

# Analysis of the potential of the Port of Novi Sad to become a new container terminal on Danube

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*This paper discusses the possibility the establish and construct a new container terminal in the Port of Novi Sad which has regional and international importance and good geographical position, located in the Serbian Autonomous Province of Vojvodina. The provided analysis presents current container flows in Serbia and the forecast for the next 5 and 10 years (including three scenarios: realistic, pessimistic and optimistic), at first for the whole country, but later on the analysis was focused on the Danube gravitating regions in Serbia and finally to the existing Port of Novi Sad in order to evaluate its potential to become a logistics center. It was concluded that the construction of a new container terminal in the Port of Novi Sad on the Danube aims to bring about a significant change in the container transport system in Serbia, but also in the region or the Danube countries.*

**Keywords:** container terminal, port, logistics, Novi Sad, Danube.

## 1. INTRODUCTION

Serbia, officially the Republic of Serbia (RS), is a country situated at the crossroads of Central and Southeast Europe in the southern Pannonia Plain and the central Balkans. The sovereign state borders Hungary to the north; Romania and Bulgaria to the east; Macedonia to the south; Croatia, Bosnia and Herzegovina, Montenegro to the west and claims a border with Albania through the disputed territory of Kosovo (Figure 1). Serbia numbers around 7 million residents. Its capital, Belgrade (2 million residents), ranks among the oldest and largest cities in southeastern Europe.



Figure 1. Geographical position of the Republic of Serbia

The Republic of Serbia has a favorable traffic - geographical, but at the same time very sensitive geostrategic position. The significance of this position is reflected in the passage of the corridor across the territory of the Republic of Serbia from the ancient times of Via Militaris, by which the shortest terrestrial connection is realized between Europe and Asia or the Middle East.

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The Republic of Serbia is in contact with the major European regions, that is, at the intersection of the roads towards Central Europe - the Danube River, the Mediterranean - the South Adriatic and the Alps.

There are three corridors across the Balkans, while two corridors pass through Serbia. The first is the river corridor of the Rhine - Main - Danube that connects Rotterdam to the Black Sea. On the TEN - T map, the Danube Corridor through Serbia is marked with a broken line, which means that there will be no funding from the European funds until 2030. It should be mentioned that regarding the surrounding countries, Serbia has the least navigation problems. The EU and other funds finance the maintenance of locks and removal of submerged ships from the II World War in Prahovo. The second corridor is Orient/East Mediterranean, which, in its greatest part, follows the route of the former Pan-European Corridor X. Figure 2 shows the TEN - T corridors defined by the new TEN - T policy.

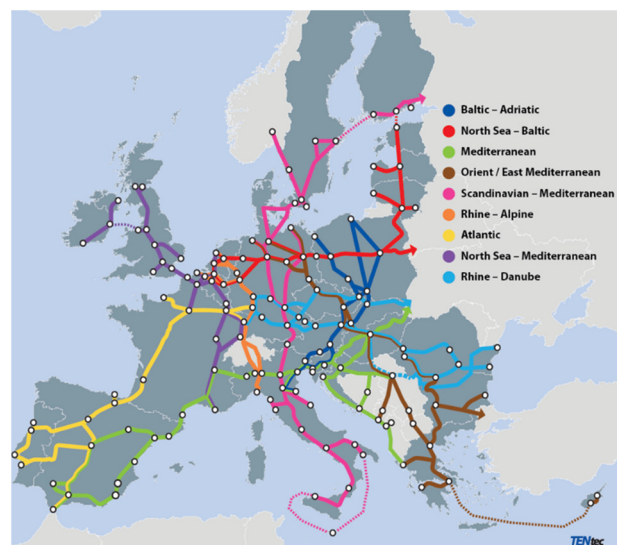


Figure 2. TEN - T corridors

The General Master plan of traffic in Serbia until 2027 is support for making the right decisions in development. It is an instrument of strategic planning that should be constantly used and improved. It provides for the establishment of good legislative procedures and the modernization of the institutional framework in the field of transport. He also gave directions for the strategy of development of water transport of the Republic of Serbia from 2015 - 2020. The results of the EU DAHAR project (Danube Inland Harbor Development) - Transnational program of development (SEE) related to the development of ports as logistics centers and their integration into the Danube logistics network were taken into account when drafting the Strategy in the form of recommendations to competent state authorities. The goal of the project is to align the long-term logistic development of the small and medium - sized port on the Danube, which would result in the establishment of a common development strategy. Position of the Republic of Serbia in relation to the Danube basin is given in Figure 3.



Figure 3. Position of the Republic of Serbia in relation to the Danube basin

Figure 4 shows the forecast of the volume of traffic on inland waterways of the Republic of Serbia (in thousands of tonnes) realized by domestic and foreign ships (inland transport, import and export) [1].

Bearing in mind that multimodal traffic allows the rapid and safe transportation of large quantities of goods, as well as directly affecting the reduction of traffic congestion and pollution reduction, the increase in the volume of goods transported by inland waterways is a direct consequence of accepting the principles of multimodality.

Table 1. Participation of exports by ports in the listed cities of the Republic of Serbia (in tonnes) in total exports

| Ports and docks | Quantity of freight (t) | %     |
|-----------------|-------------------------|-------|
| Pančevo         | 743394                  | 34.41 |
| Smederevo       | 352041                  | 16.30 |
| Belgrade        | 72927                   | 3.38  |
| Novi Sad        | 619837                  | 28.69 |
| Prahovo         | -                       | -     |
| Other           | 371964                  | 17.22 |
| Total           | 2160163                 |       |

## 2. STATE-OF-THE-ART AND POTENTIALS OF THE PORT OF NOVI SAD

The Port of Novi Sad (Luka Novi Sad A.D.) is situated at 45°20'N and 19°51'E, in the central part of the Autonomous Province of Vojvodina in northern Serbia.

The Port of Novi Sad is located at km 1254 at the left bank of the Danube, in the Novi Sad – Savino Selo Canal (part of the Danube - Tisa - Danube - DTD Canal network) at its km 0.4 - 1.2. It covers an area of 24 ha.



Figure 5. Danube Region [2]

Port is situated at the TEN-T Rhine - Danube Corridor (former Pan-European Corridor VII), as well as at former Pan - European Corridor X, which is projected to be a part of the TEN-T Orient/East - Med Corridor, Figure 6, and it is an important transport and cargo handling center of the Central Europe.



Figure 6. Position of the Port of Novi Sad

This position clearly indicates a good geographical position of the port and determines the direction of development in order to meet the needs of the local economic environment and international flows of goods, with particular attention to the development of multimodal transport.

The distance between the Port and the corridors:

- 300 m to the railway corridor Xb,
- 3 km to the road corridor Xb.

The Port of Novi Sad is located in the Novi Sad city which belongs to a group of Danube cities. The Novi Sad city, thanks to its geographical position in Province of Vojvodina and good traffic connections, represents the economic and business center of Vojvodina. The Port of

Novi Sad serves a region with a diameter of 60 km in which live approximately 600,000 inhabitants. Although the port handles several dominant types of goods, where each of them has specific origin and destination of their flows which implies that the size and shape of hinterland is different in relation to the type of transported goods, however it could be said that the basic hinterland of the Port of Novi Sad is South Bačka district (region within 60 km), while the competition margin cover almost the whole range of Vojvodina (Figure 2.4.). The Port of Novi Sad is mainly port for bulk cargo where the main exporting goods are cereals (mostly transported to Constanta and to a lesser extent to Germany) and scrap iron transported to Constanta. Transport activities in the port hinterland are realized mostly by road transport. The imported goods are coal and coke (import from Russia), fertilizers (import from Russia, Romania and Austria) and road salt (import from Egypt).

The direction Danube - east provides links with:

- All international ports along the Danube, downstream from Novi Sad. In addition to the ports in Serbia, those are: Bulgarian ports (Vidin, Lom, Ruse, Silistra,...), Romanian ports (Cernavoda, Braila, Galati, Giurgiu, a canal and Constanta) and Ukrainian ports (Reni and Izmail).
- Black Sea ports Varna, Burgas, Constanta.
- Over the Black Sea ports, the port has a direct connection with the Mediterranean Sea, Atlantic and Indian oceans.

The direction Danube - west provides links with:

- All international ports along the Danube upstream of Novi Sad, as are: Hungarian ports (Baja, Dunaujvaros, Budapest,...), Slovak ports (Komarno, Bratislava), Austrian port (Vienna, Linz, Enns) and German ports (Passau, Regensburg, Kelheim)
- Rhine region over the Rhine - Main - Danube Canal with Germany, Switzerland, France and the Netherlands, which provides way to the North Sea and Atlantic Ocean.

## 2.1 Infrastructure and equipment

The port disposes of a water area of 6 ha, with a depth of 4 - 10 m and 5 mooring places for the simultaneous accommodation of ships. The total length of the quay is 800 m.

The port has 6,000 m of operational railway tracks.

The port disposes of following equipment:

- Portal cranes, capacity 5 t to 27.5 t,
- 7 forklifts with a capacity of 3 t, 1 forklift with a capacity of 5 t, 2 forklifts with a capacity of 12.5 t, 1 forklift with a capacity of 28 t,
- 2 wheel loaders, 3 skid - steer loaders,
- 2 weighbridges, of which one is for road and rail with a measuring range of 100 t,
- 3 telescopic funnels for bulk cargo handling, with capacity of up to 500 t/h per funnel,
- 2 packaging machines (packing of bags of 50 kg and big bags of 1,000 kg),
- Pump for oil products with a storage capacity of 270,000 m<sup>3</sup>.

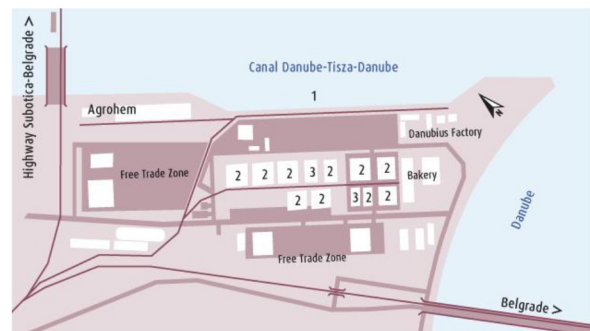


Figure 7. Port of Novi Sad surroundings infrastructure

The Port of Novi Sad disposes of 44,000 m<sup>2</sup> of closed and 100,000 m<sup>2</sup> of open storage areas in the function of public and customs warehouses. These storages offer storage services for domestic and export and import goods.

## 2.2 Cargo handling in the port

The port handles and stores:

- Bulk cargo,
- General cargo,
- Containers and
- Liquid cargo.

The most common handled and stored cargoes are bulk and general cargoes.

## 2.3 Containers handling

The Port of Novi Sad can handle 20' and 40' (and 45') containers of maximum gross weight up to 27 t. In recent years, the port handles containers arriving by road and rail from the Adriatic ports Koper and Rijeka. Transshipment of containers arriving on the Danube is unfortunately rare.

## 2.4 Port development plans

The long - term development of the Port of Novi Sad would have the following point:

- Short - term development in an existing location that should become a logistics center and

- Long - term development into so - called Asia logistics center with the relocation of all bulk cargo (and silo) and "dirty goods" to a new location, and at the existing location, which is an integral part of the urban zone of the City, to build warehouses with additional logistical services.

## 3. CONTAINER FLOWS AND FORECASTED VOLUME OF CONTAINERIZED TRANSPORT

Regarding the available data for Serbia, obtained by interviewing leading containers forwarding companies operating in Serbia, container throughput is around 75,000 containers): 45,000 containers - import / 30,000 containers - export

Main ports for Serbian container export/import are:

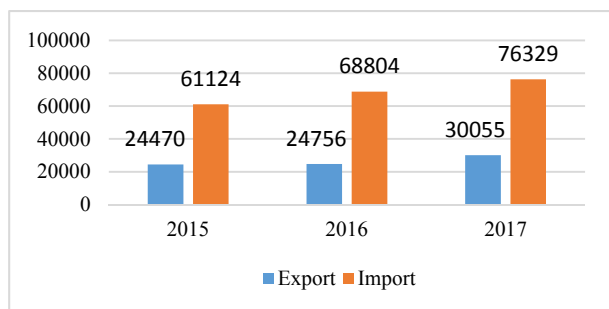
- Rijeka, Croatia: (40,000 containers),
- Bar, Montenegro: (20,000 containers),
- Koper, Slovenia: (10,000 containers),

- Piraeus, Greece: (3,000 containers),
- Thessaloniki, Greek/North EU ports (Rotterdam, Hamburg, Antwerp): (2,000 containers).

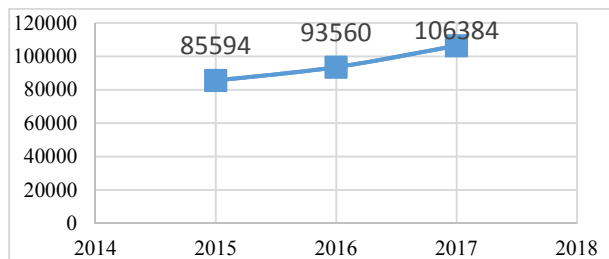
Total imports and exports from the customs offices that gravitate to the Danube Region and in the reviewed period from 2015 - 2017 (Figure 8) are given in Table 2 and on the chart (Figure 9). [3]

**Table 2. Total imports and exports from the customs offices that gravitate to the Danube Region in the TEUs in the period 2015 - 2017. [3]**

|        | 2015          | 2016          | 2017           |
|--------|---------------|---------------|----------------|
| Export | 24,470        | 24,756        | 30,055         |
| Import | 61,124        | 68,804        | 76,329         |
| Total  | <b>85,594</b> | <b>93,560</b> | <b>106,384</b> |

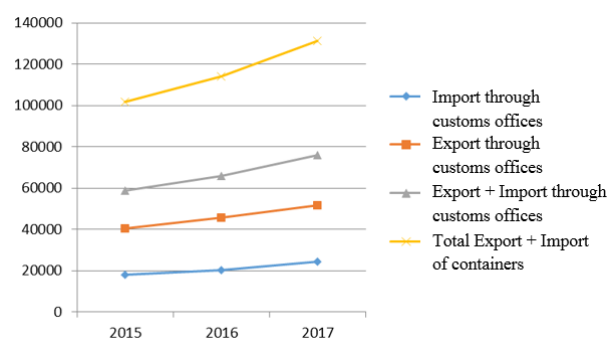


**Figure 8. Total imports and exports from the customs offices that gravitate to the Danube region in the period 2015 - 2017. [3]**



**Figure 9. Total imports and exports from the customs offices that gravitate to the Danube region [3]**

The overall export and import of containers in the Republic of Serbia, as well as the export and import realized through the customs offices that gravitate to the Danube region, is given in the following chart (Figure 10). [3]



**Figure 10. Export, import of containers, export and import realized through the customs offices that gravitate to the Danube region [3]**

The increase in the number of containers in the Danube Region is: 9.3% for 2015 - 2016, and 13.7% for 2016 - 2017, and as a basis for the assessment of growth can be taken:

- 10% as the expected annual increase (medium scenario),
- 5% as a pessimistic option (low scenario),
- 15% as an optimistic option (high scenario).

For containers and container transport in the Danube Region, regarding Serbia and from the previous analysis, on the basis of 106,338 TEUs from 2017, follows: The increase in the number of containers, according to data from the Customs of Serbia, can be approximately estimated to 10% per year.

If in Serbia, related to the Danube region, the increase in the number of containers in the next 5 years would be at the level of:

- 0%, this would mean over 60% of TEUs for the next 5 years, which is 171,278 TEUs,
- 5% (pessimistic variant) for the next 5 years would mean about 28% TEUs, which is 136,171 TEUs,
- 15% (optimistic variant), this would mean over 100% TEU for the next 5 years, which is about 212,768 TEUs.

For the next 10 years (until the end of 2027), during which the cost of investing in the container terminal should be demanded, the number of containers in Serbia - the Danube region would be with a factor of annual increase of:

- 10% the number of containers would increase by a factor of 2.6, or around 276,598 TEUs,
- 5% (a pessimistic variant) would for the next 10 years amount to about 63% TEU, which is 173,405 TEU,
- 15% (optimistic variant), the number of containers would increase by factor 4 or about 425,536 TEU (optimistic forecast).

Of the total number of containers in Serbia, it can be taken with great reliability that

- One third belongs to the region of Vojvodina,
- One third to the region of Belgrade,
- One third in the region of southern Serbia (south of Belgrade).

Customs data of Serbia show that over 80% of the total container transport expressed in TEUs gravitates to the Danube region. [3]

If the base is taken as a rounded figure for 2017 of 105,000 TEUs that is for the increase in the number of containers of 10% per year in the Danube region:

- 169,000 TEU for 5 years,
- 273,000 TEU for 10 years (until the end of 2027). [3]

For the region of Vojvodina, which conditionally tends to the port in Novi Sad, the number of containers could be at the level of 1/3 of the total number of TEUs for the Danube Region (estimated by the number of TEUs by customs offices), which means for 2017 from the current around 35,000 TEU, for 5 years:

- With a 10% increase of 56,000 TEUs,
- With a 5% increase of 45,000 TEUs (pessimistic option),

- With a 15% increase of 70,000 TEUs (optimistic option).

And in 10 years, the expected number of containers in the Port of Novi Sad could be:

- With 10% increase: 91,000 TEU,
- With a 5% increase of 57,000 TEUs (pessimistic option),
- With 15% increase: 140,000 TEU (optimistic variant).

Such a forecast indicates that there is sufficient justification for the design and construction of a container terminal on the Danube and the expectation that the Danube will be a carrier or at least a significant factor in container transport.

For containers that could gravitate towards the Port of Novi Sad, the number of means of transport for previous data for 2017, forecasts for 2027 and for the increase in the number of containers of 10%, provided all containers are transported with the respective modes of transport is:

- 17,500 to 45,500 trucks for the transport of containers in an ideal combination of 2 TEUs/semitrailers (half of the designated numbers for TEUs),
- 583 compositions with 60 TEUs/composition, up to 1,517 compositions,
- 437 ships or barges (with 80 TEUs/barges), up to 1,137 barges for 2027.

If navigation on the Danube would be at least 300 days a year, it would appear that under ideal logistics conditions, if all the containers were transported by the Danube, it could be one to two self-propelled ships daily on the Danube.

In real terms, the number of containers that can be transported by the Danube is primarily associated with containers that come from the east and are unloaded in Constanta and a smaller number of containers circulating from and towards central Europe along the Danube. For these analyses, global movements of goods must also be taken into account, since the transport of the containers by the Danube implies liner services from Constance to at least Enns or Regensburg.

If the situation arises that the North Ports are overloaded with containers as it was before 2008, world operators will look for more favorable variants with ports on the Adriatic Sea and with the Constanta port for containers coming from the Far East, which in that period favored the activation of container terminal in Constanta, but also in Koper, Rijeka, etc. [3]

Since this analysis is restricted to the Port of Novi Sad, it appears that, with 10% growth, container terminals from the current potential of 35,000 TEU (up to 91,000 TEU in 2027) could have been a railway or railroad-road terminal for the transshipment of containers that arrive with wagons and ships, because truck transport from the Adriatic ports means door-to-door transport and does not require reloading.

If for reasonable 5 - 10 years the Serbian Railways are brought into the state of acceptable use and increase the environmental awareness of unacceptable environmental pollution from truck transport, at least half of these containers could be railways (including Luka Piraeus). The Danube remains a potential not only for Serbia, but also for EU countries.

Following this ecological principle for the transport of goods, for the Danube and for the Port of Novi Sad, the targeted number of containers in the Port of Novi Sad in 2027, therefore with a ten-year delay in applying EU environmental rules, would be: About 41,000 TEUs in 2027 would have to be transported by the Danube and unloaded in the Port of Novi Sad, while the rest to 91,000 TEU by rail (18,200 TEU) and road transport (over 31,000 TEUs).

At the level of 5 years, with a 10% increase, this figure gives 25,200 TEUs for the transport by the Danube and 11,200 TEUs by rail transport, which involves cargo handling in the port.

Based on these presented data, it is obvious that there is a need for the creation of a modern container terminal in Serbia, in this case it should be the new container terminal in the Port of Novi Sad.

The above data will be a basis for further work on the design of the container terminal in the Port of Novi Sad.

#### 4. CONCLUSION

The aim of this paper was to analyze possibility of construction of the new container terminal in the Port of Novi Sad which has regional and international importance and good geographical position, located in the Serbian Autonomous Province of Vojvodina.

The basic goal was to identify container volumes in the region and estimate feasibility for the logistics center.

For the predicted volume of containerized transport in the Danube Region and Vojvodina province three assumptions have been analyzed, for the next periods of 5 years and respectively 10 years:

- 10% as the expected annual increase (medium scenario),
- 5% as a pessimistic option (low scenario),
- 15% as an optimistic option (high scenario).

For the economic hinterland of the Port of Novi Sad, in the foreseen conditions could be expected a realistic increase of the container flows by 10 %.

Based on the analyses and the current location of the Port of Novi Sad, it is assumed that the container terminal handles only containers with goods that are not in the category of dangerous goods.

It is as a final point conclusive that the construction of a new container terminal in the Port of Novi Sad on the Danube aims to bring about a significant change in the container transport system in Serbia, but also in the region or the Danube countries as the development of containerization is a prerequisite for the development of economy. It is obvious from this paper that the transport of goods to the Danube should be significantly more economical in order to gain an advantage in the supply chain. Also, as the follow-up effects of the new container terminal in the Port of Novi Sad and its transformation in the logistics center, in addition to all other effects, will generate new jobs and enable integration of the Port into the EU intermodal transport network.

Finally, it should be mentioned that the expected level and type of activities in the area of the Port of Novi Sad regarding the development of the new container terminal won't affect the environmental and health impacts, if the

proper and well planned measures are carried out. Furthermore, there will be no additional impact on cultural heritage and historical heritage within the new terminal location.

#### ACKNOWLEDGMENT

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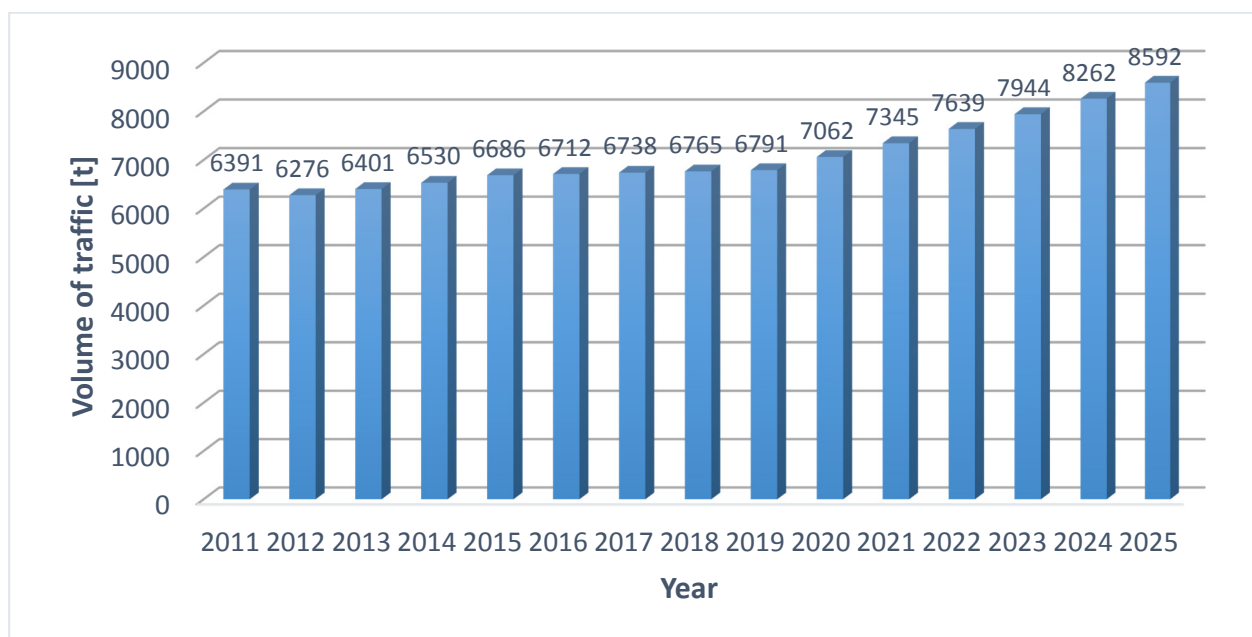


Figure 4. Forecast of traffic volume on the inland waterways of the Republic of Serbia