

# Analysis of the railway system in the region of Serbian Banat

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**Abstract** – Technical and exploitation condition of most railways in Serbian Banat is unsatisfactory.

Railway stations in Serbian Banat region transport extremely small number of passengers.

The volume of railway freight transport, even in the conditions of liberalization of the railway market, is still small.

**Keywords** – Administrative divisions, railway infrastructure, railway transport, condition, realization.

## I. INTRODUCTION

Banat is a geographical and historical region straddling between Central and Eastern Europe that is currently divided among three countries: the eastern part lies in western Romania; the western part in northeastern Serbia (mostly included in Vojvodina, except a small part included in the Belgrade Region); and a small northern part lies within southeastern Hungary (Figure 1).

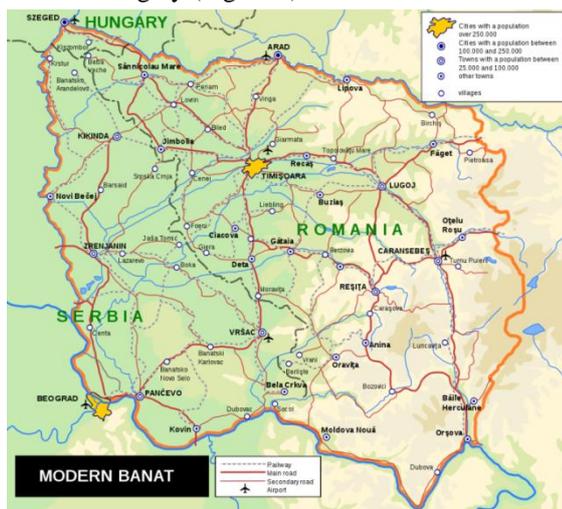


Fig. 1. Map of the region of Banat [1]

On the territory of Vojvodina, Banat is administratively divided into three districts: North Banat, Central Banat and South Banat, North Bačka, West Bačka, South Bačka and Srem (Figure 2).

That Serbian Banat region comprises the following administrative districts: North Banat, Central Banat and South Banat.

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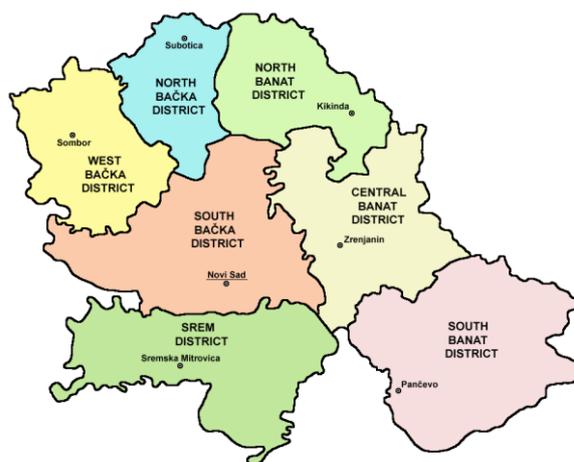


Fig. 2. Districts of Vojvodina

Synergy between the level of economic and social development and the level of transportation system development is a generally known fact. The development of economic potentials of some region significantly depends on the development of transportation system and its interconnectivity with neighbouring regions. Quality railway service is a very important factor in a successful transport system.

On the territory of the contemporary Romanian and Serbian Banat, the oldest railway was built and put into operation on 20th August 1854 on the relation Oravica (Romania) – Jasenovo (Serbia) – Crvena Crkva – Bela Crkva – Vračev Gaj – Sokolovac (Serbia) – monastery Bazijaš (Romania), on the left riverside of the Danube. The purpose of the railway Oravica - Bazijaš was the transport of coal for steamships supplying. The concession for the railway construction was given to Viennese Mining Directorium. Early historical development of the railway in the above mentioned regions certainly played an important part in structuring a specific business culture of their population. Due to this, these regions even today result in representative positions in their countries.

On the account of the conducted analysis it can be concluded that railway network between Serbia and Romania is inherited from the period of Austria-Hungarian monarchy, that is, administrative-state continuity of counties Torontal (Kikinda, Zrenjanin and Pančevo), Timis (Timisoara, Vršac, Bela Crkva) and Krašo-Zorenji (Lugoj, Karansebes and Resita). Bordering parts of the Kingdom of Serbia and Kingdom of Romania did not develop the strategy of mutual railway interconnectivity. In contemporary circumstances, Romanian interests in this part of their territory are directed to the development of Paneuropean Corridor 4, and Serbia is analogously directed to the development of the Paneuropean Corridor 10. Common strategies of railway interconnectivity of these corridors via the Danube still have not occurred.

Technical and exploitation condition of most railways in region is unsatisfactory. The average age of railway tracks, particularly in Banat, is over 100 years, and on most tracks the same surface is still being used, although its envisaged maintenance cycle has expired (overhaul).

Railway stations in Serbian Banat region transport extremely small number of passengers. In the observed region in 2019 more than 175,800 passengers were dispatched via railway traffic, and around 170,400 passengers arrived. Generally, this represents 10% lower volume of travel in relation to the year of 2015.

In the period 2015-2018 there is a rise in the volume of transported goods, primarily due to the rise in transport in international traffic. In 2019 there is a fall of 13% in the total international traffic and also in the domestic traffic. However, the volume of railway freight transport, even in the conditions of liberalization of the railway market, is still small. North Banat district achieves around 0.5, Central Banat 0.35 and South Banat 0.83 million tons of goods trade.

Banat region has great potentials for a dynamic economic progress in the following period. The development of railway in Banat region should be focused on using the railway as a primary traffic mode for transport.

## II. THE CURRENT RAILWAY INFRASTRUCTURE IN SERBIAN BANAT REGION

The analysis of the part of region in Banat implies that north-eastern part of North Banat District (north of Kikinda along the border with Romania) is sparsely populated with low natality rates and mechanical outflow of population. Similar situation can be found in the east of Central Banat District by the border with Romania. In South Banat District, the situation is slightly better, primarily due to the position of the town Vršac and the proximity of the capital of Serbia - Belgrade, which generates significant passenger and goods flows to Serbian-Romanian border. At the same time, out of two railway border crossings between Serbia and Romania (Kikinda-Jimbolia and Vršac-Stara Moravica), the railway towards Vršac is incomparably more active. Also, it can be stated that the infrastructure of the inherited railway system is incomparably better preserved in the Romanian part of Banat.

From the outermost South Banat District the development of the so-called "Banat Gorge" begins, that is, today known as "Đerdap Gorge" of the river Danube, which crosses the state border Serbia-Romania.

These railways are marked in the following way in acts of law of the Republic of Serbia (Figure 3):

- *Main railroad:*
  - Line 107: Belgrade Centre – Pančevo Glavna – Vršac – state border – (Stamora Moravita)
- *Regional railroad:*
  - Line 201: Subotica – Horgoš – state border – (Röszke);
  - Line 202: Pančevo Glavna – Zrenjanin – Kikinda – state border – (Jimbolia);
  - Line 205: Banatsko Miloševo – Senta – Subotica;
- *Local railroad:*

- Line: 309 Pančevo Varoš – Pančevo Vojlovica;
- Line: 313 Vršac – Bela Crkva;
- *Manipulative railroad*
- Line: 401 Vršac – Vršac Vašarište;
- Line: 402 Kikinda – Methanol-vinegar complex.



Fig. 3. Railway network in the observed region

On the account of the conducted analysis it can be concluded that railway network between Serbia and Romania is inherited from the period of Austria-Hungarian monarchy, that is, administrative-state continuity of counties Torontal (Kikinda, Zrenjanin and Pančevo), Timis (Timișoara, Vršac, Bela Crkva) and Krašo-Zorenji (Lugoj, Karansebes and Resita). Bordering parts of the Kingdom of Serbia and Kingdom of Romania did not develop the strategy of mutual railway interconnectivity. In contemporary circumstances, Romanian interests in this part of their territory are directed to the development of Paneuropean Corridor 4, and Serbia is analogously directed to the development of the Paneuropean Corridor 10. Common strategies of railway interconnectivity of these corridors via the Danube still have not occurred. Romania as a EU member directs its interests primarily to other EU members, first of all, to Hungary and Bulgaria. Serbia, which still is not a EU member, does not have a clear internal strategy for the development of direct railway interconnectivity over the river Danube, between Banat and other region (Podunavlje, Braničevo District), which would significantly relieve railway junction Belgrade. [3]

The categorization of railways is very different from category A railways (16.0 t, 5.4 t / m) to category D2 (22.5 t, 6.4 t / m). All lines are single-track without modern signaling systems.

In the region of Serbian Banat, there are a large number of industrial tracks that are used very little. Industrial tracks are in poor conditions, with the tendency of their closing. A lot of industrial tracks are not maintained at all, and those which are maintained, there is a minimum of investment. Due to this, their allowed capacity is unsatisfactory and it is mostly 16-18 tons/axle. It is assumed that the main reason for their being unused is poor quality and lower reliability of railway services.

Developed logistics centres with intermodal terminals in Serbian Banat don't exist, except port "Dunav" Pančevo on the river Danube: ship-land transport (road, railway) extremely rarely due to rare arrivals of the ships with containers at this port.

### III. RAILWAY PASSENGER TRANSPORT IN SERBIAN BANAT

Joint stock company for railway passenger transport "Srbija Voz" is the only operator in passenger transport on the railway market. Observing the passenger transport in railway traffic on the republic level, it can be said that the number of passengers in domestic and international traffic is in decrease. In internal (domestic) traffic, the number of passengers had been decreasing since 2011. There was a noticeable increase by around 25% in the number of transported passengers in 2013 in relation to the previous year, and in relation to 2011, by around 22%. After 2013, the number of passengers decreased from one year to another. In relation to 2011, the traffic volume in 2019 fell by 26% in domestic and 78% in international traffic. We can come to similar conclusions by analyzing the realized operations in passenger kilometers.

The fall in passenger transport volume in railway traffic is directly related to the trend of decrease of the number of passenger trains which operate on the railway network in Serbia, mostly due to limited financial resources of the competent institutions for the services of public transport (Passenger Service Obligation - PSO).<sup>1</sup>

From the aspect of railway traffic in North Banat administrative district a more significant passenger transport volume was realized by railway stations Kikinda, Senta and Čoka. At other stations the passenger transport was negligible. In North Banat District, at the above mentioned stations, during 2019 the realized passenger transport accounted for 24,569 (Figure 4).

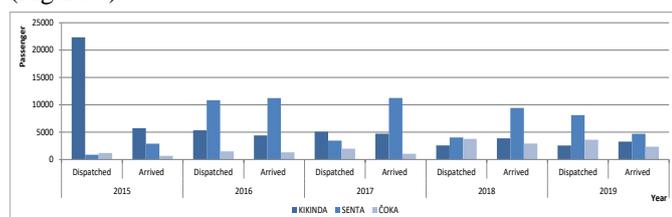


Fig. 4. Typical railway stations in North Banat administrative district: number of dispatched and arrived passengers (source [3], prepared by the authors)

In the Central Banat administrative district a more significant volume of passenger transportation was realized by railway stations Zrenjanin, Zrenjanin factory, Elemir, Melenci, Novi Bečej and Banatsko Miloševo. At other stations the passenger transportations was significantly lower. In this district at the above mentioned stations during the year of 2019, the transportation of 141,750 passengers was performed (Figure 5).

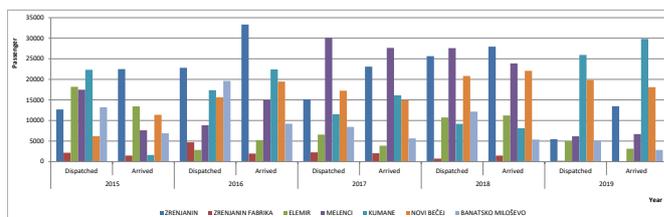


Fig. 5. Typical railway stations in Central Banat administrative district: the number of dispatched and arrived passengers (source [3], prepared by the authors)

In South Banat administrative district a more significant volume of passenger transportation was realized by railway stations Pančevo Glavna, Pančevo Varoš, Plandište, Vladimirovac, Alibunar and railway stop Pančevo Bridge. In this district at the mentioned stations during the year 2019, the transportation of 179,942 passengers was realized.

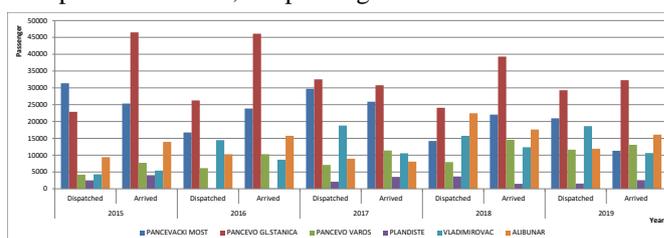


Fig. 6. Typical railway stations in South Banat administrative district: the number of dispatched and arrived passengers (source [3], prepared by the authors)

Railway stations in Serbian Banat region transport extremely small number of passengers. In domestic traffic, the most important stations are Kikinda and Pančevo Glavna, somewhat above 20,000 pax/year, Pančevo 30,000-40,000 pax/year and Zrenjanin 12,000-15,000 pax/year. Other stations transport 10,000 pax/year.

Railway lines in Srpski Banat on which railway traffic is organized are: Belgrade - Pancevo - Vrsac (and in the part between Vrsac and Alibunar), Belgrade - Pancevo - Zrenjanin, Zrenjani - Debeljaca - Debeljaca (Pancevo) Zrenjanin - Kikinda and Kikinda - Senta - Subotica. It should be noted that the suburban railway traffic "BG train" is organized from Pancevo to Belgrade (not analyzed in this paper).

The Belgrade - Pancevo - Vrsac railway line is one of the most vital regional lines in Serbia and one of the few that to some extent meets modern standards in technical and organizational terms [4].

The number of trains according to the timetable that operated on the observed railway lines is shown in the following table. As can be seen from the table, the number of trains was reduced on the observed lines, except on the lines Belgrade - Pancevo Gl. - Vrsac, Zrenjin - Kikinda and Kikinda - Senta.

In international traffic the transportation of passengers to Romania was conducted only via the railway border crossing Vršac (1 pairs), but that traffic was also stopped in the early August of 2017.

<sup>1</sup> Srbija Voz is a company which operates in keeping with legal regulations of EU No. 1370/2007.

Table 1. Number of trains on railway lines in North Banat and timetables

Railway line	Number of trains according to the timetable		
	2016/17	2017/18	2018/19
Beograd – Pančevo Gl. – Vršac	5 pairs	5 pairs	5 pairs
Vršac – Alibunar	2 pairs	/	/
(Beograd) – Pančevo Gl. – Zrenjanin	4 pairs	3 pairs	1 pair
Kikinda – Zrenjanin – Pančevo Gl. (Ovča)	/	/	2 pairs
Zrenjanin – Debeljača – (Pančevo Gl.)	1 pair	1 pair	/
Zrenjanin – Kikinda	3 pairs	3 pairs	3 pairs
Kikinda – Senta – (Subotica)	1 pair	2 pairs	2 pairs

#### IV. RAILWAY FREIGHT TRANSPORT IN SERBIAN BANAT

##### A. The volume of freight transport

The following figure shows the ratio of the total volume of goods transport by rail in the Banat region and the whole of Serbia (except for transit). The Serbian economy can use rail transport services in domestic traffic, import and export. The transit was initiated by the needs of an economy that does not originate from Serbia. With the exception of 2019, it can be concluded that railway freight traffic (except for transit) on the territory of Serbia is stagnant and is around 9 million tons. Railway freight traffic on the territory of Banat in Serbia since 2016 has a declining trend and ranged from 0.6 to 1.3 million tons, which is a share in the total rail transport of 7.5 - 15% (Figure 6).

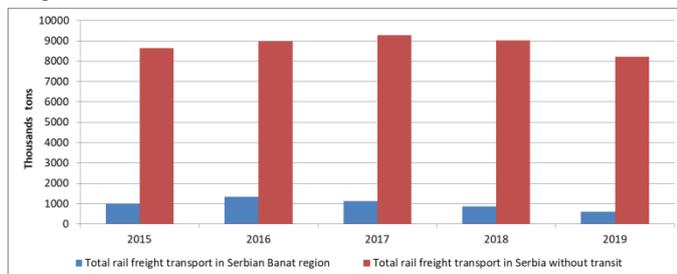


Fig. 7. Comparative overview of the volume of railway transport in Serbian Banat and Serbia (source [5], prepared by the authors)

Generally, in North Banat administrative district, there is export oriented trade. The economy of the Central recorded growth in import. The economy of South Banat administrative district is characterized by exceptional dominance of export.

The following figure shows the volume of transport in the districts of Banat in Serbia. As can be seen from the picture, the largest volume of rail transport (internal, import and export) is realized in the South Banat District. However, in all districts of Banat there is a declining trend in the volume of rail transport.

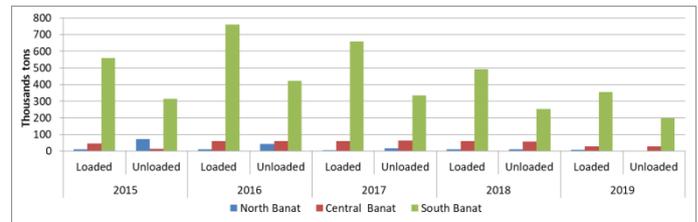


Fig. 8. Volume of railway freight transport in Serbian Banat (source [5], prepared by the authors)

Regarding economic centres in Serbian Banat region the railway station Pančevo Varoš in domestic freight traffic achieves a portion of the volume of loading and unloading in relation to the whole network in the interval of 16-25%. The station realizes a significant export flow to Romania.

The main transit goods flows for and from Romania, transported by means of railway traffic, are directed to the railway station situated by the border, Vršac Border. Bordering railway station Kikinda Border is not used for transit goods flows transported by means of railway traffic. This station is only used for goods flows which are imported or exported to Romania (mostly for/from Kikinda, and sometimes Senta, too).

##### B. Using transport modes in trade

From the aspect of using transport modes by the quantity of trade in the period 2012-2019, road transport participates with 74%, and railway with 25%, while waterborne transport modes (river) and other participate with less than 1%. The participation of intermodal transport is negligible (Figure 8).

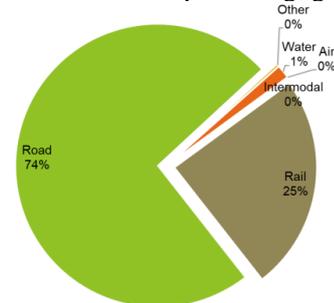


Fig. 9. Modal split of traffic in trade of the economy of North Banat administrative district (source [6], prepared by the authors)

The highest participation is achieved by road transport with the countries of the former Yugoslavia, and with the countries of Central and Southeast Europe. Railway traffic was mostly used for the transport of goods to / from the countries of Central, Southeast and Southwest Europe. Figure 9 shows the foreign trade of North Banat administrative district by transport modes.

From the aspect of using a transport mode by the quantity of trade in visibles, in the period 2012-2019, road traffic participates with 87%, waterborne transport (river) with 8% and railway with 5%. Air transport participates with less than 1% (Figure 10).

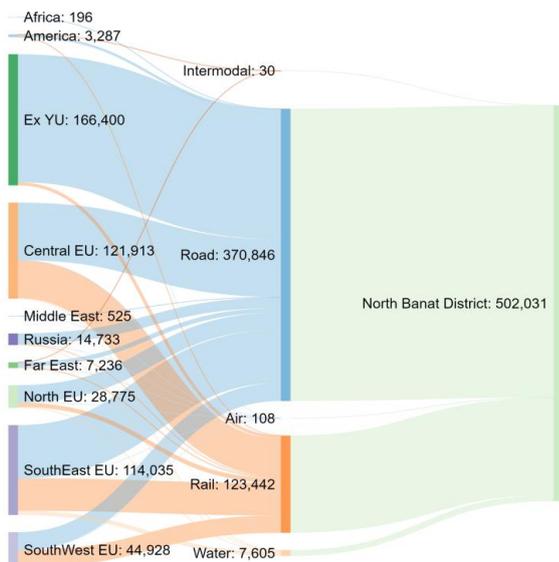


Fig. 10. Foreign trade in the economy of North Banat administrative district by transport modes (source [7], prepared by the authors)

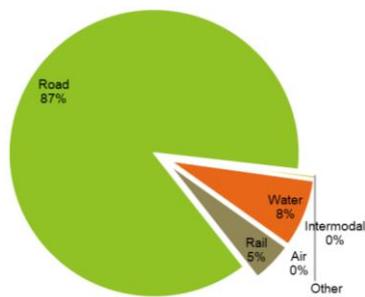


Fig. 11. Modal split of traffic in trade of the economy of Central Banat administrative district by quantity (source [6], prepared by the authors)

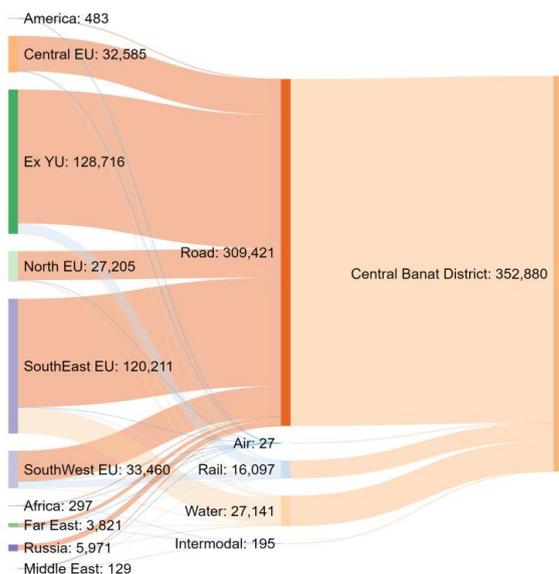


Fig. 12. Foreign trade of the economy of Central Banat administrative district by mode of transport (source [7], prepared by the authors)

Road transport has the largest participation in foreign trade in visibles of Central Banat administrative district by mode of transport with the former Yugoslavian countries and the countries of Southeast Europe. It is also significantly represented in the goods transport with the countries of Central, North and Southwest Europe. Railway traffic was mostly used for goods transport to/from former Yugoslavian countries and Southwest Europe, while waterborne transport was used for Southeast Europe (Figure 11).

From the aspect of using transport modes by the quantity of trade in the economy of South Banat administrative district in the period 2012-2019 road traffic participates with 53%, waterborne (river) with 36%, railway 10% and pipeline traffic with 1%. Air traffic participates with less than 1%. The participation of intermodal transport is negligible (Figure 12).

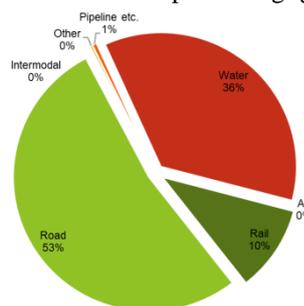


Fig. 13. Modal split of traffic in trade of the economy of South Banat administrative district (source [6], prepared by the authors)

Figure 13 shows foreign trade of South Banat administrative district by mode of transport.

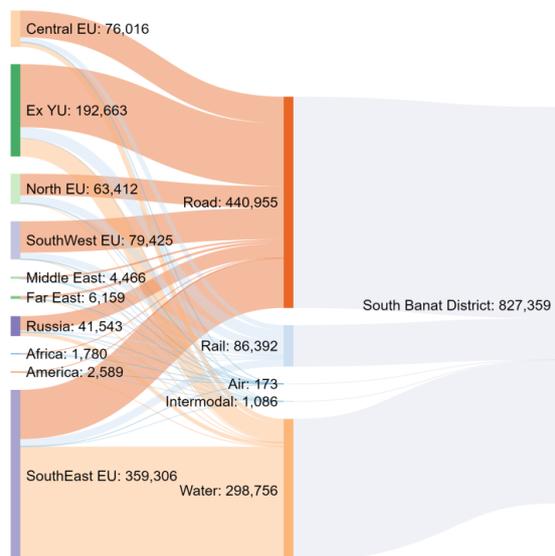


Fig. 14. Foreign trade of the economy of South Banat administrative district by transport modes (source [7], prepared by the authors)

As it can be seen, the largest participation is achieved by road transport with former Yugoslavian countries, Central and Southeast Europe. Waterborne transport services the economy of this region significantly by transporting goods to/from Southeast Europe, and slightly less from/to the countries of the former Yugoslavia (Croatia). Railway traffic was used for the

transport of goods to/from the former countries of Yugoslavia, Southeast and Southwest Europe. The use of intermodal transport from/to Northern Europe, Far East, Russia, Africa, America and Southwest Europe is noticeable.

## V. RECOMMENDATIONS AND VISIONS IN THE FIELD OF RAILWAY TRAFFIC IN THE SERBIAN BANAT REGION

In the existing plans for the modernization of railway network there is only preparation of spare railways for the support of corridor X while it is being modernized. In accordance with the plan, the conducted /planned activities are on the railways number 202 and 205. Future plans should reconsider the possibility and need for the modernization of other railways in region, as well.

In the previous period the Republic of Serbia procured new transport means (21 EMU of the label Stadler Flirt 413/417 and 27 DMU series 411 of the manufacturer Metrovagonmaš). The development of the railway should be accompanied by a continuous renewal and modernization of transport means.

On the level of TEN-T network, the railways which belong to Serbian Banat region are not planned as an integral part of this group. In the following period it is necessary to examine the possibility and elaborate the plans for joining the railways of the region to the network TEN-T.

Analysis of the transported goods show that the railway traffic is only used in bigger industrial centres. The development of railway in region should be focsded on usin the railway as a primary traffic mode for transport. In that sense, in the planned period it is necessary to analyse the possibility of using railway transport for goods transport in industrial centres of Serbian Banat region.

Since there is only one transporter in passenger traffic, there is no posibility of formation of transport prices by market principles. In the future, alongside the development of railway passenger traffic, gradual introduction of other transporters into the system should be considered.

Due to the absence of complete implementation of the regulative 1370/2007/EC, in practice, there is a tendency of suspension of passenger trains, which negatively affects the quality of transport, consequently the decrease of railway traffic use. In the following period it is necessary to elaborate plans and initiate activities which have the aim of eliminating this negative trend.

The analysis also determined that in nono of the municipalities of administrative districts of Banat region, except in the municipality of Vršac, there is not clearly defined "public service obligation" (PSO). As one of the measures for the advancement of railway traffic, it is necessary to consider the possibility for defining this model of financing by unprofitable transport services in all other municipalities of the observed region. In this way in time railway companies could significantly improve their business operations.

As a special part of transport system there is intermodal transport which is poorly developed in observed region. The analysis established that on state level there are not any plans for the development and stimulation of intermodal transport

development. One of the aims of traffic system development in the observed region definitely should be this mode of transport.

## VI. CONCLUSION

Technical and exploitation condition of most railways in Serbian Banat region is unsatisfactory.

The assessments of the authors are that the in the following 5-10 years, like in the previous 5-year period, the state will not have enough money nor time to deal with regional and local railways in Serbian Banat region. Most of the investment into railway infrastructure is and will be directed towards the modernization of railways on Corridor X (Budimpešta – Belgrade and Belgrade – Niš for velocities up to 200 km/h, and Šid – Stara Pazova, Niš – Preševo and Niš – Dimitrovgrad for velocities up to 200 km/h), and on the directions Belgrade – Bar and Belgrade – Pančevo – Vršac, and very rarely on other railways. It will definitely not provide the necessary quality of railway infrastructure.

Certain types of goods, due to the quantity, characteristics, transport price and similar, will be transported by railway traffic. The expected development of this region economy will definitely affect the increase of railway freight traffic use.

The existence of private freight operators in the observed region is a positive prerequisite for the offer of cheaper transport services and of better quality.

Further absence of PSO in railway traffic by local self-governments in the region will cause further collapse of passenger traffic quality.

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