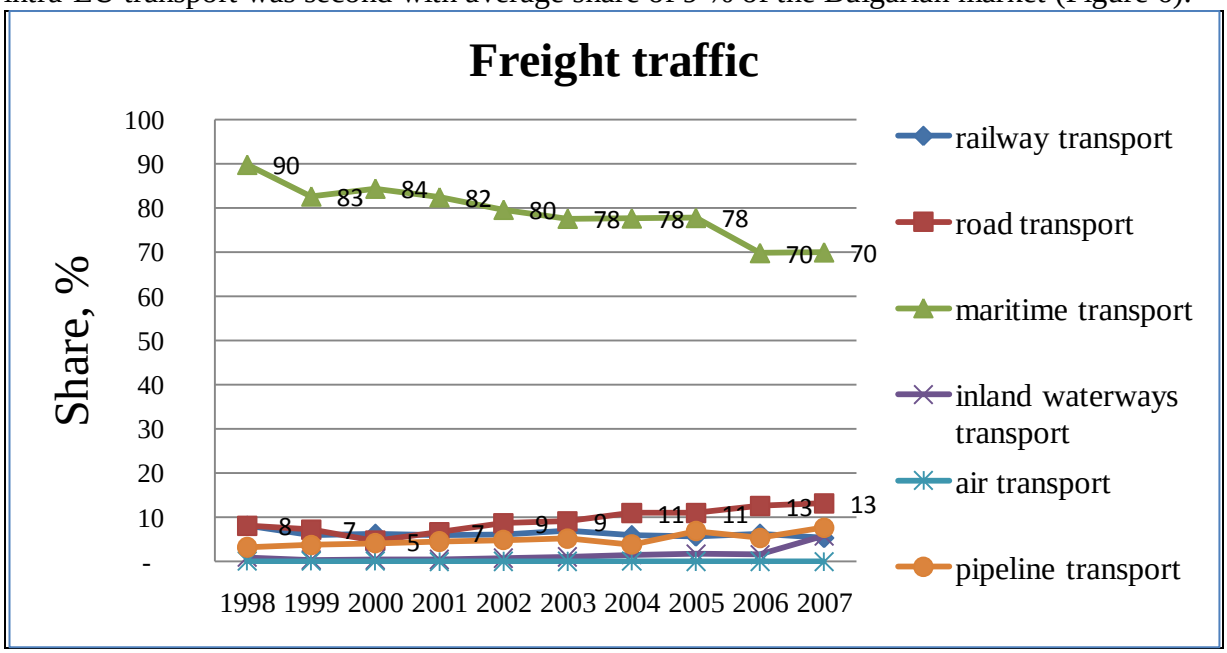

Figure 6 Modal split in freight transport in Bulgaria

Source: National Statistic Institute

When the modal split is presented only for the surface modes then the road transport is of major significance and its services have a share of almost 54% of freight haulage. This indicator allow to assess the effectiveness of policies whose aim is to achieve a shift towards more energy efficient and environmentally friendly modes of transport. It is obvious that this aim is not achieved towards the end on 2007 (see figure 7).

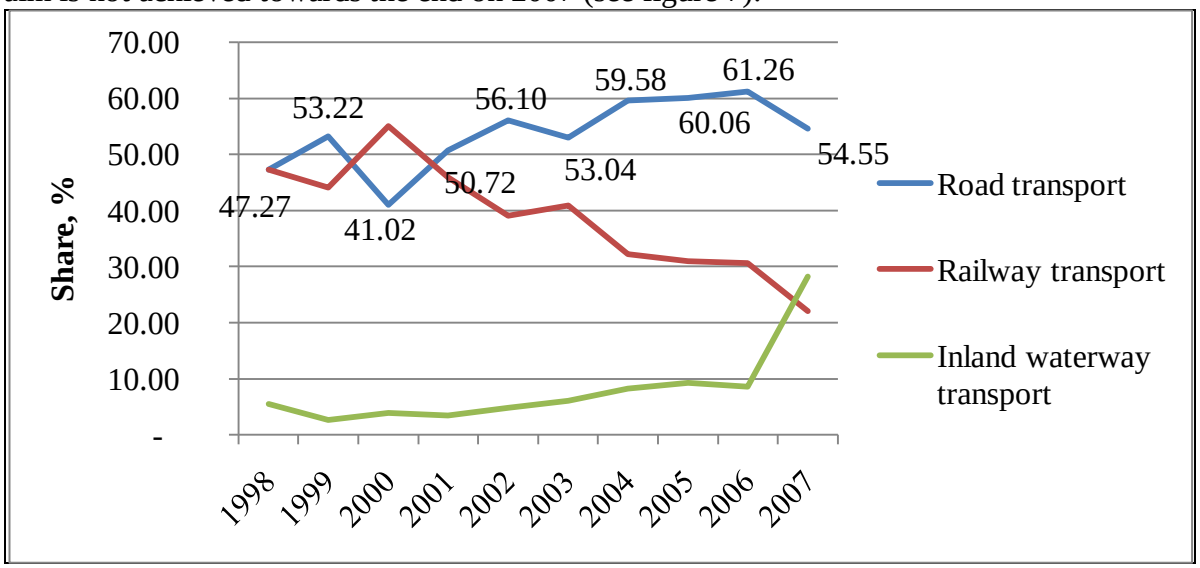

Figure 7 Modal split in surface transport in Bulgaria

Source: National Statistic Institute

Intention of the EU's and Bulgarian transport policy is to focus on possible alternatives to road transport including the appropriate development of the Trans-European Network (TEN-T)[5] and inter-modal links for freight logistics. Promotion of inland waterway transport is also the objective of measures envisaged in the Commission action programme "NAIADES"[6] and the "Marco Polo II" Programme[7].

In order to ensure detailed picture of the development of road transport in Bulgaria some additional indicators could be analysed as follows:

Final consumption of households for transport

The total expenditure for transport in Bulgaria are € 2,9 billion or roughly 18 % of total expenditure in 2007. About 12 % (€ 362 million) was used to purchase vehicles, almost 55,5% (€ 1,6 billion) was spent on the operation of personal equipment e.g. (to buy fuel for the car, spare parts etc.) and the remainder 32% (€929 million) was spent on transport services (e.g. bus, train, plane tickets). The average annual share of transport in final consumption of households is 5,5%. For comparison, in the EU27 these indicators were as follows: 13.7% of the total consumption of European citizens was spent on transport-related items, of which about one third (32,7%) was used to purchase vehicles, almost half (49,5%) was spent on the operation of personal transport equipment and the remainder 17,8% was spent for transport services[8]. Comparing with the average level of the expenditure on transport per head in the EU Member States it is obvious that the final consumption of households for transport in Bulgaria is lower but when the question is about its share then the figures show a relatively higher level of expenditures for transport and especially for transport services.

Employment in road transport

The transport sector provides employment of 145 873 people as of the end of 2006. The number of the employed persons has been gradually decreasing (about 3.5-4.0% in the average per year after 1998) as a result of the optimum methods applied in the activity and private companies' entrance in the sector. After a long period of restructuring, employment

levels in transport sector are now stabilising but in road transport there still exist shortages of qualified personnel. In the end of 2006 some 9580 road enterprises employing 63 262 persons were active in providing road transport services in Bulgaria. They generated over EUR 1,593 billion in turnover. Transport services accounted for 4,04% of the persons employed in the country of which road transport services have a share of 43,4% of persons employed in the whole sector, 26% of them are involved in freight services and the other 17,4% - in passenger road transport (see figure 8).

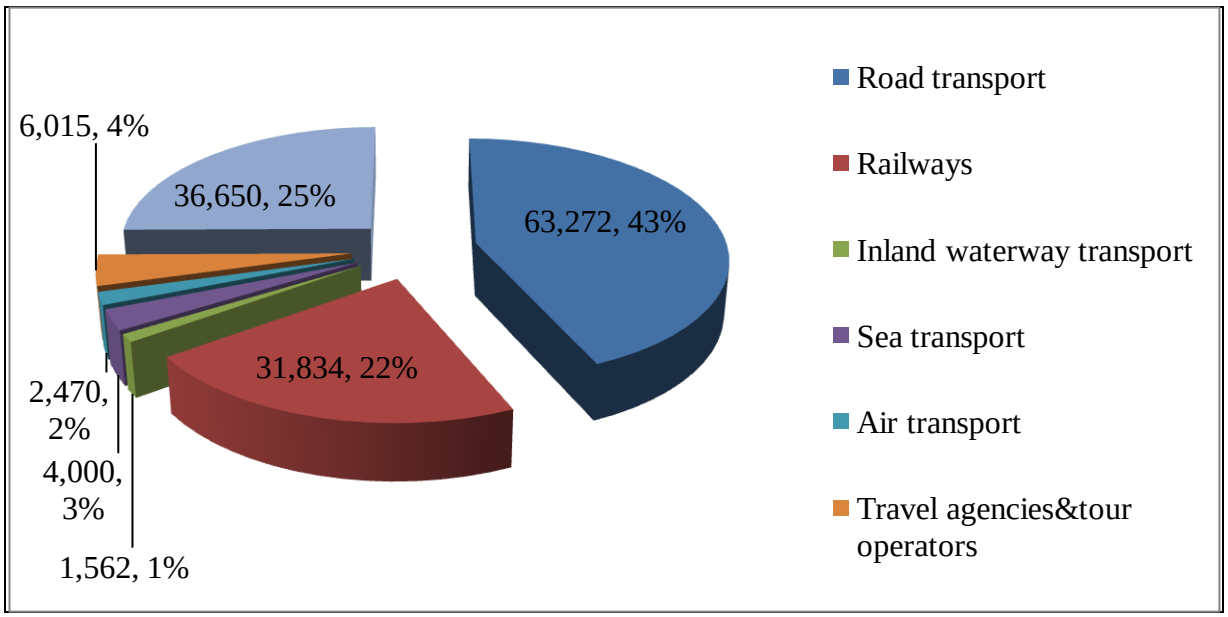

Figure 8 Employment in transport sector in Bulgaria, 2006

Source: EUROSTAT

The elaboration of a short term strategy regarding the human resources development in the transport sector is an essential point related to the fact that the implementation of the major transport infrastructure projects under the Operational Programme on Transport of the Ministry of Transport (Ministry of Transport, 2006b) will have a great impact on employment rates not only during the construction phases but also on the business in Bulgaria at all. This issue is recognized as of great importance for the country. Consequently, maintaining and strengthening the competitiveness of transport operators through improvement in human resources management is the best guarantee for durably high employment.

Stock of vehicles in road transport

During the period 1998 – 2003 the number of trucks, special vehicles and road tractors in Bulgaria is permanently growing but after that it started to decrease. The reason is the fact that Bulgarian road operators must satisfy the technical requirements for access to the freight transport market in EU and they had to renew their old stock of vehicles. The other reason is the optimization of the utilization of vehicle through improvement in service performance and operating higher freight volumes with fewer vehicles. As it could be seen from the figure 9 below during the last 2 years in the period the trend is towards growth in the relevant stock of freight vehicles. The average rate of renewal of vehicles' stocks in the last two years is between 3-4% for the trucks and between 7 to 10 % for road tractors.

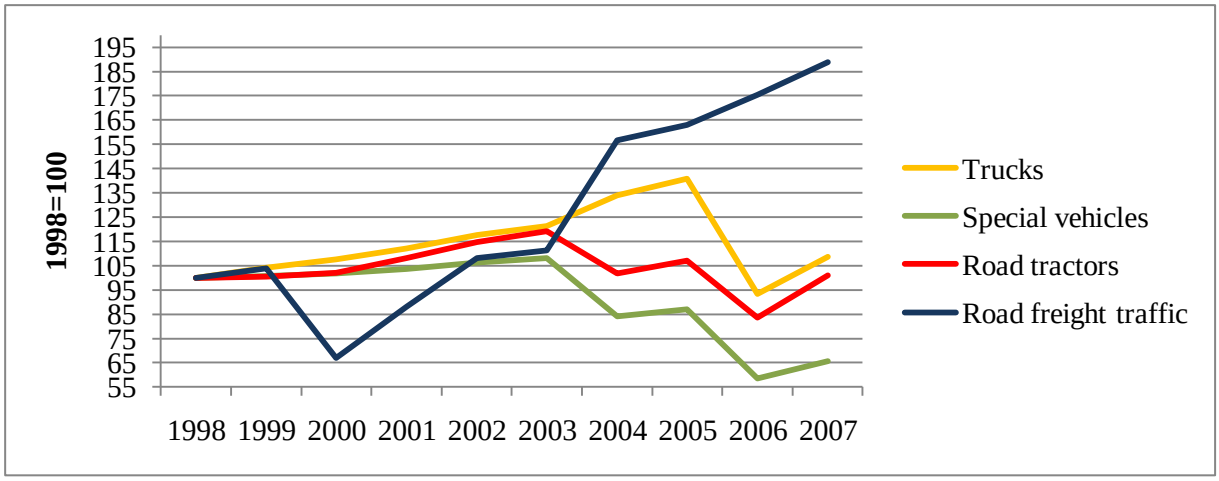

Figure 9 Stock of freight vehicles compared to road freight traffic, 1998 to 2007, index 1998=100.

Source: National Statistic Institute

Respective trends in stock of passenger vehicles are presented on figure 10. As it could be seen, the stock of buses and coaches constantly lessen with the average rate of decrease of 5% while the number of passenger cars in the country is growing from 1998 to 2005. After 2005 for the reasons of EU accession, newly registered private cars are less than in the previous years and they even decrease with 36% in 2006 subsequently increasing with 3% in 2007. At the same time the passenger road carriages increased permanently by an average annual rate of 7%. Again, as well as in the freight transport in the passenger one, there was an attempt for optimal utilization of vehicles through operating higher passenger traffic with fewer buses and coaches.

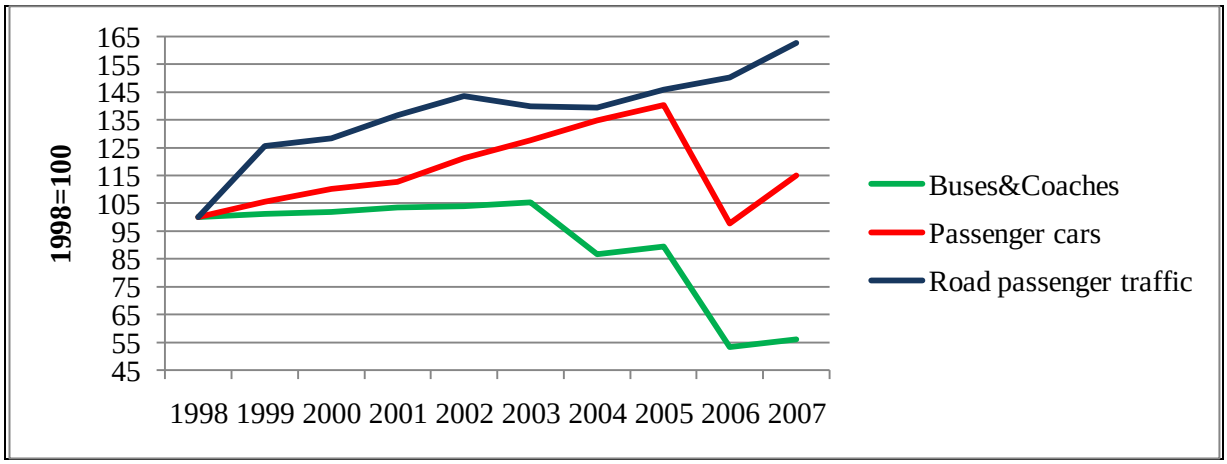

Figure 10 Growth in stock of passenger vehicles compared to the growth in road passenger traffic, 1998 to 2007, index 1998=100.

Source: National Statistic Institute

Number of enterprises registered in road transport

At the end of 2006 the number of registered transport enterprises in Bulgaria are 29 422 of which 14 711 in road transport. The share of registered enterprises for freight services is 52% and for passenger services – 48%[9]. Obviously, despite the high EU-standards and requirements for road transport services, this mode of transport is the most attractive for entrepreneurs. The main reason is the small amount of funds necessary to establish an enterprise. However, the majority of road transport operators have at their disposal only one vehicle but there exist big operators with significant stock of vehicles as well. The freight

road haulage both the internal and the international are operated completely by private enterprises and the passenger transport is operated by state owned enterprises[10] as well as by private ones.

Length and density of road network

The overall density of the entire road network is 0,35 km/km², which is lower than the average about 0,40 km/km² for the EU-27, but is higher than that of countries such as Poland and Slovakia and equals that of Latvia, Lithuania, Romania, and Slovenia. On the other hand, the density of the Bulgarian road network on 10 000 citizens (50,05 km per 10 000 citizens) is lower than the average density for the EU 27 – 94,3 km per 10 000 citizens, as well as for all the new member states, with the exception of Hungary and the Czech Republic. Having in mind the fact that about 40% of the Bulgarian relief is mountainous and therefore low in population density, the overall density of the road system is sufficient.

The classification of the roads is done on administrational basis and does not take into account neither the technical characteristics of the road, nor the intensity of traffic, except when dealing with the motorways (see table 1). In 1999 with the approval of the new system of classification, the IV class roads were excluded from the national road network. At that point 5 256,6 km of the latter were reclassified as roads III class. The main goal behind the reclassification was to leave roads connecting the municipal centres and groups of smaller villages in the respective municipalities. Those roads have been designed and built according to the standards for IV class roads and therefore do not meet the current III class standards. The condition of many of those roads is extremely poor. As a result, the main part of the road network - the roads with the highest concentration of traffic- includes the motorways and a part of I, II, and even III class roads.

Table 1 Length and density of road network in Bulgaria

Indicator	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total length of road network, km	37 261	37 288	37301	37296	38232	38249	38221	38245	38352	38432
Sare of motorways	0,9	0,9	0,9	0,9	0,9	0,9	0,9	0,9	1,0	1,1
Share of main roads	8,1	8,1	8,1	8,1	7,9	7,7	7,7	7,8	7,7	7,7
Share of secondary roads	10,3	10,2	10,3	10,3	10,0	10,5	10,5	10,5	10,5	10,5
Share of third class roads	17,2	31,8	31,9	31,9	31,7	31,3	31,3	31,3	31,3	31,3
Share of other roads	63,5	49,0	48,9	48,9	49,6	49,6	49,6	49,6	49,5	49,5
Dencity of road network on km²	0,34	0,34	0,34	0,34	0,34	0,34	0,17	0,34	0,35	0,35
Density of road network on 10 000 citizens	44,98	45,31	45,8	47,3	48,45	48,75	48,99	49,28	49,69	50,05
Investments in road network, mio EUR	n/a	n/a	n/a	191,6	175,1	181,6	213,8	282,7	311,5	371,8

Source: National Statistic Institute

When assessing the overall condition of the road network in the country, it should be noted that a large portion of the roads have not been repaired in more than 15 to 20 years, when periodic maintenance is scheduled for every 5 to 7 years and thorough maintenance and major repairs are scheduled for every 12 years[11]. Most of the reclassified roads mentioned earlier need reconstruction in order to meet the standards for III class roads. The roads going east-west are generally better developed than those going north-south, with unsatisfactory service in the peripherals, namely on the southern border - the Danube riverside, and those located between the Pan-European transport corridors IV and IX. Due to the chronic lack of

maintenance funds and the previously postponed repair work, the condition of the road network is unsatisfactory.

The condition of the road infrastructure by the middle of 2006 is characterized by (Ministry of Transport, 2006):

- The lack of funds, leading to inability to meet the normative deadlines for maintenance and repairs, which results in multiplication of the aging effect and noticeable increase in the expenses for periodic repairs and maintenance of the road pavement. For the same reason previously prepared technical projects, mainly dealing with road rehabilitation, have to be revised and redone;
- The excessive interval of time between the preparation of the projects and their realization – often caused by a change in the legislation, or an expiration of the validity of documents connected with the expropriation of areas meant for building purposes, of reports, of EIA (Environmental Impact Assessment) decisions, etc.;
- The trend of deterioration of the overall condition of the roads continues to exist. Over the years 2004 and 2005 the length of the roads classified as being in good condition has decreased with 1444,6 km and 700 km respectively;
- The condition of the III class road network, which is of great municipal importance, is extremely poor due to the fact that the majority of the roads have not been repaired in over 20 years.
- The need of enhancement or reconstruction of the sections of the road network with highest levels of concentration of traffic that have exhausted or are close to exhaustion of their traffic capacity.
- The need of construction of roads to connect the towns and different roads in the north-south direction on the main road system, with priority given to the roads part of the TEN-T road network.

Investments in road network

When comparing the investments in roads relative to the gross fixed capital formation (GFCF) it is obvious that despite the decrease between 2001 and 2004, the indicator is consistent with the overall growth in economy (see figure 11). However, including the growth in the total length of road network in the "picture" we could conclude that the real reason for the investments growth is on account of modernization and rehabilitation of existing roads but not of the new roads' building.

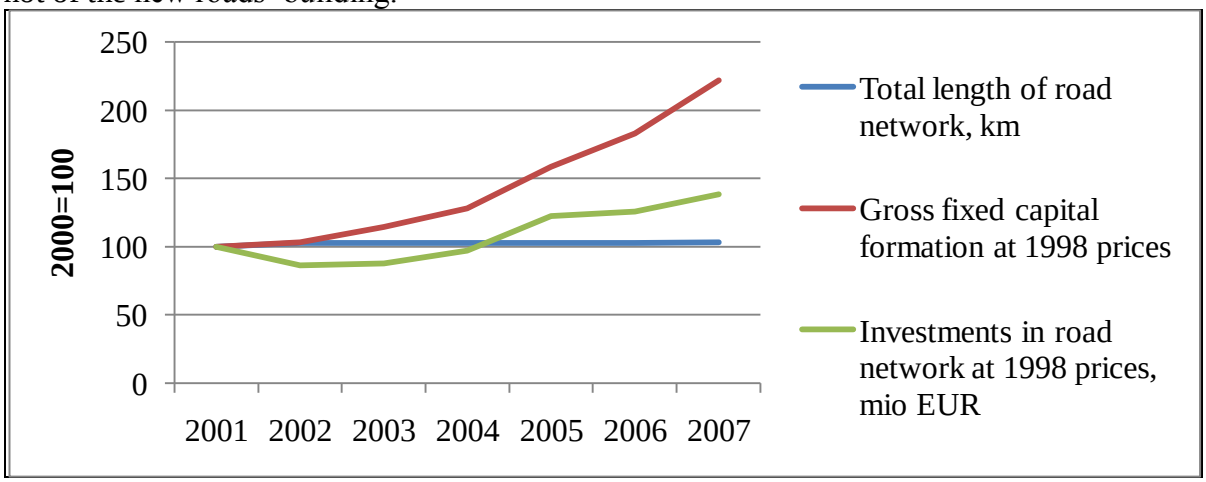

Figure 11 Investments in road network compared to the gross fixed capital formation, 2001 to 2007, index 2001=100.

Source: National Statistic Institute and Road Network Agency

The Programme for construction and development of the road network in Bulgaria is oriented towards the fulfilment of the main principles of state transport policy enhancing the integration of Bulgaria in the EU and at the same time, encouraging the development and improvement of the trade relations with the neighbouring countries. The main investment projects are directed to international roads and Pan-European Corridors in order to ensure modernisation of the national road network and to improve transport connections with the neighbouring countries.

Taking in consideration the analysis of the key indicators made above it could be concluded that the overall framework described shows that notwithstanding the important role of the road transport for the mobility in the country, its development does not ensure consistent contribution to the economic development. The indicators presented are used for the estimation of level of economic sustainability of road transport in terms of the growth of GDP and other indicators for economic development. The indices' assessment of the effect of the growth in the indicators is generally reflected by a change of the value of one or more indicators. For this reason it is necessary to estimate the overall framework and the influence of different indicators on the economic performance.

ASSESSMENT OF THE ECONOMIC SUSTAINABILITY OF ROAD TRANSPORT: METHODOLOGICAL FRAMEWORK AND KEY INDICATORS

Having in mind that transport activities contribute to the economic development of the country, it is very important to estimate the overall impact of transport or of a separate mode on the economic growth and society's wealth (Chen et al., 2007). The evaluation of the impact of road transport on the economic development of the country will permit to assess the achievement of the main goals regarding economic sustainability of transport as whole. The transport sustainability impact assessment can be done by identifying the specific contribution of transport to the process of total wealth formation (Korzhenevich, A et al., 2007). For the purpose of estimation, the indicators analysed above are included in an assessment matrix. Using this matrix will enable to estimate the overall fulfillment of the objective on economic sustainability of road transport included in Bulgarian transport policy. The model suggested in the paper is developed in order to analyse economic aspects in sufficient details and to assess the influence of the development of road transport on the national economy. The model considers the linkages between transport and economy, mainly in terms of the effects of road transport development on economic variables like GDP, GVA, gross fixed capital formation etc. As a result its contribution to the sustainability could be estimated.

The set of variables presented in table 2 are used to compute the correspondence between the indicators and the respective transport measures. In some cases, however, the indicator is not a direct output of the model, so further work is required. On the other hand, there appears to exist some gaps as described in the previous part, several measures of contribution of transport to the economic development are available only for one or two years (such as employment in road transport, share of transport expenditure in the total of households' consumption etc.), consequently they are not included in the assessment matrix. As far as the usage of the modelling tool is concerned, a partial assessment is provided. On the other hand, the recommendations of EUROSTAT related to economic sustainability assessment are towards the usage of traffic volume and modal split as common measures for the contribution of transport to the economic development. With regard to that, an attempt for evaluation of the economic sustainability of road transport is presented in the paper. The model data included in the table 2 is analysed using SPSS14 statistical software.

Table 2 Road transport impact on economic development indicators - assessment matrix

Economic indicators	Influencing factors	Functional form (based on sig F)	Factors' influence	Indicator's response	Significance Sig t
GDP	Freight traffic, tkm; Passenger traffic, pkm	Cubic Cubic	0,354 0,247	1,2% 0,9%	0,002 0,001
GDP	Road freight traffic, tkm Road passenger traffic, pkm.	Compound Compound	0,354 0,247	1,2% 0,9%	0,002 0,001
GVA	Freight traffic, tkm; Passenger traffic, pkm;	No functional form fitting Logarithmic	0,585	1,3%	Not significant 0,000
Share of transport in GVA	Share of road transport in freight traffic; Share of road transport in passenger traffic	No functional form fitting. Linear	0,199	1,4%	Not significant 0,013
Road freight traffic, tkm	Number of lorries; Number of road tractors; Number of special vehicles	No functional form fitting No functional form fitting Linear	0,000		Not significant Not significant 0,001
Road passenger traffic, pkm	Number of buses and coaches; Number of passenger cars.	Linear No functional form fitting	0,000		0,017 Not significant
Road freight traffic, tkm	Length of roads; Investments in road network;	Exponential Logistic	0,003 0,050	0,03% 0,43	0,047 0,015
Road passenger traffic, pkm	Length of roads; Investments in road network;	Linear Quadratic	0,057	0,12	Not significant 0,035
Gross fixed capital formation	Length of road network Investments in road network	Linear Linear	0,82 27,1	9,2% 2,1%	0,035 0,002

Introduction of the key economic indicators and respective indicators for the development of road transport in the matrix seems to give a good notion about the impact of this mode on the economic development of the country. Obviously, the volume of freight and passenger traffic has significant influence on the GDP produced – on 1 billion tkm change in freight transport it changes with EUR 354 million or 1,2% of GDP. Respective change induced by passenger transport is EUR 247 million or 0,9% of GDP. When analysing the influence of road traffic the changes induced are the same. Consequently, in Bulgaria the major share of the contribution of transport to GDP is on account of road transport.

The influence of the passenger traffic on GVA could be estimated as significant. On 1 billion pkm change in passenger traffic the response of GVA in the country is EUR 585 million which is a change of around 1,3% of GVA. For freight traffic the matrix could not produce relevant measure of influence based on the lack of functional form explaining the

correspondence between the indicator GVA and the influencing factor ‘freight traffic’. Additional estimation of the change of share of transport in GVA as a result of change of the share of road passenger traffic gives a notion about the influence of road transport on the GVA produced in the economy as whole. On 1% change in the share of road transport on the transport market response 19,9% change in the share of transport in GVA. Consequently, the change in modal split induces respective change in GVA in transport and GVA in the economy as whole of around 1,4% for the whole period.

Another factors included in the matrix are the changes in stock of vehicles in road transport. The results show that there’s no significant influence of these factors on the road passenger and freight traffic. The case is different regarding the length of roads and the investments in road network. On 1 km change in the total length of the roads response 3 million tkm change in freight traffic, e.g. 0,03% change in freight traffic. The respective change in passenger traffic is insignificant and could not be estimated.

An important influencing factor when assessing the overall economic influence of road transport is “Investments in road network”. As it could be seen from the table above, the change induced by EUR 1 million investments in road network is around 50 million tkm and 57 million pkm. That is to say 0,43% of the freight traffic and 0,12% of the passenger traffic.

The importance of the investments in transport and the total length of road network is higher when exploring their influence on gross fixed capital formation in the country. The response of the indicator is equal to 820 000 EUR on 1 km change in the length of road network (9,5%). On EUR 1 million change in the investments in transport correspond EUR 27,1 million change in gross capital formation for the whole period which is almost 0,32% of GFCF. On annual basis investments in road network contributes with 2,1% of GFCF. Obviously, namely investments in road network and length of roads are crucial for the influence of the road sector on the economic development in the country. Based on that, recommendations for future development and for the transport policy of Bulgaria could be made.

RECOMMENDATIONS FOR FUTURE DEVELOPMENT AND ACHIEVEMENT OF ECONOMIC SUSTAINABILITY OF ROAD TRANSPORT

In order to evaluate the sustainability of road transport, the first step was to identify the main impact assessment on the relevant national transport policy and sustainable development priorities. These categories are as follows (Martino et al., 2006):

- **economic impact of transport -** the direct impact of the transport on growth and employment as well as the indirect impact of transport policy on the competitiveness and spatial development;
- **environmental impact of transport -** the contribution of transport to energy consumption, climate change, air pollution, noise, land consumption, water pollution, waste production and the issue of pricing transport external costs;
- **social impact of transport -** the effects of transport policy on income distribution, the contribution of transport to social exclusion due to poor or uneven accessibility of vulnerable groups (low income, elderly, etc.) to job opportunities, education, health care, social relations etc., and the harmful effects of transport on people health, including mainly the impacts of road accidents, exposure to air pollution and noise, lack of physical activity.

Contribution of road transport in Bulgaria to the economic pillar of sustainability could be assessed having in mind that the citizens and policy makers are concerned with the role that policies or transport infrastructure projects can play in generating employment and growth. The transport sector plays a double role: it contributes to the formation of the GDP and employment in the country as other sectors of the economy, and on the other hand, transport policies and projects have an impact on short and long-term spatial development. Through its

contribution to the gross fixed capital formation, investments in transport infrastructure are a principal instrument for economic development.

In view of our small land area and dispersed pattern of population settlement and economic activity, the road transport is, and will continue to be, the dominant mode of internal transport in Bulgaria. The road mode would lose this dominance if there was comprehensive investment in a national public passenger transport and railway freight services. Instead, in the transport policy of the country the door is opened to largescale road-building, based on forecasted traffic growth predictions which did not take into account any future modal shift. As traffic increases, an increasing percentage of the network will fail to meet the specified level of service objective without ongoing improvements to the network.

The problems in the development of the road transport in Bulgaria are numerous but it must be mentioned in priority the poor quality of the road infrastructure; lack of sufficient administrative capacity and technical equipment to perform an effective control of the implementation of the social and technical requirements of acquis communautaire transposed in Bulgarian legislation, the low technical level of the considerable part of the motor fleet, and, as a major consequence, the limitation of the access of the Bulgarian transport operators to the transport market of the EU. Currently, this access is limited on the basis of bilateral agreements with the member-states and the licensed quotas for market access agreed therein.

A well-developed and maintained road infrastructure provides the foundations for the country's economic growth and sets the preconditions for development of the road transport. The implementation of various projects co-financed under EC will be fulfilled according to the Operational Programme on Transport[12] (Ministry of transport, 2007b). The improvement of the road network and the progress in the road transport sector as a whole depend on the realization of the following strategic goals:

- Improvement of the national road network control system through introduction of a modern planning processes providing effective maintenance and saving financial resources;
- Achievement of a compliance of the technical and operational parameters of the road infrastructure with the European technical standards for ensuring transport safety and quality;
- Homogenization of the road network along the Pan-European transport corridors and within the sections of the TINA-network on the territory of the country;
- Integration of the Bulgarian road network with neighboring countries network.

The achievement of these goals will provide better opportunities for the successful integration of the national road infrastructure into the developed road network of the EU.

Sustainable road transport is fundamental for the economic development. Whereas it started as a movement driven by environmental concerns, over these last years there has been increased emphasis on social equity and fairness issues, and in particular the need to ensure proper access and services for lower income groups and people with mobility limitations, including the fast growing population of older citizens. Many of the people exposed to the most vehicle noise, pollution and safety risk have been those who do not own, or cannot drive cars, and those for whom the cost of car ownership causes a severe financial burden. For that reason it is of crucial importance to assess the economic impact of passenger transport and to outline the opportunities for further development of public road transport. For the time being, the road transport in Bulgaria is developing, showing serious growth with respect to the passenger carriages. The problems with the age structure of the stock of vehicles in the country, the transport operators' difficulties concerning planning the investments, the emissions into the environment, the noise caused by road transport are among the most negative factors, which the country must overcome in order to achieve higher level of sustainability.

The main general result from the analysis made is that the overall effects of transport infrastructure investments and other transport policies are small compared to other socio-economic and technical macro-effects, such as globalization, increasing competition between cities and regions, ageing of the population, shifting labor force participation and increases in labor productivity. These economic issues have additional and even greater impact on the economic development of the country. As it was considered the economic growth due to investments in road network is 2,1% over the last 7 years which is a very small contribution comparing to indirect economic impact induced by transport accidents and environmental pollution. The indirect economic impacts related to losses of productivity and output and costs, related to elimination of negative effects such as noise, air and soil pollution, greenhouse gases, etc. should be included in the model as well in order to evaluate the overall long-term sustainability of road transport. From the *economic point* of view, including these indicators in the assessment matrix will enable to evaluate their indirect influence on the GDP growth and on the other hand, to achieve more accurate base for comparing returns of investments in road network. Thus, the welfare of the society, as a whole, could be evaluated unlike the growth in traffic volume. Furthermore, this will add to the social pillar of sustainability of transport.

CONCLUSION

In order to contribute to the economic development of the country the transport policy should be directed towards sustainable development of the road transport infrastructure of national, EU and cross-border importance. Achievement of this goal is a precondition for sustainable and balanced long-term economic growth. Comparing the measures envisaged in the National strategy for sustainable development of transport system (Ministry of Transport, 2007 a) and the conclusion from the analysis made, it is clear that the economic dimension of this policy is consistent with the main principles of sustainable development.

Sustainability demands a broader look at priorities for road transport alongside other modes to find the best balance between the needs of the economy, society and the environment. With regard to this the main ambitions of Bulgarian transport policy should be for transport that contributes to the economic success of the nation by enabling more people to travel in a way that minimizes the environmental impact; transport that is flexible enough to adapt and respond to social changes; transport that is easy and accessible to use.

Delivering a sustainable road transport is the most positive statement about the growth and development of this mode of transport in Bulgaria. Passengers want road transport services that are reliable and represent value for money, that are comfortable, accessible and easy to use. The public as a whole wants road transport that contributes to economic growth while meeting the environmental challenges ahead. The road transport can only meet these goals if it has the sufficient infrastructure to carry the freights and the passengers who want to use it.

The road transport sector contributes to the formation of GDP, Gross Value Added and employment, as any other sector of the economy. Consumption of private and public transport services is also an important component of total consumption, and the deterioration of transport equipment and infrastructure is included in the consumption of fixed capital. Thus, transport contributes to the formation of gross and net national saving and economic development as whole (Martino, 2006). On the other hand, the most relevant contribution of transport to the value of human capital is negative, i.e. the potential years of life lost due to the injuries and fatalities caused by transport accidents. Going downward in the assessment process, transport is clearly a key consumer of energy and land resources, and a major source of pollutants and CO2 emissions. Consequently, besides its economic contribution for full transport sustainability impact assessment it is necessary to consider the social and environmental issues as well.

Addressing the sustainability of transport systems is an important activity as evidenced by a growing number of initiatives around the world to define and measure sustainability in

transportation planning and infrastructure provision. Frameworks based on important causal relationships between infrastructure and the broader environment, infrastructure impacts on the economy, environment, and social well-being; and the relative influence of agencies over causal factors, are largely being used to develop and determine indicator systems for measuring sustainability in transport systems (Joen & Amekudzi, 2005). Process-based approaches involve community representatives and other stakeholders in planning and present opportunities to educate the public and influence collective behaviours. These frameworks can be used collectively to help policy makers refine their visions as well as develop policies, planning procedures, and measurement and monitoring systems for achieving sustainable transport systems.

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[1] European Commission, Directorate-general for Energy and Transport. *Keep Europe Moving: Sustainable Mobility for our continent.* Brussels, 2006.

[2] With regard to the achievement of this goal a National Long-run Programme for Encouraging the Use of Bio-fuels in Transport Sector 2008-2020 is developed.

[3] The TINA process was designated to initiate the development of a multi-modal transport network within the territory of the candidate countries for accession: Estonia, Latvia, Lithuania, Czech Republic, Slovakia, Hungary, Poland, Slovenia, Romania, Bulgaria and Cyprus. In the Final Report, October 1999, the backbone network was defined, which was the network proposed by the European Commission and is based on the ten Pan-European Transport Corridors, and the additional network components, proposed by the countries.

[4] Based on data for 2006. Source: EUROSTAT and National Statistic Institute.

[5] The idea of Trans-European Networks (TEN in the EU jargon) emerged by the end of the 1980s in conjunction with the proposed Single Market**.** The **Treaty** establishing the European Union provides a sound legal basis for the TENs. Under the terms of Chapter XV of the Treaty (Articles 154, 155 and 156), the European Union must aim to promote the development of Trans -European Networks as a key element for the creation of the Internal Market and the reinforcement of Economic and Social Cohesion**.** This development includes the interconnection and interoperability of national networks as well as access to such networks. The construction of Trans-European Networks is also an important element for economic growth and the creation of employment. Directorate General for Energy and Transport, 2008.

[6] European Commission adopted an action programme on the promotion of inland waterway transport called NAIADES (Navigation and Inland Waterway Action and Development in Europe) in January 2006. The programme includes recommendations for action to be taken between 2006 and 2013 by the European Community, its Member States and other parties concerned.

[7] Marco Polo is the European Union's funding programme for projects which shift freight transport from the road to sea, rail and inland waterways. The current, second Marco Polo programme runs from 2007-13.

[8] Source: EUROSTAT.

[9] Source: EUROSTAT.

[10] The state companies perform passenger services under public services obligations. It is especially widely spread for public urban transport and for intercity transport services ordered by municipalities.

[11] As it is stated in the Strategy for development of the transport infrastructure in Bulgaria towards 2015, developed by the Ministry of Transport of the Republic of Bulgaria. http://www.mtitc.government.bg/page.php?category=451&id=2022

[12] The investment programme of Ministry of Transport envisages investments in road network of EUR 3,6 billion between 2007 and 2013 including budget, EU funding and other sources.