



## The role of the Transport System in the Economic Development of Bosnia and Herzegovina

**Haris Gekić** Higher Level Teaching Assistant, M.Sc., PhD student, Department of Geography, Faculty of Natural Sciences, University of Sarajevo, Zmaja od Bosne 33-35, 71000 Sarajevo, Bosnia and Herzegovina,

**Aida Bidžan**, Higher Level Teaching Assistant, M.Sc., PhD student, Department of Geography, Faculty of Natural Sciences, University of Sarajevo

**Boris Avdić**, Teaching Assistant, MA, Department of Geography, Faculty of Natural Sciences, University of Sarajevo

**Received: June 5, 2012/ Accepted: March 22, 2014, 221-238 P**

### Abstract

The article discusses the impact of transport system on economic development in Bosnia and Herzegovina. Transition or the process of restructuring the economy and society in Bosnia and Herzegovina is taking place very intensively, but also in very difficult and special conditions. Construction of new and expansion and reconstruction of existing roads in Bosnia and Herzegovina is the assumption that the transport infrastructure will have a strong influence on regional economic development. It is also important to note that the future economic growth domestic industrial production and population growth, and development of the transport system and the demand for transport services, will have a steady growth with the help of the more developed transport infrastructure in the future. The transport system of Bosnia and Herzegovina and neighboring countries is differentiated. The results show large differences between industries that are rapidly recovering from war damage and those that are still in a state when they do not serve their purpose. Road transport is poor and despite the difficulties inherent structure largely begun to expand while the railroad has no expansion takes place with very little capacity.

**Keywords:** Transport Systems, Economic Development, roads, transport infrastructure, transition

### 1. Introduction

Efficient transport is a critical component of economic development, globally and nationally. Transport availability affects global development patterns and can be a boost or a barrier to economic growth within individual nations. Transportation investments link factors of production together in a web of relationships between producers and consumers to create a more efficient division of production, leverage geographical comparative advantage, and provide the means to expand economies of scale and scope. Transport's contribution to economic development includes the following:

- Network effects—linking more locations exponentially increases the value and effectiveness of transport
- Performance improvements—reducing cost and time for existing passenger and freight movements increase transport's contribution to economic growth
- Reliability—improves time performance and reduces loss and damage, thus reducing economic drag
- Market size—access to wider markets adds to economies of scale in production, distribution, and consumption, thereby increasing economic growth
- Productivity—transport increases productivity gained from access to a

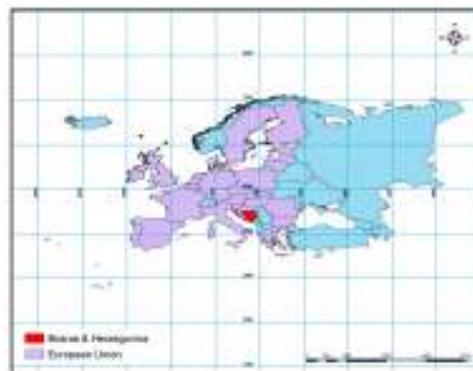
larger and more diverse base of inputs such as raw materials, parts, energy, and labor, and broader markets for more diverse outputs (Krugman, 1991).

The transport sector is an important component of the economy, impacting on development and the welfare of populations. When transport systems are efficient, they provide economic and social opportunities and benefit that impact throughout the economy. When transport systems are deficient, they can have an economic cost in terms of reduced or missed opportunities. Transport also carries an important social and environmental load, which cannot be neglected. The impacts of transportation are not always intended, and can have unforeseen consequences such as congestion. Mobility is one of the most fundamental and important characteristics of economic activity as it satisfies the basic need of going from one location to the other, a need shared by passengers, freight and information (Rodrigue, 2006).

Dual name of Bosnia and Herzegovina is actual name of independent and internationally recognized state (since 6 April 1992) which is also 177th member of OUN (since 22 May 1992), in the frame of existing borders. Total area of Bosnia and Herzegovina is 51 209 km<sup>2</sup> (rank 125th in the World).

According to its geographic position, Bosnia and Herzegovina is a country of Southeast Europe. Bosnia and Herzegovina is located in a western part of the Balkan Peninsula, and adjoin with the Republic of Croatia from north, west and south, and from east with Republic of Serbia and Republic of Montenegro. With its coast facade in Neum – Klek area in length of 24, 4 km, it comes out to the Adriatic Sea. According to

astronomical-geographic position, territory of Bosnia and Herzegovina is situated on north Earth hemisphere in a field of geographic coordinates: 42<sup>0</sup> 33' 00'' N (Trebinje) and 45<sup>0</sup> 16' 30'' N (Bosanska Dubica), and 15<sup>0</sup> 44' 00'' E (Bihać) and 19<sup>0</sup> 37' 41'' E (Bratunac). Such astronomical-geographic position has a great importance for physical-geographic characteristics of territory of Bosnia and Herzegovina and its life conditions, especially climatic, hydrographical, pedological and biogeographic characteristics (Figure 1). In geotectonic and geomorphological sense, the territory of Bosnia and Herzegovina lies in Mediterranean zone of young mountain chains of the Dinarides, unique mountain regional complex of Southeast Europe, with mild exceeding towards north into Pannonia plain, and with sharp exceeding on south into the Adriatic basin. In hydrographical sense, the greatest part of the territory of Bosnia and Herzegovina belongs to the Black Sea's basin, and minor part to the Adriatic's basin.



**Figure 1. Geographic position of Bosnia and Herzegovina in Europe**

The territory of Bosnia and Herzegovina has a very favourable regional-geographic position, because it is situated between European regions (the Mediterranean and Pannonia

regions) of several natural-geographic, social-geographic and economic-geographic characteristics. This component of geographic position of Bosnia and Herzegovina has been valorised for centuries, because it represents the most powerful factor of the future integration into European social, political and economy flows. Since 1 July 2013, Bosnia and Herzegovina has adjoined the European Union as well.

Actual international political-geographic position of Bosnia and Herzegovina has started since the moment when on Independence Referendum, which took place on 29 February and 1 March 1992. Its inhabitants decided it should be independent and sovereign integral state, as it was recognized later on by the European Union on 6 April 1992, and then by UN on 22 May 1992 and by great number of countries as well. Until now Bosnia and Herzegovina has been admitted into the number of international organizations (e.g. the Council of Europe), associations and institutions. In wide international frames such position of Bosnia and Herzegovina may be considered as generally favourable.

In a historic-geographic and historic-cultural sense, the population in Bosnia and Herzegovina survives on a territory where during the history it has come to stronger fusions and interferences of civilization-cultural influences from both European and Asian people and leading monotheistic religions. That characterizes Bosnia and Herzegovina as multicultural, multireligious and multiethnic state community. According to estimates, about 3,8 million inhabitants live today in Bosnia and Herzegovina (127<sup>th</sup> in the World).

In economic-geographic sense, if globally observed, Bosnia and Herzegovina is situated between economically developed area of Central, West and North Europe on one side, and less developed area of Northeast, East and Southeast Europe on the other side. With Bosnia and Herzegovina's coming out to the Adriatic Sea and with building the land roads (railroads and highways) of meridian stretch direction along the natural corridors which bond the European regions of various levels of social-economic development, more favourable conditions have been created for complete valorisation of its transport-geographic position and actively inclusion into global economy flows of Europe and the Mediterranean. Advances of transport-geographic position, as important transit area between the European regions, makes the territory of Bosnia and Herzegovina naturally unavoidable and economic-geographically very important, what is testified by the route of trans-European corridor Vc which passes through Bosnia and Herzegovina.

Propitiatory of economic-geographic position of Bosnia and Herzegovina come to significance when taking into account propitiatories which come from transit transport-geographic position and richness in hydro energetic potential, ores, forests, cultivated lands and work force in Bosnia and Herzegovina on one side, and their poverty in developed European countries in wider environment, on the other side. Those are the advances by which valorisation Bosnia and Herzegovina has greater possibilities for joining the economy flows of Europe comparing to other countries of Southeast Europe.

Belonging of Bosnia and Herzegovina to large morphologic complexes – the Pannonian, Dinaric and Adriatic, with different economic structures, physical geographic characteristics and historical and cultural courses, essentially determines its transport-geographic position. In diversity of relief structure of the area of Bosnia and Herzegovina particularly distinguish themselves the Dinaric Alps that stretch in a northwest-southeast direction and create natural obstacles with a limited number of passes, which represent important transport corridors by river valleys. Geographic position of Bosnia and Herzegovina has an important role for the European transport system. Historical flows have been passing for thousands of years over the Balkans (more recently the term Southeast Europe has been used) in two basic directions, diagonally from West Europe toward the Middle East, and transversally from Central Europe toward the Adriatic basin. Through historical development, transport networks on the Balkans had main centres in the wider surroundings of Bosnia and Herzegovina, such as Vienna, Budapest, Belgrade, Istanbul and Rome. Because of this, different conceptions of constructing the transport network were present in geographic area of Bosnia and Herzegovina, and in its surroundings. Particularly deep traces were left by the Ottoman Empire that tried to construct the road network with a centre in Istanbul, and Austro-Hungarian Monarchy that was building the railway tracks with the centres in Vienna and Budapest. Today's system of transport routes of Bosnia and Herzegovina developed through a long historical past, but the importance of particular directions was changing in

dependence of socio-economic conditions and geopolitical processes (Marić, 2008).

Geographic position of the country is a dynamical and complex phenomenon, which inevitably includes an evaluation of spatial relations of geographic and social factors, as well as their interdependence. Under the Yugoslav Federation, Bosnia and Herzegovina was characterised by local and 'internal' dimension of its geographic position in relation to dialectically and functionally connected contents of the Yugoslav space. With gaining independence and state-building of Yugoslav republics, territorial structure of the former Yugoslav and wider regional space has been changing. By this, geographic position of single new states in the same space has changed completely. The least what Bosnia and Herzegovina can and has to do now for its economic development is to valorise the complexities and connections of intraregional, interregional and supraregional dimension of its geographic position, and the related interests in circumstances of a new geo-transport European structure and relations in a narrower and wider surroundings (Tunjić, Jug, 2008).

## **2. Theoretical bases**

According to teoretical-metodological approach, researches in this paper are very complex and they include knowledge on causes and consequences of the most important transport-geographical problems which reflect on economic development of Bosnia and Herzegovina. Beside classical scientific methods (analysis, synthesis, generalization etc.), in this paper were used, among others, cartographic, geographical and mathematical-statistical methods.

As initial, basic and general, the analysis method is necessary for partition of such a complex system as it is transport as a subject in transport geography study.

Geographical method is a method without which geography (thus transport geography as well) couldn't be imagined, yet becoming necessary to other sciences. Its importance and significance come out from the fact that appearances and processes have one of the most important characteristics, and that is territoriality. Transport as a subject in transport geography study has a very important characteristic – bond with territory as irreplaceable category, i.e. with concrete territory (part of geographical space) regardless on taxonomical hierarchy. Russian geographer Kolosovskij, N. (1969) says about this method: "Territorial approach is considered as general and compulsory when study all the problems in physical and economic geography as well. Important difference between physical geography and neighbour natural science areas, as well as between economic geography and other social sciences is reflected in systematic and compulsory usage of this approach".

Map is the beginning and the end, "alpha and omega" of any geographical research. Geographical opinion is bond with territory and map represents simplified territory model, it is a second geographical language.

In 1959, Wilfried Owen emphasized: "There is a close relation between volumes of transport and levels of economic activity. In the United States, for example, over a considerable number of years every dollar of gross national product (in 1947 prices) has meant the movement of some four ton miles of intercity freight. This

close correlation results from the fact that most economic activities are possible only if transport is available to make them so. Comparisons of transport facilities and services among countries in different stages of economic development emphasize the relationship. For example, France has 136 km of improved roads for every 100 square km. of area, compared to 5 km of improved roads in Indonesia and 2 in Paraguay. There are nearly 4,000 motor vehicles for every 10,000 persons in the United States and only 9 for that many people in India. Railway ton-km of freight total more than 7 100 per capita in Canada compared to 71 in Iran. Rail passenger travel per capita in the Netherlands is seventeen times what it is in Colombia".

To understand the theoretical connection between transportation and development, it is important to appreciate the fact that the transportation sector of any economy is tied directly or indirectly to a multitude of other sectors. The following are only a few of the many activities directly linked to the transport sector of any economy:

- Transportation facility/equipment building and maintenance,
- Construction materials/equipment processing and supply,
- Transport facilities operation and administration,
- Transportation program/service management and administration,
- Acquisition and distribution of transport and related services,
- Supply of catering and other services to transport sector employees.

This suggests that any effort to improve the transport sector is likely to have a (positive) ripple effect on these and other areas of the economy. Thus,

transportation constitutes a strong production input (Njoh, 2008).

A specific purpose of transportation is to fulfill demand for mobility, since transportation can only exist if it moves people and freight around. Otherwise, it has no purpose. This is because transportation is the outcome of a derived demand. Distance and a core attribute of transportation can be represented in a variety of ways ranging from a straight line between two locations - to what can be called logistical distance; a complete set of tasks required to be done so that distance can be overcome. Consequently, any movement must consider its geographical setting which in turn is linked to spatial flows and their patterns (Tolley and Turton, 1995).

It is widely acknowledged that transport plays a crucial role in economic development. The transport sector is an important component of economy impacting on the development and welfare of populations. When transport systems are efficient, they provide economic and social opportunities and benefits that impact throughout the economy. When transport systems are deficient, they can have an economic cost in terms of reduced or missed opportunities.

Improved transport brings obvious benefits to the economy embracing improved logistics and improved mobility that leads to the improved profitability of business. This in turn leads to greater demand for transport and requires a larger extent of investment and then leads to improved transport and better productivity and profitability. Having this cycle well-working, a country's economy becomes stable and conditions for long-term business planning and making are created (Mačiulis et al., 2009).

It is commonly agreed that the role of transportation in any system is that of a lubricant; it allows personal movement and trade and also information. These elements are vital to economic development, allowing factors of production to be combined efficiently and divisions of labour to be exploited, while at the same time permitting supplying agents to interact with consumers. That said, the provision of transportation facilities does not automatically lead to economic development. Transportation is perhaps best seen as a facilitator that allows the maximum economic potential of an area or region to be realised (Button et al., 2010).

As transportation is a part of production, any improvement in its efficiency helps to lower production costs of goods and thereby reduce their prices. Increases in speed reduce the average volume of goods in transit and allow producers to carry smaller inventories. Greater speed shortens the time from the beginning of production to the final sale, enabling producers to gauge their markets more accurately, reduce risk, and lower interest costs. In general, a highly developed modern transportation system permits a nation to enjoy the advantages of territorial division of labor to an extent not possible under primitive or otherwise ineffective systems. In fact, the transportation system might be termed the key to territorial division of labor and a highly efficient modern economy (Campbell, 1963).

### **3. Main role of Transport system in Economic Development of Bosnia and Herzegovina**

In the transport system of Bosnia and Herzegovina, a differentiated development of transportation branches is distinguished. The

branches in expansion and those in stagnation or backwardness may be distinguished. It is clear that this is noticed on the condition of particular transport networks – on tendencies of their development, arrangement and equipping by means of transport, as well as transportation volume and on transportation output. Such differentiated development is a consequence of unequal economic position of single transportation branches, particularly of their position in transition conditions; then of inherited relations and influence of war circumstances. For all the above mentioned things, role of single transportation branches in economic development is different (Sić, 1993).

Export dynamics of transport services has had a positive trend until the global economic crisis, in the last decade (Table 1.). It should be emphasized that every year more than half of the exports of services in Bosnia and Herzegovina make transport services. Value of share of transport services exports in total export of Bosnia and Herzegovina was 3.1% in 2008 and was by 1.2% higher than in 2006.

As a result of global economic crisis the export value of transport services was reduced by 36% against the previous year, while the share in export value of Bosnia and Herzegovina was reduced by 0.6%. In comparison with the neighbouring countries, Bosnia and Herzegovina had the least share of transport services export in 2009. This is a consequence of a poorly developed

and an obsolete transport network and means of transport, but also of poorer overall economic development of the country.

Table 1. Export dynamics of transport services, 2006-2009

Year	2006	2007	2008	2009
Value in 000/USD	65 820	76 055	156 129	99 408
The share of the transport services	1,9	1,8	3,1	2,5

Source: Agency for statistics of Bosnia and Herzegovina, 2011

Today, about 694.000 people are employed in Bosnia and Herzegovina. Number of unemployed persons increases permanently, and unemployment rate is estimated at about 43.3%. In activities of transportation, storage and connections about 50.026 of persons are employed, which is 7.2% of total number of employed persons. This share approximately corresponds to some countries of the European Union with a difference that in those countries a number of the employed persons is far bigger.

The share of activities of transport, storage and connections in total GDP in 2003 was 8%, and had been even higher than that of the European Union (Table 2.). Since that year, a permanent decline in share of these activities in total GDP of Bosnia and Herzegovina has been present as a consequence of significantly slower development in relation to other economic activities.

Table 2. The share of transport sector to GDP, 2003-2009 (constant prices)

Year	2003	2004	2005	2006	2007	2008	2009
The share of transport sector	8,1	8,0	7,7	7,3	7,0	6,7	6,4

Source: Agency for statistics of Bosnia and Herzegovina, 2011

It is also characteristic that, in addition to such trend of share within the total

national GDP, in entire period, an increase in value of GDP in these

activities is also present. GDP activities of transport, storage and connections increased from 603,3 million euros in 2003 to 787,3 million of euros in 2009. However, this is considerably poorer, even for two times, against the total growth of GDP. Road transport has the biggest role both in export of transport services and in number of employed people. Its expansion has been continued until the most recent time. It has dominance in passenger transport and an increasing role in goods transport (Jakimavičius, Burinskiene, 2007). Similar to circumstances in the former East European socialist countries, the transition toward market economy in Bosnia and Herzegovina also meant further increase in truck transport. It strengthens on all distances and adapts quickly to requirements of the transport demand. The road transport dynamics favours rather a development than quality of the network.

In spite of that, the road network has a key role in achieving accessibility at national level. The biggest distinction of Bosnia and Herzegovina in relation to developed European countries is a low mobility of personal car transport. Therefore, bus transport has a major role in passenger transport; in accordance with this is its role in organisation of space. For consideration of the role of transport in economic development of Bosnia and Herzegovina it is necessary to show basic characteristics of the transport system of Bosnia and Herzegovina.

### 3.1. Road transport

Road transport of Bosnia and Herzegovina runs in the network of roads of total length of 26 010 km, of which somewhat more than 57% is with asphalt base. Density of that network is only 51 km/100 km<sup>2</sup> of area of state territory (rank 55th in the

World), while density of the main roads is 7.5 km on 100 km<sup>2</sup> of area. Or, on each 10.000 inhabitants on average comes 69 km of roads. Local roads prevail in the structure with length of 17.355 km, and regional with 4 794 km and main roads with 3 811 km (Adapted from Agency for Statistics of Bosnia and Herzegovina, 2013).

Freeways in Bosnia and Herzegovina have been built "meter by meter" for a last ten years. While the majority of countries in Southeast Europe work on spreading the freeway networks, Bosnia and Herzegovina has built only 73 kilometres for a last 10 years. From that, 38 kilometres has been built on relation Sarajevo – Kakanj, and only 34 kilometres on relation Banja Luka – Bosanska Gradiška.

The territory of Bosnia and Herzegovina is intersected by six highway directions (Figure 2), which are included into European highway network of transport routes with total length of 995 km:

E-59: Izačić-Bihać-Ripač-Užljebić

E-65: passage through Neum

E-73: Šamac-Doboj-Lašva-Sarajevo-Mostar-Doljani-Croatian border;

E-661: Bosanska Gradiška-Banja Luka-Jajce-Lašva;

E-761: Bihać-Bosanski Petrovac-Jajce-Sarajevo-Višegrad-Vardište-border with Serbia;

E-762: Sarajevo-Brod na Drini-Šćepan polje-border with Montenegro (Figure 2).

Complexity of geographic position has determined the major characteristics of the road network in Bosnia and Herzegovina. Only one fifth of its area are the plain areas with altitude of up to 300 m, where the roads were laid freely with mild curves and slopes with wider lanes (up to 7,5 m).

The remaining part of the territory belongs to a hilly-mountainous area with significantly higher altitudes, which is divided by river valleys, which are rather suitable for location of the road transport routes. Such geographic characteristics conditioned construction of roads with sharp curves and steeper slopes, and narrower lanes

so that they often surmount a series of mountain curves. For this reason, on larger part of these sections transport conditions are not in accordance with a class of roads, transport volume and structure, which reflects unfavourably on economy and safety of transport (Nurković, 2008).

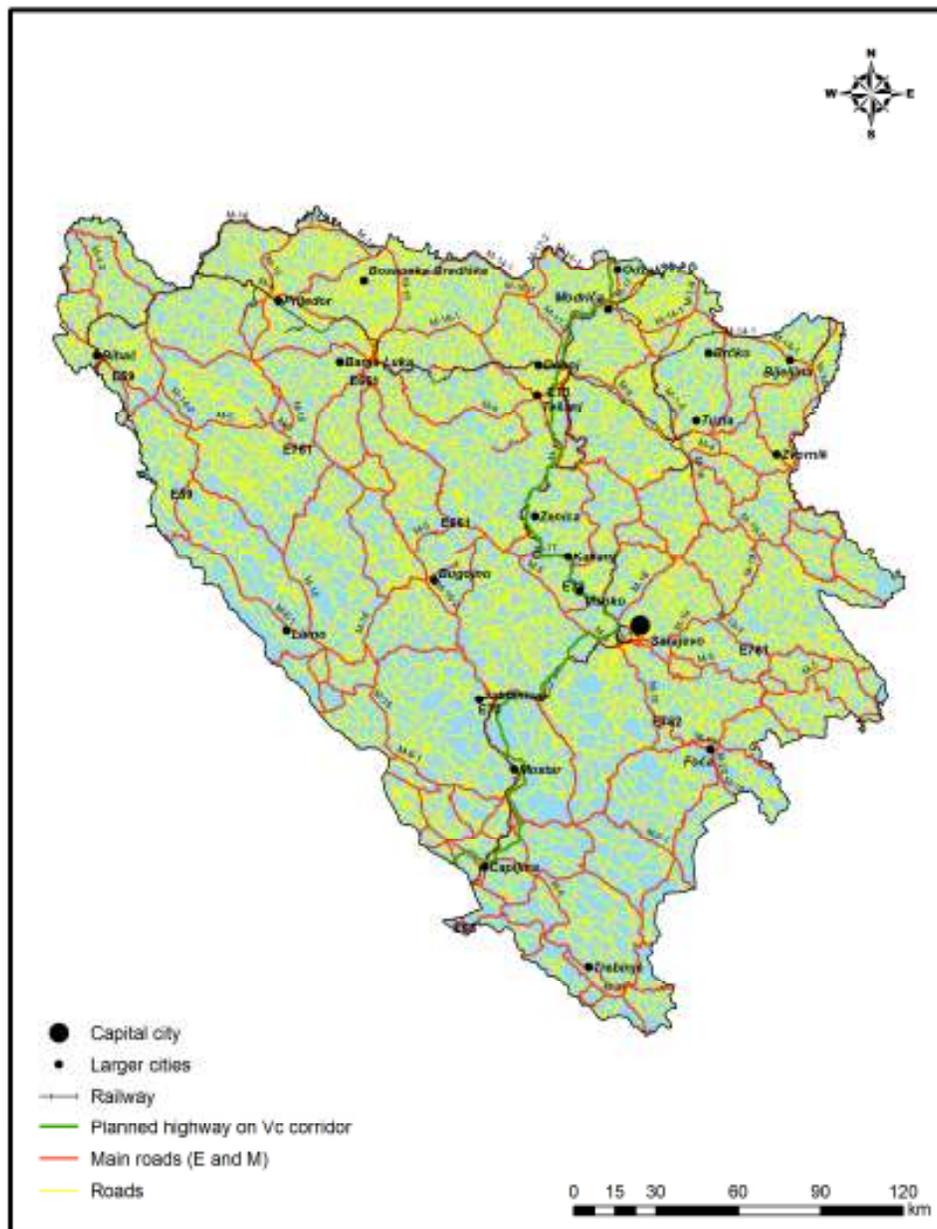


Figure 2. Road network in Bosnia and Herzegovina, 2013

Road transport of Bosnia and Herzegovina is differentiated as it is in the neighbouring countries. Big differences between the branches that are recovering faster from the war damages and those that still do not serve their purpose are present. The road transport, in spite of difficulties and a poor, inherited structure, started with expansion to a large extent, while the rail transport is still without expansion and runs with a very little capacity.

In the period 1992-1995 road and rail network underwent damages about 35%, and about 40% of all bridges were destroyed. By time, most of the road and also the railway transport were reconstructed on the main roads and tracks.

Until mid-2003, Bosnia and Herzegovina was the only country of South East Europe that did not have a single kilometre of contemporary highway. Today, road transport routes in Bosnia and Herzegovina are among the worst in Europe. They are obsolete, badly maintained and dilapidated. Due to poorly developed transport routes in urban centres and on the intersections, an increased number of cars in Bosnia and Herzegovina causes big transport congestions and increase operating costs of economic activities, causes pollutions and makes population's life difficult on the whole. It should be emphasized that public institutions and enterprises responsible for road maintenance spend annually about 1 million euros for court costs and compensations for damages to drivers who damaged their cars due to bad roads.

A tabular review of the transport dynamics (Table 3) clearly indicates to a constant trend of increase of either passenger and freight transport (or road transport) until 1990, which proves the

fact that it is a dominant form of transport in Bosnia and Herzegovina.

**Table 3. Traffic dynamics in road transport, 1965-2009**

	1965	1975	1988	2005	2009
Passengers (in 000)	15 600	37 580	72 104	25 675	27 669
Goods (in 000/t)	3 954	10 150	31 078	2 479	5 069

*Source: Statistical Yearbook, 1969-2010*

Number of the transported passengers in road transport increased in the period from 1965 to 1975 by 140.9%, while that increase in the next 13 years, in 1988 was 91.8% against the year of 1965. This increase is a result of a strong industrialization and urbanization of space of Bosnia and Herzegovina in that period, which lead to increase of living standards and naturally to the strengthened process of automobilization.

Condition of the road transport even after the war events in the past decade of the last century did not change much (except the decrease in numbers), which means that even today this is a main form of the transport. This is proved by intensive modernization of the road routes, as well as by the plans of construction of new road directions. In 2005, a number of transported passengers was only 35.6% of the pre-war number, which is, if observed chronologically, a return to a condition from the beginning of the 1970s, when Bosnia and Herzegovina was to enter the most economically developed period of its history. The conditions have not changed until now, when the number of transported passengers in road transport increased only by 7.7% in relation to 2005, or is only 38,3% of the passenger transport before the war. Unlike that, goods transport in road transport experienced its full disaster after the war events. Today, it is only 16.3% of the pre-war transport.

A significant indicator of economic development of the country and its population is also a condition of road motor vehicles. Total number of registered vehicles in Bosnia and Herzegovina in 2000 was 699.293, and that number increased in 2010 to 843.151, or by 20.5% (Table 4).

**Table 4. Registered road motor vehicles, 2010**

Motor vehicle	Number of vehicles	By Age in %
Mopeds	4 449	-
Motorcycles	7 522	-
Passenger Car	72 4787	73,3 % older than 10 years
Bus	4 112	78,2 % older than 10 years
Goods road motor vehicle	75 763	66,4 % older than 10 years
Trailers	20 378	-

*Source: Agency for Statistics of Bosnia and Herzegovina, 2011*

According to data of the Agency for Statistics in Bosnia and Herzegovina, total of 843 151 vehicles were registered in 2010. According to average density of 224 vehicles per 1000 inhabitants, Bosnia and Herzegovina along with Albania shares the last place among the European countries. It should be emphasized that condition of motor vehicles is unsatisfactory, as the majority of them are older than 10 years (73.3% of passenger vehicles, 78.2% buses and 66.4% of goods vehicle are older than 10 years) which speaks sufficiently on economic condition of population in Bosnia and Herzegovina.

### 3.2. Railway transport

Contrary to significance of road transport in economic development of Bosnia and Herzegovina the role of railway transport in economic development is far lesser, due to a poorly developed network and slow modernization and, in particular, large war damages. The war has affected the railways far stronger than the road transport. In conditions when the

development trends similar to those in the developed Europe are expected from the railways, particularly in regard to large speeds in passenger and combined goods transport in road transport, it still goes through a period of crisis. Therefore, in the near future a stronger substitution of road with rail transport cannot be expected, as is the case in the European Union.

Railway transport in Bosnia and Herzegovina has a historical function because it has considerably induced the industrialisation process of the country, as a dominant form of the transport. Development of heavy industry and other branches of industry and their location were essentially connected to railway network in the country. The war events (1992-1995) devastated and destroyed almost all components of railway system, which has left noticeable consequences, not only in transport but also in all economic activities. Industrial activities basically accelerate urbanisation process along the major railway directions, which proves the fact that about 70% of settlements are located exactly along them.

Total length of railway tracks in Bosnia and Herzegovina is 1 024 km of which 703 km or 68.6% is electrified, and 87 km of double tracks have been constructed. Geographic distribution is unequal, and the biggest concentration is in northern Peri-Pannonian part of the country. Considering morphologic characteristics and dominance of the hilly-mountainous relief structure, railway system of Bosnia and Herzegovina includes 174 tunnels of total length over 50 km and 339 bridges whose length is 15.3 km.

In the limits of the railway system four important railway directions could be separated: one of transversal character,

and three of longitudinal character. Transversal railway direction: Šamac-Doboj-Sarajevo-Mostar-Čapljina and port of Ploče in Croatia has a particular importance, as it coincides with Pan-European transport Corridor Vc. Longitudinal railway directions are located in northern part of country, and direction: Zvornik-Tuzla-Doboj-Banja Luka-Bosanski Novi is parallel with Corridor X, and directions: Banovići-Tuzla-Brčko-Croatia and so-called 'The Una's track: Bosanski Novi-Bihać-Martin Brod-Croatia. So, the railway network of Bosnia and Herzegovina via port of Ploče has access to the Adriatic Sea and through the ports of Brčko to the Sava River, thus making a very important connection with the forms of water transport.

According to density of railway network of Bosnia and Herzegovina does not lag much behind in comparison with the European countries, but the volume of transported goods and passengers (reduced to 1 km of track) is significantly smaller than the European average. Reasons for such condition lie in obsolescence of railway infrastructure, for which it cannot be used in normal capacity. There is no adequate number of passenger cars and locomotives for transport on longer relations. Volume of freight transport, particularly of coal and ores is very low, which considerably affects the economy of railway work.

The existing railway capacity enables maximum allowable speed of only 50-70 km/hour. However, those speeds are in passenger transport about 40km/hour due to poor condition of technical elements of track, and in freight transport even lower. The highest speed is achieved on direction Doboj-Bosanski Novi (55 km/hour in

passenger transport and somewhat less in freight transport), while the slowest trains are on directions Doboj-Zvornik in passenger transport and Sarajevo-Ploče in freight transport. Within the integration of railway system of Bosnia and Herzegovina into standards of Trans European Railways (TER) (minimum nominal speed 120 km/hour) activities on replacement of surface layer of tracks, modernization of signal, information and telecommunication systems and remote control systems are necessary, and only then the railway system would have a more significant role in economic development of Bosnia and Herzegovina.

Transport dynamics in railway transport clearly shows the condition in this activity in almost the half of the past century. Volume of passenger railway transport in 2009 was only 4.5% of the achieved volume before the war occurrences. Transport dynamics on the railways shows a permanent decrease in passenger transport as the competitive abilities of road transport are bigger, but the freight transport recorded a permanent increase until the 1990s, and after that it considerably decreased even by 70%, although it was still by 54% higher than the cargo traffic in road transport in 2009 (Table 5.).

**Table 5. Traffic dynamics in railway transport, 1965-2009**

	1965	1975	1988	2005	2009
Passengers (in 000)	29 931	29 890	20 296	1 119	910
Goods (in 000/t)	24 195	26 941	36 940	12 065	11 117

*Source: Statistical Yearbook, 1969-2010*

By mid-1960s, 29 931 passengers were transported by railways of Bosnia and Herzegovina and in next ten years that number has not changed much. In the first half of the 1980s, as a

consequence of increasingly higher living standards, a number of transported passengers decreased on the account of transport by road transport. In the first decade of 21<sup>st</sup> century the condition in railways of Bosnia and Herzegovina has been very difficult, which is also proved by the data of only 910 000 of transported passengers in 2009.

### 3.3. Other types of transport

In transport system of Bosnia and Herzegovina one more branch experiences an expansion – it is telecommunication transport. It is important to emphasize that only after the war years density of telephony considerably increased, which was followed by construction of numerous digital telephone exchange offices, introducing optical cables, and inclusion into the European system of telecommunications. It is certainly a result of major role of telephone and internet transport in space organization, not only for its dispersion character and social width, but also for the fact that it enables integration with particular information systems. It is also important to emphasize that with that form of transport appear some tendencies congruent to those in more developed Europe – post offices are completely replaced by telecommunications. Total number of active fixed telephone lines is 989 680, and total number of mobile users is 3.1 million. Total of 29% households have internet connection, and 35% of population older than 15 years uses internet (rank 50th in the World according HDR 2013).

Due to limited spatial distribution of networks, other forms of transport do not have a bigger role in achieving transport availability at the level of Bosnia and Herzegovina. In relation to land types of transport, water transport

in Bosnia and Herzegovina is of significantly minor importance. Bosnia and Herzegovina is internationally verified as a maritime country, as it is a successor to that membership from the previous SFR Yugoslavia. The competences of Bosnia and Herzegovina include main roads towards Neum and Dubrovnik with peninsula Klek, and coastal waters of the Adriatic Sea within the borders of the country. According to Agreement from 1995 an exit to the Adriatic Sea has been approved in Bosnia and Herzegovina through the Croatian territory via port of Ploče. Later in 1998, an Agreement was signed between these two countries on free flow of goods through the Croatian territory between Bosnia and Herzegovina and Port of Ploče, as well as through the territory of Bosnia and Herzegovina between Neum and Ploče. The biggest importance for river transport has the Sava River flow, which is navigable at length of 330 km. Minor importance have lower courses of its right tributaries of Una, Vrbas, Bosna and Drina. The Neretva River is navigable at length of 4 km from Metković to Gabela. A rather intensive transport ran by the Sava River, and the biggest river terminals were raised at Brčko, Šamac and Brod. However, due to war occurrences in the last decade of the past century this aspect of transport is cut on the geographic area of former SFR Yugoslavia. Navigation by this river ran on average 300 days per year, and the biggest limitations represented minimum water levels.

Air transport has developed in Bosnia and Herzegovina only since the 60s of the past century when, in 1969, an airport was constructed in Sarajevo ('Butmir'). Even today, it is a major airport where the largest part of air

transport is run. In addition to Sarajevo airport, three more were constructed: in Banja Luka ('Mahovljani'), Mostar and Tuzla. Annual transport of passengers on the airport of Sarajevo is about 450 000, in Banja Luka about 70 000 and in Mostar about 45 000. All of four airports were registered for international air transport. Main problems that appear in functioning of air transport in Bosnia and Herzegovina relate to high prices of services, flight safety and mutual adjacency of airports, a small state territory and an expressed competition in the countries from immediate surroundings.

Air transport in Bosnia and Herzegovina showed a significant progress in the last two decades: from a very small number of transported passengers in the last decade of the past century up to present somewhat more than a million. In 2005, total of 469 747 passengers were transported, and in 2009, that number increased by 17% and was 549 170 passengers. In 2009, total of 2 052 tons of cargo and 311 tons of mail were transported, which is really much less in comparison with other European countries. Although it has a small importance in economic development of Bosnia and Herzegovina, air transport will have very good prospects if, at least, problems of flight safety are solved, and the prices of services are adjusted.

#### **4. Role of transport accessibility in economic development**

Basic characteristics of today's transport system of Bosnia and Herzegovina, also of particular transport networks within that system, for example, road network that has a particular importance in economic-geographic life of any country, essentially affect the accessibility of

particular areas, and thereby also on opportunities for their economic development. A special attention should, therefore, be paid on considerations of the transport accessibility.

It is certain that single areas of Bosnia and Herzegovina have different transport accessibility. It can easily be proved by applying specific forms of network models. Even the simplest, topological, respectively a theoretical accessibility in road network of Bosnia and Herzegovina emphasises a different position of single spaces. Contrary to the most accessible Central Bosnia with Sarajevo, there are poorer accessible spaces, in parts of East, Southeast and West Bosnia. It is certain that specific territorial spreading and physical-geographic characteristics of the state area of Bosnia and Herzegovina intensify the problem of the East and the West. However, this is also affected by unfavourable inherited transport relations that have not changed until now.

Other forms of accessibility, particularly those measured in kilometres, time and costs, can even better serve as indicators of unequal accessibility of single areas of Bosnia and Herzegovina.

Application of network models reveals the less accessible areas to us. Their common characteristic is that they are separated according to geo-transport and also according to economic development issue, in relation to the national or an adequate wider economic centre. Such position of less accessible and separated areas creates numerous difficulties in their economic development. We will mention only the most important ones. First of all, such areas have transport charges above average, which results in higher

prices and a lower income. Furthermore, a deteriorated access to market, market information and to consumers affects the sales volume, possibilities for application of innovations and alike. Such areas have, thereto, also a limited access to those urban centres that are big enough to create a supply of new services (Sić, 1997).

Sarajevo is an area of the biggest attractiveness in Bosnia and Herzegovina. This area's appeal has continuously grown in several past decades, particularly after the war occurrences (1992-1995) when Sarajevo became a political centre of the new country and completely assumed the functions of Bosnian metropolis. The basis of current Sarajevo's attractiveness makes its accessibility. First of all, it is transport accessibility, since Sarajevo represents the largest transportation hub of Bosnia and Herzegovina and, at the same time, a transport centre through which inclusion into the European and world's flows is achieved. However, in this regard Sarajevo is also the most accessible, respectively the most attractive economic centre for domestic and international capital as well, even more because it represents, at the same time, the largest centre of business information and activities widely connected with foreign business centres.

Comparison with similar areas in Europe shows that Sarajevo has all the characteristics of the core area: it concentrates a large demographic potential and has a stable population growth, high urbanisation level and dynamical economic development, particularly of tertiary activities, however, it is overburdened at the same time with problems of infrastructure, congestion, and

pollution of environment. The role of Sarajevo in development of entire country and in encouraging the development of the neighbouring areas is distinctive.

The areas of transitional accessibility merge spatially with the area of Sarajevo and are characterised by a relatively good accessibility, particularly if they are located in the zones of transport corridors or large junction points. Economic position and developmental possibilities of such areas are, however, very different, due to influence of inherited relations and newer political circumstances. Therefore, these areas are divided into two mutually different groups.

The group of areas of relatively stable economic development include the areas located north, northwest and partly south of Sarajevo. Their characteristics are diverse economic opportunities and a dynamical development, induced by focal activity of Sarajevo and own economic centres (Tuzla, Brčko, Banja Luka, Mostar). With such characteristics they resemble some western European areas. However, dynamics of those areas is a result of inclusion into broader, European developmental processes, and also of administrative division of Bosnia and Herzegovina on two entities: The Federation of B&H and Republic of Srpska. The areas of Bihać, Doboj, Bijeljina and Široki Brijeg also belong to a group of areas with relatively stable economic development.

The areas of transitional accessibility that are in crisis are mainly located between the previously mentioned areas, and these are the areas of Zenica, Travnik, Bugojno, Konjic and alike. Despite a relative accessibility, their unfavourable economic circumstances are the result, first of all,

of the war occurrences, and only after that of unfavourable demographic processes, administrative system of the state and alike. Their position is in vicinity of the national core and imposes a need for higher investments into economic and infrastructural facilities.

The areas of peripheral accessibility are both in spatial and transport aspect far from the national core and transitional areas, which reflects on their position and dynamics of economic development. These are less developed areas with a very employment rate, insufficiently developed agriculture, and all of these are due to less favourable physical-geographic conditions, so emigration is permanently present in them. These are the areas of Eastern Bosnia (Rudo, Rogatica, Bileća, Gacko etc.) and Western Bosnia (Glamoč, Bosansko Grahovo, Drvar and other).

Transport system has a large importance in economic development of every country. First of all, it enables accessibility to all areas thus affecting both economic and regional development. With inclusion to developmental processes of the European Union, an opportunity for faster economic development is opened, particularly through valorisation of some comparative advantages of Bosnia and Herzegovina. For example, we emphasize the opportunities for contemporary economic development that are offered by transport - geographic position of Bosnia and Herzegovina.

##### **5. Conclusion**

Considering the basic goals and directions of policy of transport development, on the whole, or just within a specific part of country, should start from the viewpoint that it

makes, with its total capacity and method of forming the offer of services of its utilisation, only one part of total economic system and that it should satisfy the needs for transport of its country with its transport capacity. From the above mentioned it comes that transport development policy must be observed as an integral part of total economic development and its goals, within the broader area. Corridor Vc, with its infrastructure and available transport capacity, will represent the most important part of transport system of Bosnia and Herzegovina. That importance will be expressed, not only according to geographic position and passing capacity, but also according to a number of economic services that would be available to passengers. It is because the transports routes have multifunctional role that we say that transport represent an essential factor in development of economy.

A freeway through Bosnia and Herzegovina starts from the Sava River bank and in north-south direction, from the settlement of Donji Svilaj, on B&H side towards the border of B&H and Croatia, north of Ploče, going along the rivers of Bosnia and Neretva. The contact point between two countries, on north part has been defined on the Sava River, and the common border crossing will be on the area that belongs to Croatia. Corridor Vc will be included in network of TEM transport infrastructure of Southeast Europe and goes in direction from Budapest via Osijek and Sarajevo towards port of Ploče. Through Bosnia and Herzegovina, the route of Corridor Vc will have a length of about 330 km, and until now only 73 km have been constructed.

In addition to connecting the central Adriatic with Central and East Europe, Corridor Vc has a potential to improve

considerably the commercial connections of Bosnia and Herzegovina with countries in the region and broader. Understanding the importance of modernization of road network, an activity on preparation of implementation of transport routes' construction, of higher class, has intensified in Bosnia and Herzegovina recently, respectively freeways and fast roads, with a goal to meet the needs of population and economy. It may be expected that construction of this freeway and other transport routes will be a key promoter of economic activities and that it will enable inclusion of Bosnia and Herzegovina into the major European transport flows and the global economic system. When we observe contribution in economic development that would be achieved by construction of Corridor Vc through Bosnia and Herzegovina in that context, we notice its broader economic-geographic significance, which is indicated by the following facts:

- Corridor Vc stretches by central area of Bosnia and Herzegovina, in north-south direction, by valleys of the rivers Bosnia and Neretva, i.e. along the area with the highest concentration of population of natural and labour-created resources;

- In the area that covers less than 20% of state territory, if we observe a region of 40 km in radius of the Corridor, has around 56% population, who generate over 64% of total GDP of Bosnia and Herzegovina.

- The existing two-way road transport route of width 7 m, which passes along the corridor (road M17), has not been meeting transport needs in regard to level of services and transport safety for a long time.

- Significant improvement of accessibility to economic centres, health facilities, facilities for rest and recreation and alike, will create special advantages for economic development of Bosnia and Herzegovina.

- A large contribution of freeway to employment and increase in production will be conveyed on a wide range of indirect producers and suppliers of consumer goods, materials and equipment, by which the effects are being multiplied.

- Construction of the planned freeway with by-pass roads around larger cities will largely reduce the transport in the urban transport network and alleviate the problems of transport congestion thus postponing the need for investment interventions.

- With corridor construction, transit transport will be redirected out of narrower urban zones, which will enable more appropriate use of space.

In addition to mentioned advantages, construction of other numerous facilities will take place, which will serve for meeting the needs of participants in transport, which will certainly lead to creating a large number of jobs, intensification and increase in production in existing plants, as well as establishing new production capacity, particularly in a sector of equipment, agricultural-food industry and services. After putting a facility in operation, a direct additional employment in the jobs of freeway management and maintenance will take place, as well as numerous services.

Improvement of transport conditions will also enhance the quality of life, which will be manifested through:

- Reduction in length of travelling and time of transporting the goods and passengers
- Reduction in costs of transporting the goods and passengers
- Reduction of harmful effects to environment
- Increase in employment
- Valorisation of transport-geographic position of Bosnia and Herzegovina
- Increase in competitiveness of economy in gravitational area of the corridor

#### References

- Agency for statistics of Bosnia and Herzegovina, Sarajevo
- Button, K., Doh, S., Yuan, J., (2010), The role of small airports in economic development, Henry Stewart Publications, Airport Management, 4 (2), 125-136
- Campbell T. , (1963), Transportation and Regional Economic Development, *Transportation Journal* Vol. 3, No. 1, Penn State University Press, 7-13
- Jakimavičius, M., Burinskiene, M. (2007), Automobile transport system analysis and ranking in lithuanian administrative regions. *Transport: 22* (3): 214-220.
- Krugman, P., (1991), New Economic Geography, *Journal of Political Economy*, 1991
- Mačiulis, A., Vasiliauskas, A., Jakubauskas, G. (2009), The impact of transport on the competitiveness of National economy. *Transport: 24* (2): 93-99.
- Marić, Đ. (2008), Saobraćajna geografija. Istočno Sarajevo, Zavod za izdavanje udžbenika
- Njoh, A.J., (2008), Implications of Africa's transportation systems for development in the era of globalization. *Rev.Black Polit.Econ.* , 35 (4), 147-162
- Nurković, R. (2008), Contemporary bases of classification of the roads and their influence on regional development of Bosnia and Herzegovina. *Proceedings, Traffic influence on the regional development*, 19-30.
- Owen W. ,(1959), Transportation and Economic development, *The American Economic Review* Vol. 49, No. 2, Papers and Proceedings of the Seventy-first Annual Meeting of the American Economic Association (May, 1959), pp. 179-187
- Rodrigue, J., Comtois, P., Slack, B. (2006), *Geography of transport systems*. New York, Routledge
- Sić, M. (1997), Motorways and location of economic activities in Central Croatia. *Croatian Geographical Bulletin: 59*, 83-93.
- Sić, M. (1993), Basic questions of development and organisation of traffic system in Croatia. *Croatian Geographical Bulletin: 55*, 13-26.
- Statistical Yearbook of Bosnia and Herzegovina, ZS, Sarajevo, 1969-2010
- Tolley, R., Turton, B., (1995), *Transport Systems, Policy and Planning: A Geographical Approach*. Longman, Harlow, UK, 402.
- Tunjić, F., Jug, B. (2008), New geopolitical dimensions of the social development valorisation of Bosnia and Herzegovina. *Proceedings, Traffic influence on the regional development: 43-58*.