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Integrating Danube Region into Smart & Sustainable Intermodal Transport Chains

Multimodal infra- and suprastructure facilities and services

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Executive summary

The report examines the existing and partly planned intermodal facilities in the Danube ports, their role in intermodal supply chains and the barriers for further development of intermodal facilities and services.

The analysis of multimodal facilities in various ports along the Danube demonstrated heavy disbalance in favour of the ports on the upper, and partly middle Danube. This is not just in terms of multimodal facilities, but also in terms of intermodal services connecting seaports and inland ports. The upper Danube and middle Danube ports, down to Budapest, benefit from their geographical position and relative nearness to North Sea ports and Adriatic ports, enabling them to harvest the benefits of economies of scale and use frequent rail shuttles to and from these seaports. Moreover, inland ports of the upper, and partly lower, Danube are physically closer to large industrial centres of high-tech products capable of generating containerized cargo flows of higher value goods and have excellent railway connections. Last, but not least, the high economic development of their host countries serves as a perfect generator of both inbound and outbound flows of goods suitable for containerization and therefore for intermodal supply chains. In terms of fully functional intermodal terminals in inland ports, only Enns, Vienna, Bratislava, Budapest, Belgrade and Giurgiulesti have such terminals. The one in Belgrade is heavily underused as there are no more barge shuttles from Constanta to feed it with containers. Moreover, it is not connected by railway with any of the seaports in the neighbourhood. Out of these terminals, only the one in Giurgiulesti is connected with the seaport of Constanta with a regular feeder line for containers. Intermodal (container) terminals in Enns, Vienna, Bratislava and Budapest are connected with various Adriatic and North Sea ports by regular rail shuttles.

In *Austria*, both analysed ports, Enns and Vienna, have functional and well-equipped intermodal (container) terminals. Although located in inland ports, both terminals function mostly as bi-modal terminals (rail and road), as only a small number of empty containers are transported by IWT as spot shipments. This is mostly to the fact that they are very far away from Constanta as the entry/exit seaport for overseas trade using inland waterway transportation, and because they have very developed railway infrastructure and regular connections with Adriatic and North Sea ports.

In *Slovakia*, container terminal in Bratislava operates in a more or less similar way as Enns and Vienna terminals, although it has less railway connections with North Sea and Adriatic ports. There are no regular barge feeder lines to/from any seaports.

In *Hungary*, container terminal in Budapest also functions in a similar manner as those in Austria and Slovakia, although it is interesting to note that in 2020 first trains with containers arrived all the way from China to Mahart Container Centre in Budapest. Occasionally, empty containers are shipped by barge to different ports.

Croatia has very favourable access to the Adriatic Sea and all its seaports, thus enabling the geographical shift of spatial concentration of containerized cargoes to the west of the country, closer to the sea and, for example, the large container terminal in the seaport of Rijeka. Any containers that originate (or have destination in) from the eastern part of the country (with the Danube being its eastern border) are

hauled in and out of the region much faster either by rail or by truck. Therefore, very little demand for intermodal transport of containers via the Danube and Croatian inland port of Vukovar has been observed to date. Largely due to these reasons, the port of Vukovar does not have a dedicated container terminal on its own, although it can handle containers with the existing equipment.

Serbia is in a very specific situation as it has an unusual dispersion of (generally limited) containerized cargo flows through various bi-modal terminals, whereas some of them are located very close to either Sava or Danube waterway, but without physical access to them. The capital of Belgrade, for example, until recently had at least 4 intermodal terminals – 3 existing and 1 planned, whereas only one, in the Port of Belgrade, is a real tri-modal terminal with physical and equipped access to water, but has no regular barge or rail shuttles to any of the seaports Serbia uses for its imports or exports. Such dispersion of containerized cargo flows prevents the spatial concentration and the consequent formation of the economies of scale in any of the existing or planned intermodal terminals.

Apart from a number of container terminals in the seaport of Constanta, with a large number of regular maritime lines throughout the globe, *Romania* has no intermodal terminals in inland ports. Nevertheless, there is one terminal under development in the Port of Galati. However, there are no regular barge or rail shuttles for containers in any of the Romanian inland ports, including Galati.

As regards to *Bulgaria*, one of its important inland ports is Ruse where containers are handled on an ad-hoc basis, very rarely in the last five years. Multipurpose terminal Ruse East is a terminal that handles various types of cargo and is equipped to handle containers from ship to shore and vice-versa, upon demand.

Moldova has one intermodal terminal in the port of Giurgulesti where containers are served, mostly originating from and being destined to the seaport of Constanta. There is a regular feeder line between these ports, transporting containers.

In *Ukraine*, Port of Reni is capable of handling containers at the multipurpose terminal, while the Port of Izmail has a container terminal with determined handling facilities. However, no container flows have been recorded in these two ports in the last five years, while any earlier container transports were rare and on a spot basis.

Inland ports play a significant role in the multimodal transport chains as they represent intermodal nodes and junctions of multiple transport modes. In addition, inland ports are connected with logistics centres, industrial areas, agricultural areas or large consumption centres such as urban zones. In this respect, inland ports can assume the following roles or any combination thereof:

- multimodal hub for multimodal core network corridors;
- platform for the region's trade and industry;
- connecting point between the long-distance freight transport and last mile of urban freight transport (city logistics).

Compared to road transport, intermodal services need to deal with specific challenges. A most notable barrier for intermodal transport in comparison to single mode transport are the additional actions that need to be taken with the cargo –

transshipment in intermodal terminals, sometimes even buffer storage and the last-mile transports which, in many cases, need to be performed by truck. This frequently results in higher door-to-door costs and comparatively longer transit times, especially in cases where cargo origin or its final destination is not close to inland waterway ports. Apart from these widely applicable barriers to further development of intermodalism on the Danube, there is a number of barriers which are specific for the region. Such barriers include, but are not limited to:

- geographical distribution of seaports in and around Danube countries;
- long distance (leading to very long transit times) of highly developed industrial and consumption centres and logistic hubs from the seaport of Constanta;
- railway competition from seaports not connected with the Danube.
- insufficiently developed railway infrastructure connecting the seaport of Constanta with inland ports;
- navigational hindrances on the Danube: shallow sections, low water, high waters, etc;
- lack of large urban agglomerations and consumption centres along the Danube before (downstream of) Belgrade;
- lower level of industrialization, especially of high-tech industries requiring containerization of cargo flows;
- low level of availability of intermodal infrastructure, suprastructure and equipment in many ports of the middle and lower Danube;
- lack of cooperation between modes and spatial planning organizations;
- lack of involvement of global logistic operators, shipping lines and global terminal operators to manage and operate intermodal terminals in the Danube ports, even though one of the world's largest terminal operators, DP World, became the first global player in Danube inland ports as it acquired the port operator in the Port of Novi Sad in Serbia and it plans to develop a container terminal there.

Table of Contents

1 Table of Figures

2 Table of Tables

3 Abbreviations

Abbreviation	Explanation
CTE	Container terminal Enns
GFIP	Giurgiulesti Free International Port
IWT	Inland waterways transportation
IWW	Inland waterways
PA	Port Authority
RMG	Rail mounted gantry crane
RTG	Rubber tyre gantry crane
RS	Reach stacker

4 Introduction

4.1 Scope of the report

The report provides an assessment of the existing multimodal/intermodal facilities in terms of infrastructure and superstructure with their status quo. In addition, this report contains an inventory of existing intermodal services in ports (the portfolio of services for intermodal units such as containers and semi-trailers) and rail/IWT/road shuttles between seaports and intermodal (or container) terminals located in inland ports on the Danube.

Only selected ports were analysed in details, including the ports of:

- Enns,
- Vienna,
- Bratislava,
- Budapest,
- Vukovar,
- Belgrade,
- Ruse
- Galati,
- Constanta,
- Giurgiulesti.

4.2 Role of inland and seaports in multimodal transport

4.2.1 Role of ports as intermodal nodes

Both sea and inland ports serve as intermodal nodes, primarily due to their naturally convenient position at the intersection of at least two different modes of transport – water on the one side, and land (rail, road or both) on the other. However, not just the physical preconditions and transport connections make one port an intermodal node. To be an efficient intermodal node, a port needs to have adequate land plots in a port, relevant terminal infrastructure, suprastructure, facilities and equipment, accompanied by "soft" elements such as digitalized planning and operations management systems or software.

Typical intermodal terminal performs the following basic services:

- Loading/unloading of intermodal units between different transport modes (ship to wagon, ship to truck, wagon to truck, etc.);
- Inbound/outbound inspections, such as document checks, security, physical conditions of intermodal units such as containers, dangerous cargo handling, etc.
- Internal transshipments within the terminal;

- Inbound/outbound ship/train/truck checks;
- Transit storage for intermodal loading units (container yard, trailer parking space, etc.).

In addition, intermodal terminals may offer a myriad of additional value added services, depending on the demand or in a quest to increase their competitiveness. These services include, inter alia, the following ones:

- Storage for intermodal loading units;
- Forwarding and ship agency services;
- Customs services;
- Hauling in/out by trucks;
- Repair and maintenance of containers, trailers, etc;
- Power supply for reefers (containers and semitrailers);
- Stuffing and stripping, etc.

Although seaports and inland ports share a large scope of similar functions and spatial and operational features, they are very different in terms of trade patterns. Their differences in handling intermodal cargo flows are the most apparent ones, apart from the physical differences in sizes and types of vessels they handle. The more distant from seaports, the more notable this difference becomes for inland ports. Unlike inland ports on the, for example, Rhine River, inland ports on the Danube rarely handle intermodal cargoes over water, that is, cargoes hauled in and out by barges (or motor cargo vessels). This is due to the extremely large distances of inland ports from the only seaport (Constanta) generating significant overseas containerized cargo flows. In most of the cases, those Danube ports that handle intermodal cargoes at all, they handle either land-to-land intermodal cargo (mostly carried by railway, such as in case of Enns, Vienna, Bratislava, etc.) or they handle empty containers, such as port of Budapest. Most of empties are collected in a determined port by trucks or by rail, and they are shipped by barge to an agreed destination port (sea or inland).

Compared to road transport, intermodal services need to deal with specific challenges. A most notable barrier for intermodal transport in comparison to single mode transport are the additional actions that need to be taken with the cargo – transshipment in intermodal terminals, sometimes even buffer storage and the last-mile transports which, in many cases, need to be performed by truck. This frequently results in higher door-to-door costs and comparatively longer transit times, especially in cases where cargo origin or its final destination is not close to inland waterway ports.

However, good planning of supply chains and better synchronization of different modes can, in many cases, lead to reduction of overall transport costs, apart from the obvious environmental benefits. This is even more feasible if the shipper or receiver is not aware that his or her cargo is transported by intermodal transport. Furthermore, the overall cost of intermodal transport, as well as the total transit time, need to be competitive in comparison to a single mode transport, where possible and applicable.

There is a number of factors that have significant influence to shippers' decision on opting for intermodal transport:

- multiple agents included in the process (truck companies, port and terminal operators, rail operators and seagoing and inland waterway vessel operators),
- necessary cargo consolidation and securing of return cargoes (avoiding the large share of empty returns) in order to ensure minimum critical volumes necessary for economical operation of barges and trains,
- the need to apply different purchasing or stock schemes that may also alter the production schemes, due to longer transit times.

Intermodal transport greatly depends on the decisions of shippers. In order to ensure that the shippers are willing to choose intermodal transport as an option, good balance between the costs involved in the overall supply chain on the one hand, and reliability, punctuality and flexibility in cargo delivery on the other hand, needs to be established. In addition, there is a growing trend of requiring shippers to report the environmental footprint of their supply chains, which is likely to trigger additional consideration of intermodal transport as an option for shippers' supply chains. Nevertheless, a shift to intermodal transport is more likely to occur if there is an economic benefit on a corporate level.

The PLATINA 2 project elaborated a conceptual framework for modal choice (Figure 1). The framework demonstrates that the transport quality and transport costs are directly influenced by the location, network quality, legal framework, economic and external factors. In addition to this, the PLATINA 2 project revealed that the critical selection criterion for transport mode is the total door-to-door cost. Nevertheless, shippers are willing to temporarily accept higher transport costs if the mid- or long-term economic advantages are proven.

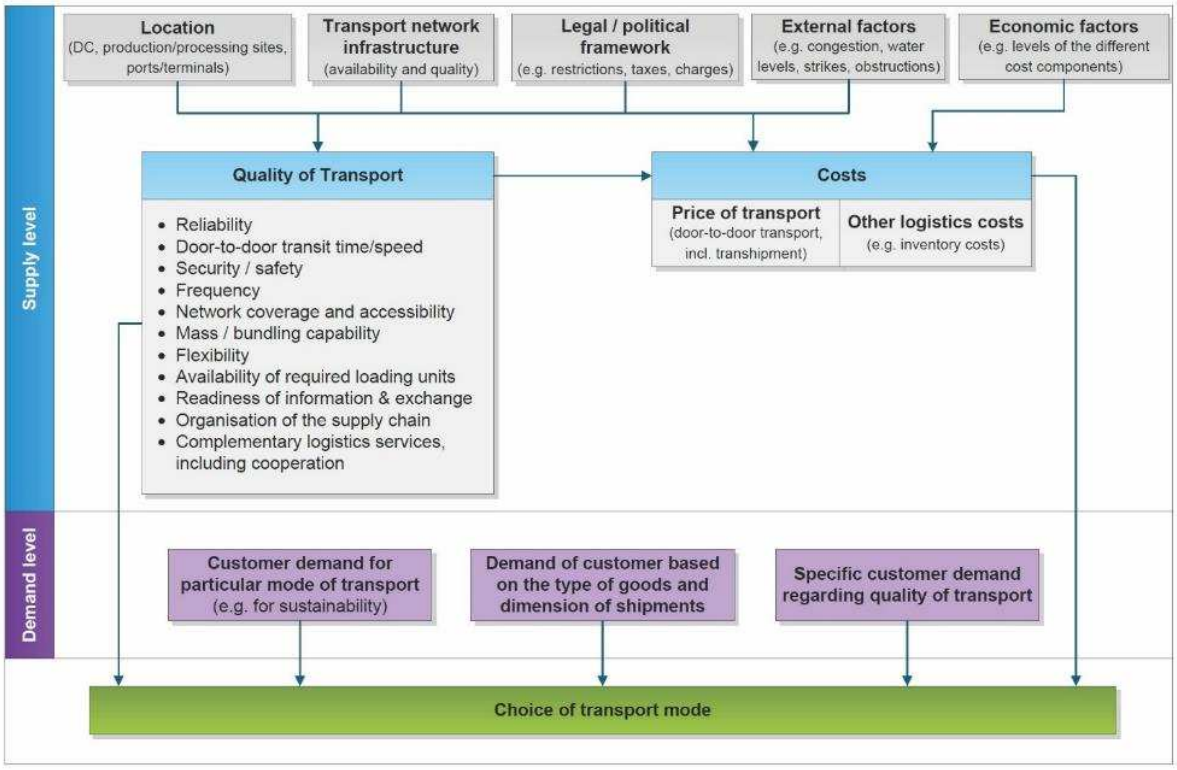

Figure 1: Conceptual scheme for modal choice1

It needs to be emphasized that barge or rail service frequency of only once a week with the same (or longer) transit time as in case of road transport is not acceptable for shippers. This is due to the act that when a barge or rail departure is missed, the next departure is six days later. This can result in serious consequences such as detention/demurrage costs which would increase the total costs. The higher the departure frequency, the less negative consequences caused by delays. A daily rail service is considered to be the perfect alternative for direct trucking. However, in many Danube countries, such cargo volume, especially of containers, is no more than wishful thinking at this moment. Logically, the higher number of containers, the greater possibilities for more frequent barge or rail services.

According to the "Platform for multimodality and logistics in inland ports[2]", the minimum setup for a train or barge service (depending of course on the distance of the maritime ports) is two departures per week in every direction. Filling the fixed capacity with adequate volumes is often only possible when volumes of different

1 2014, PLATINA 2, Deliverable D1.3, Comparison of Modal Shift Studies

2 https://ec.europa.eu/transport/sites/transport/files/modes/inland/doc/2015-07-logistics-inland-ports-platform-long-position-paper.pdf accessed 16.03.2021.

shippers are bundled, requiring for a neutral service (barge or rail shuttles open for all parties).

Establishing intermodal transport service in any supply chain requires a careful trade-off between somewhat conflicting requirements: allowing for additional time and flexibility in supply chain operations in order to maximize the opportunities of economies of scale (cargo bundling) on the one hand, and minimization of operational costs on the other hand. In practice, this means that containers will have longer dwell times and that assets will have lower utilization rate. This trade-off is sometimes referred to as being lean and agile simultaneously.

Inland ports play a significant role in the multimodal transport chains as they represent intermodal nodes and junctions of multiple transport modes. In addition, inland ports are connected with logistics centres, industrial areas, agricultural areas or large consumption centres such as urban zones. In this respect, inland ports can assume the following roles or any combination thereof:

- multimodal hub for multimodal core network corridors;
- platform for the region's trade and industry;
- connecting point between the long-distance freight transport and last mile of urban freight transport (city logistics).

One of the necessary pre-conditions for development of intermodal transport along the Danube is a developed railway network and the functional and efficient cooperation between inland waterway transportation players (ship and port operators) and railway infrastructure managers and operators. This is necessary due to limited coverage of the Danube waterway network. Such collaboration between rail and inland waterway sector can offer sustainable transport solutions through their interconnections in inland ports.

Multimodal hub for multimodal Comprehensive Network Corridors: inland ports serve as efficient transshipment nodes on inland waterway sections of the multimodal Core Network Corridors. They are linking the maritime transport leg and the continental transport modes (rail, road and IWT) and serve as “spoke” ports for seaport hubs. Inland ports with railway connection benefit from the extension of their reach further into the hinterland where there is no waterway network. Inland ports in the Rhine area often combine barge and rail liner shuttles in the door-to-door supply chains. However, similar examples do not exist on the Danube since those ports having intermodal terminals in their port areas use mostly railway transportation as there are no regular barge shuttles from any seaports on the Danube (or even at the North Sea coast) towards any of the inland ports. Intermodal terminals in the Danube inland ports serve as multimodal hubs, but only as bi-modal hubs, connecting rail to road and vice-versa. Moreover, such ports and terminals usually offer customs clearance on the spot, further haulage towards the final destination and a large variety of other logistic and value added services. Unfortunately, no such terminals with regular rail shuttle services exist anywhere downstream from Budapest. In fact, Danube ports that do have regular rail shuttle services from seaports, can offer rail transport only to/from North Sea ports (Rotterdam, Antwerp, Hamburg, etc.), and not a single one

maintains regular rail shuttles to/from the seaport of Constanta as the natural and logical "gate" for all Danube inland ports.

Platform for the region's trade and industry: inland ports function as nodal points for regional economies. Apart from the benefits of spatial concentration of transport and logistic services, inland ports are very attractive location for business and industries, as their proximity and a scope of relevant services have a positive impact on the competitiveness of such businesses and industries.

Connecting point between the long-distance freight transport and last mile of urban freight transport (city logistics): inland ports located in the capital cities of the Danube countries or other major cities are convenient for the development of the sustainable last-mile transports and city logistics. Cargo bundling, innovation and smart solutions can contribute to reduction of the environmental footprint of city logistics. Although road transport remains the most popular mode used in urban freight logistics, there are several examples of intermodal urban freight logistics using rail or waterways for the "last mile" transport such as applied in Paris, Amsterdam and Utrecht. However, no such initiatives are sufficiently developed in the Danube cities with ports.

4.2.2 Barriers for development of inland ports as intermodal centres

In order to understand the scarcity of intermodal transports and intermodal facilities in Danube ports, basic characteristics of transport flows in the Danube countries need to be understood. Apart from that, barriers for intermodal transportation need to be identified.

Unlike the Rhine, the Danube River is significantly longer and shallower. Whereas the first large upstream port, capable of generating intermodal cargo flows (mostly containers) is Belgrade (1168 from the mouth of the Danube River, or ca. 900 km from the seaport of Constanta) as the first upstream capital city, the last similar port on the Rhine is Basel, which is only 850 km from the Port of Rotterdam at the mouth of the Rhine River, as one of the many seaports serving as "gates" for the containerized cargo in the Rhine area, to and from Basel. On the other hand, the last upstream port (furthest from the river mouth) on the Danube is Kelheim, located staggering 2411 km away from the mouth of the Danube River, on the west coast of the Black Sea. This represents a significant disadvantage for the development of trimodal intermodal terminals in Danube ports, from the point of view of total transit time of a container from its origin to its final destination. For example, transit times in import direction (Far East → Europe) for typical regular liner vessel, sailing from, say, Shanghai to Constanta (as the only seaport with developed intermodal terminals and waterway connection with the Danube) is 20 to 25 days, depending on the ports of call along the route. If a final destination of an import container is, for example, Belgrade, the river transit time (upstream navigation) is 3 days if an inland (river) vessel is manned with enough crew to allow 24 hours navigation. If, however, a vessel is crewed with crew sufficient to allow only 14 hours operation, the river transit time to Belgrade increases to 5 days. This is in case a feeder vessel is a motor cargo vessel with its own cargo space. In case a pushed convoy is used, the transit time increases for one day in each of the above mentioned cases. This may be increased by one day in case of rather frequent congestion at the border crossing with Serbia in Veliko Gradište and

Bezdan, plus at least one day of waiting time in the seaport of Constanta needed for transshipment of containers from sea-going vessel to river vessel either directly (rare case) or via terminal. Finally, the average transit time on the river leg of the entire voyage from the port of loading (transshipment) to the port of discharge can be anywhere between 5 and 10 days. This means that the total transit time from overseas port of origin to the river port of discharge can stretch from minimum 26 days to a more likely sum of 30-35 days.

Transit times from Constanta to various sample river ports along the Danube, in ideal conditions (no navigation hindrances of any kind) for a motor cargo vessel of 1350 tons carrying capacity are presented in the following table:

From Constanta to:	Belgrade	Budapest	Bratislava	Enns
Operation mode (A): 14 hrs	5	9	11	13
Operation mode (B): 24 hrs	3	6	7	8
Delays in transshipment port	1	1	1	1
Delays at borders	1	1	1	1
Total in case A	7	11	13	15
Total in case B	5	8	9	10

Table 1: Transit times from Constanta to sample upstream ports on the Danube

Apart from these long transit times, intermodal transport involving "the Danube option" is subject to fierce competition from railway transportation from competing seaports such as Rijeka, Koper, Trieste, Piraeus, and North Sea ports Amsterdam, Rotterdam, Antwerp and Hamburg, to name the most important ones. Railway operators offer regular daily to weekly services with so called "block" trains or "shuttle" trains from these ports to intermodal terminals located, inter alia, in many inland ports along the Danube. Transit times (by rail) from the aforementioned seaports to these intermodal terminals in Danube inland ports are very short – from 1 to 3 days in the worst case. In addition to this competitive advantage, shuttle trains from seaports run on regular basis, from several trains a day to several trains a month, depending on the inland port of destination. Details on such services are given in sections covering intermodal terminals in each country, where applicable.

For countries such as Austria, Slovakia, Croatia, Hungary and Serbia, intermodal transports involving even road transport from the seaports of Trieste, Koper, Rijeka and even Thessaloniki and Piraeus have commercial advantages over intermodal transport involving the Danube option. This is due to the flexibility of road transport and the speed of delivery of single containers.

Based on the analysis of existing intermodal facilities and services in the Danube inland ports, as well as on the information provided by Danube ports managers and

operators, the following *main barriers* for development of Danube inland ports as true tri-modal nodes are *summarized*:

- Geographical distribution of seaports in and around Danube countries: the only seaport that has direct waterway connection is Constanta and it has no regular container lines towards Danube inland ports. North Adriatic seaports are closer to Croatia, Serbia, Hungary, Slovakia and Austria, enabling shorter transit times of containers to/from their final origins/destination in the hinterland.
- Fierce railway competition from seaports not connected with the Danube: many inland ports have intermodal terminals which are connected by railway with major seaports in the North Adriatic and North Sea, offering regular rail shuttles for containers to/from those inland ports.
- Insufficiently developed railway infrastructure connecting the seaport of Constanta with inland ports in its captive hinterland (Danube countries).
- Non-existent regular liner shipping services on the Danube for the transport of containers to/from Constanta from/to Danube inland ports: after several attempts of maintaining container feeder lines from Constanta to Belgrade and Budapest (and back), currently no regular shipping lines exist or are planned in foreseeable future.
- Navigational hindrances on the Danube: lack of navigational reliability on certain sections of the Danube (prolonged periods of low water and stoppage of navigation in critical sectors), frequent period of extremely high or low waters where both situations prevent safe navigation, occurrence of ice, etc.
- Lack of large urban agglomerations and consumption centres along the Danube before (downstream of) Belgrade: large cities are known generators of high-value goods that are convenient for transport in containers via intermodal transport including IWT. Spatial concentration of such important cargo generators is very low downstream from Belgrade.
- Lower level of industrialization, especially of high-tech industries requiring containerization of cargo flows: on the average, economies of the Danube countries are not as developed as those in the Rhine area, where a large number of intermodal terminals are located even in small and medium ports. Developed economies are known as generators of cargo flows of higher value goods which are suitable for transport in containers.
- Lack of real intermodal container terminals and relevant equipment downstream from Belgrade: in connection to the previous two barriers, very few ports host real tri-modal, or even bi-modal (rail and road) intermodal terminals. In this view, the lack of relevant intermodal transshipment facilities prevents the development of rail shuttles from seaports to inland ports. Such rail shuttles are important as a booster for concentration of containerized cargoes in inland ports' intermodal terminals and as an alternative to potential Danube feeder lines by barges from Constanta.

- Lack of cooperation between modes and spatial planning organizations: for example, there are at least two container terminals outside the port of Belgrade which are very close to waterway, but without having any connection to it. Container terminal in the port of Belgrade, although connected to the railway network rarely handled all three modes. In the periods when regular container feeder lines by barge existed in the Port of Belgrade, its container terminal acted mostly as a bi-modal (IWW and road) terminal, as containers were hauled in and out of the port only by trucks. This spatial dispersion of container terminals prevents the concentration of cargo flows and cargo related activities, which is a significant barrier for the development of tri-modal intermodal terminals in ports.
- Lack of transparency and information on cargo flows: currently, there is a scarce availability of specific statistics, real-time traffic information and forecasts of both containerized and non-containerized cargo flows on the multimodal transport network. This makes any efforts in planning of intermodal cargo flows very difficult and time consuming.

5 Intermodal terminals in Austrian ports

5.1 Ennshafen port

The ENNSHAFEN port is the newest public port in Austria. It links the main transport routes for international cargo, the Rhine-Main-Danube waterway from west to east and the north-south railway that extends from the North Sea to the Adriatic. Within the Trans-European Transport Network (TEN-T) of waterways, the ENNSHAFEN port is defined as one of two Austria core nodes in the Rhine-Danube Corridor. With direct access to motorways and main roads, the ENNSHAFEN port offers ideal road links to the regions of Austria and adjacent countries. Waterways, rail and road connections empower the port as a transport hub for goods and commodities in international logistics operations and for local businesses. The ENNSHAFEN port is situated in Austria´s strongest industrial region. Serving the largest continuous industrial area on the Upper Danube, the ENNSHAFEN port is a trimodal centre spanning 3.5 million square meters; by water, it connects the business parks of Enns and Ennsdorf to a powerful economic hub. Located in the heart of Europe, the port is ideally linked to the most important inland ports and sea ports of Europe.

The ENNSHAFEN port is a centre of service, logistics and excellence in transshipment and warehousing. Its high-performance infrastructure, roads, quays and railway systems provide companies with neutral access to various modes of transportation. With a quayside extending some 2,500 meters, cargo handling conditions are ideal. Services such as transshipment, heavy cargo transshipment, warehousing, packaging and bunkering are provided by operators located in the ENNSHAFEN port.

5.1.1 Container terminal Enns - CTE

CTE Container Terminal Enns is operating a trimodal container yard located on the border of Upper- & Lower-Austria directly at the river Danube. CTE is one of the most significant transport hubs for combined transport in Upper-Austria. The site is located directly at the TEN17 rail track, connecting central Europe with the south and eastern European regions. CTE has an own motorway exit connection close to the junction of the A1. CTE therefore is the gateway for both the Industry and trading companies in the region, and the Gateway for transit cargo with final destinations in Vienna, Graz, Linz and Salzburg.

CTE (Container Terminal Enns GmbH) is a private company and operates the container terminal within Ennshafen facilities based on a long-term lease agreement with the port authority Ennshafen OÖ GmbH.

Service hours: Monday to Friday: 24h Service, Saturday: from 05:00 to 13:00

In the following table only transhipment-figures “land-land” are listed because there is no traffic for loaded containers on the river Danube. Only some small amounts of empty containers are shipped via IWW between container depots of several terminals along the Danube, but these figures do not have really relevance to container

business in the Danube region (for Ennshafen: normally 1-2 % of the total annual transhipment number)

Traffic (TEU)	2016	2017	2018	2019	2020
Containers - land to land	318.320	354.656	365.314	394.996	381.189

Table 2: Handling statistics

© ENNSHAFEN PORT

Figure 2: Container terminal Enns

5.1.1.1 Terminal infrastructure

As a multi-modal logistic hub, the Container Terminal Enns is a major hinterland terminal for the big sea ports. Spanning some 270,000 sqm and with a capacity of 500,000 TEU, it has some of the most modern transshipment infrastructure in Austria. Block train rail connections, modern gantry cranes and a full range of services ensure optimum container handling.

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	Yes	Yes/No	
Specialized intermodal terminal		Yes/No	
Total area	270.000	m^2	
Storage area	-	m^2	not defined
Handling area	-	m^2	not defined
Interim (transit) storage capacity	-	TEU	not defined
Depot (base) storage capacity	10.000	TEU	
Quay length at the terminal	620	m	
Rail length along the quay	620	m	
Capacity to handle block-trains	Yes	Yes/No	
Maximum length of complete block-train	720	m	
Number of rail sidings for loading/unloading	10	n	
Total length of rail sidings for loading/unloading	24.000	m	
Number of road lanes for truck traffic	3	n	inlets to terminal
Number of road lanes for truck loading/unloading	-	n	not defined
Parking space for trucks / semitrailers	-	n	not defined
Number of fixed ramps (Ro-Ro)	1	Harbor basin at Lower Austria	outside the container terminal area

Table 3: CTE infrastructure assets

5.1.1.2 Terminal suprastructure

The container terminal itself has only very few suprastructure installed (besides the handling equipment described in 5.1.1.3). As Ennshafen in total is organized as great public-private-partnership complex some suprastructure elements are installed outside the terminal area in close neighbourhood to the terminal (e.g., office building for partners, customs, ...).

Inside the terminal area there are situated:

- a container repair hall,
- two warehouses (used as stuffing centres) and
- a small but modern office building (help desk, counter, office space, meeting rooms, common rooms for stuff, ...).

The weighing systems for road/rail are state of the art and are just in upgrading for installation of modern digitalized systems.

5.1.1.3 Terminal handling equipment

CTE Enns operates:

- four powerful gantry cranes with a capacity of 41 tons.
- 10 rail tracks in block train length (720 meter) can be reached by electrified rail tracks. All rail tracks are covered by gantry cranes. The experienced agents arrange the daily dispatch and arrival of more than 300 railcars resp. or 3000 trains per year. The daily handling capacity comes to over 1.200 TEU's and around 400 trucks.
- more than 24 kilometres of rail tracks for dispatch and parking of block trains and single railcars. CTE has a handling capacity of appr. 500.000 TEU's per annum and will be able to supply the anticipated future increases in containerized transport.

5.1.1.3.1 Waterside handling equipment

The high-performance container gantry crane ensures that handling is efficient. This crane makes it possible to simultaneously service four block train rail tracks and two vessels along the 630 m wharf.

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
high-performance container gantry crane	25 units/hour	45	KÜNZ	2004

Table 4: Waterside handling equipment

5.1.1.3.2 Landside handling equipment

CTE Enns operates three powerful landside gantry cranes with a capacity of 41 tons each. 10 rail tracks in block train length (720 meter) can be reached by electrified rail tracks. The rail tracks are covered by the three gantry cranes.

Rail mounted gantry cranes (RMG)	Capacity (handlings/hour)	Lifting capacity (t)	Manufacturer	Production year
RMG 1	25 units/hour	45	KÜNZ	2015
RMG 2	25 units/hour	45	KÜNZ	2015
RMG 3	25 units/hour	45	KÜNZ	2019

Table 5: Landside handling equipment- RMG

Reach stackers (RS)	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
RS 1		45	KALMAR	-
RS 2		45	KALMAR	-
RS 3		45	KALMAR	-
RS 4		45	KALMAR	-

Table 6: Landside handling equipment – reach stackers

5.1.1.4 Maritime, inland waterway and rail liner and feeder services

Seagoing liner shipping services and Barge (IWW) shuttle services are not applicable for containers.

Some characteristic figures regarding rail shuttle services for CTE Enns are as following:

- 3000 trains per year in 2019
- 6000 container repairs per year in 2019
- appr. 6000 containers in permanent storage 2019 (2020 figures are not typical / Covid)
- about 10 rail operators in the terminal
- all leading seaports are served (Antwerp, Bremerhaven, Hamburg, Koper, Trieste, Piraeus, Rotterdam, Wilhelmshaven)
- appr 20 trains per day are serviced from the terminal
- typical travel times: Hamburg 17 hours, Koper 10 hours, Piräus 48 hours

Typical train connections Terminal Enns:

Enns – Hamburg	17 trains a week in each direction
Enns – Bremerhaven	5 trains a week in each direction
Enns – Koper	2 trains a week in each direction
Enns – Piräus	2-3 trains a week in each direction

Table 7: Average train connections CTE

The information in the table are average values (as of March 2021) and can change at any time.

Current Maritime schedule Terminal Enns

- Traffic accessibility German Ports

Dispatch day	Port of destination	Closing
Monday	CTB	11.00H
Monday	BRV	17.00H
Tuesday	MAS	17.00H
Wednesday	CTA/CTB	11.00H
Wednesday	BRV	17.00H
Thursday	MAS	17.00H
Friday	BRV	11.00H
Friday	MAS	17.00H
Saturday	CTA/CTB	FR 17.00H

Table 8: Outbound rail connections to German seaports3

Arrival day	Port of entry	Closing
Monday	Bremerhaven	06.00H
Monday	Hamburg	13:30H
Tuesday	Maschen	13.30H
Wednesday	Maschen	06.00H
Wednesday	Maschen	13.30H
Friday	Hamburg	13.00H
Saturday	Bremerhaven	MO 06.00H

Table 9: Inbound rail connections from German seaports

Description:

- CTB: Container Terminal Burchardkai Hamburg
- CTB: Bremerhaven
- MAS: Mix via Maschen all quais in Hamburg and Bremerhaven
- CTA: Container Terminal Altenwerder
- TCT, EKOM, SÜD are arranged via Maschen.

- Traffic accessibility south ports Trieste & Koper

Outbound and inbound: Triest and Koper have a daily connection (A/C) vice versa. Please contact your local container operater for more details. Closing: 17.00H

[3] Source: Maritime - Rail Schedule - TRAFFIC ACCESSIBILITY - CTE - Container Terminal Enns (www.ct-enns.at) Accessed 19.03.2021.

5.1.1.5 Services to cargo and containers

Container Terminal Enns offers a full range of services to ensure optimum container handling.

Container trucking of all containers (20ft, 30ft, 40ft/HC, 45ft, Flat, etc.):

We ensure your load gets on its way, shipments from or to the harbours, trucked domestically or cross border trucking. Whatever type of load you have your cargo is in the right hands with us. Our dangerous goods officers arrange controls for DG categories 2-6, 8 and 9.

Our trucks are equipped with modern truck telemetry. Special trailers for heavy duty transports are available. Our fleet is furnished with Euro 5 EEV/Euro 6 trucks. Truck orders can be electronically transferred via our web-based IT-Systems. CTS is the market leader when it comes to containerized transport in Salzburg.

Container storage:

CTE disposes about a storage capacity of more than 10.000 TEU's. The total terminal surface area capacity for storage of containers comes to more than 170.000m2. FCL Containers are stored in security areas and monitored 24 hours by our security systems. We provide electrical connections for refrigerated containers. In case of emergency a leakage pan is available for DG container units. Empty containers are handled by modern spreader forklifts. The communication to our clients is arranged by electronic data interchange (EDI).

Container maintenance & repair:

CTE is certified by GL Germanischer Lloyd. Container checks and repairs are carried out at our in-house facilities according to the internationally certified standards CSC – Container Safety Convention. We communicate via EDI CODECO with our clients.

VGM SOLAS weighing: CTE arranges your VGM weighing according to SOLAS regulations**.** CTE ist your expert when it comes to weighing of your containers, calibrated equipment according to VGM method 1 class IV (4) is available in Enns. Weighing is arranged according to SOLAS IMO circular MSC1/Circ. 1475 and according to national Austrian regulations that will be available in Autumn 2016.

CTE has got 3 truck gates in automated service (touch free truck gates with OCR) and even a dynamic railcar weighing system for each departing train.

Services offered	Mark with X	Note
Storage	X	
Customs clearance	X	
Stuffing/stripping	X	
Inspection	X	
Container repair	X	

Table 10: Services to cargo and containers in the Ennshafen port

5.2 Port of Vienna

The trimodal terminal WienCont is located in the port of Freudenau and connect the tree key modes of transport rail, river and road.

Located in the port of Freudenau, as a company of the Port of Vienna, we thus achieve a maximum of flexibility in terms of logistics, while saving the environment.

Supported by state-of-the-art technology, a dynamic team and our unique entrance technique using only the momentum of the trains, enables us to handle all types of container/trailer transports for our partners and offer a distinctive service in Austria and Europe.

5.2.1 WienCont Container Terminal

As a multi-modal logistic hub, the Container Terminal Freudenau is a major hinterland terminal for the big sea ports. Spanning some 170,000 sqm and with a capacity of 400,000 TEU, it has some of the most modern transshipment infrastructure in Austria. Block train rail connections, modern gantry cranes and a full range of services ensure optimum container handling.

WienCont Container Terminal GmbH is operating a trimodal container yard located in Vienna directly at the river Danube. WCT is one of the most significant transport hubs for combined transport in Vienna. The site is located directly at three TEN-T rail corridors, connecting central Europe with the south and eastern European regions. WCT has motorway exit connections close to the junction of the A1, A4 and S1. WCT therefore is the gateway for both the Industry and trading companies in the region, and the Gateway for transit cargo with final destinations in Vienna and south Europe.

WCT (WienCont Container Terminal GmbH) is a company of the Port of Vienna.

Service hours: Monday to Friday: 24h Service, Saturday: from 04:00 to 24:00

In the following table only transhipment-figures “land-land” are listed because there is no traffic for loaded containers on the river Danube. Only some small amounts of empty containers are shipped via IWW between container depots of several terminals along the Danube, but these figures do not have really relevance to container business in the Danube region (for WienCont: normally max. 1 % of the total annual transhipment number)

Traffic (TEU)	2016	2017	2018	2019	2020
Containers - land to land	440.000	403.000	350.000	375.000	427.000

Table 11: Handling statistics

© WienCont

Figure 3: Port of Vienna container terminal picture

5.2.1.1 Terminal infrastructure

As a multi-modal logistic hub, the Container Terminal WienCont is a major hinterland terminal for the big sea ports. Spanning some 170,000 sqm and with a capacity of 400,000 TEU, it has some of the most modern transshipment infrastructure in Austria. Block train rail connections, modern gantry cranes and a full range of services ensure optimum container handling.

Although we have a capacity of 400,000 TEU, we were able to reach 427,000 TEUs in 2020.

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	Yes	(Yes/No)	
Specialized intermodal terminal		(Yes/No)	
Total area	170,0	(m^2)	
Storage area		(m^2)	Not defined
Handling area		(m^2)	Not defined
Interim (transit) storage capacity		TEU	Not defined
Depot (base) storage capacity	10.000	TEU	
Quay length at the terminal	650	(m)	
Rail length along the quay	650	(m)	
Capacity to handle block-trains	Yes	(Yes/No)	
Maximum length of complete block-train	700	(m)	
Number of rail sidings for loading/unloading	7	(n)	
Total length of rail sidings for loading/unloading	-	(m)	
Number of road lanes for truck traffic	3	(n)	Inlets to terminal
Number of road lanes for truck loading/unloading	-	(n)	Not defined
Parking space for trucks / semitrailers	200	(n)	Not defined
Number of fixed ramps (Ro-Ro)	-	(n)	

Table 12: WCT infrastructure assets

5.2.1.2 Terminal suprastructure

On the terminal entrance is an automatic ingate situated and office buildings just as a container repair hall and a repair hall for reach stackers.

5.2.1.3 Terminal handling equipment

WienCont operates with three powerful gantry cranes (KÜNZ) with a capacity of 41 tons. Four rail tracks in block train length (720 meter) can be reached by electrified rail

tracks and 2 rail tracks with a length of 650 m handled with shunting. While the former rail tracks are covered by gantry cranes, the later implies a handling with reach stackers. WienCont handles around 120 trains per week. The daily handling capacity into the automatic ingate comes to over 600 trucks.

5.2.1.3.1 Waterside handling equipment

The high-performance mobile container crane ensures that handling is efficient. This port mobile crane makes it possible to service along the 1500 m wharf.

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Port mobile crane	10 units/hour	84	LIEBHERR	2015

Table 13: Waterside handling equipment

5.2.1.3.2 Landside handling equipment

WienCont operates on three powerful landside gantry cranes with a capacity of 41 tons each. 4 rail tracks in block train length (720 meter) can be reached by electrified rail tracks.

The rail tracks are covered by these three gantry cranes:

Rail mounted gantry cranes (RMG)	Capacity (handlings/hour)	Lifting capacity (t)	Manufacturer	Production year
RMG 1	25 units/hour	45	KÜNZ	2008
RMG 2	25 units/hour	45	KÜNZ	2008
RMG 3	25 units/hour	45	KÜNZ	2012

Table 14: Landside handling equipment- RMG

Reach stackers (RS)	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
3 Reach Steakers (all equal)		45	KALMAR	2012/2016

Table 15: Landside handling equipment – reach stackers

5.2.1.4 Maritime, inland waterway and rail liner and feeder services

Some characteristic figures regarding rail shuttle services for WienCont are as following:

- 120 trains per week are serviced from the Terminal
- appr. 8000 container repairs per year
- appr. 3500 TEU in permanent storage
- connections of our customers to relevant seaports (Antwerp, Bremerhaven, Hamburg, Rotterdam, Constanta, Istanbul)

5.2.1.5 Services to cargo and containers

WienCont offers a full range of services to ensure optimum container handling.

Container storage: WCT disposes about a storage capacity of more than 10.000 TEU's. The total terminal surface area capacity for storage of containers comes to more than 130.000m2. FCL Containers are stored in security areas and monitored 24 hours by our security systems. We provide electrical connections for refrigerated containers. Empty containers are handled by modern spreader forklifts. The communication to our clients is arranged by electronic data interchange (EDI).

Container maintenance & repair: WienCont and its subsidiary company FTSC (Fehringer´s Technical Service Consulting) are certified by GL Germanischer Lloyd and offers stationary services as well as a mobile inspection and a repair service in the south-east of Vienna. FTSC also offers consulting and CSC inspection. Container checks and repairs are carried out at our in-house facilities according to the internationally certified standards CSC – Container Safety Convention. We communicate via EDI CODECO with our clients.

VGM SOLAS weighing: WCT arranges your VGM weighing according to SOLAS regulations**.**

Services offered	Mark with X	Note
Storage	X	
Inspection	X	Serviced by FTSC
Customs clearance	X	
Stuffing/stripping	X	Serviced by Port of Vienna
Container repair	X	

Table 16: Services to cargo and containers in the port of Vienna

6 Intermodal terminals in Slovak ports

6.1 Port of Bratislava

Port of Bratislava is the most important port in Slovakia on the international Danube waterway that fulfils the functions of a universal cargo and passenger port. The port's potential is enhanced by its strategic geographical location at the crossroads of the Rhine – Danube and Baltic– Adriatic TEN-T Core Network Corridor. The Bratislava Port is located on both banks of the Danube River and it is a complex of water bodies, hydro technical installations, port basins and related infrastructure, facilities and storage areas served and connected to both rail and road transportation networks and infrastructure. Port land is owned by state-owned joint stock company Public ports, JSC and infrastructure and suprastructure is owned by private dominant port operator. Port is equipped with facilities for transshipment of containers, bulk and break-bulk cargo, iron ore, heavy piece goods and mineral oils.

6.1.1 Container terminal Bratislava

Container transport on the Danube is currently operating at relatively low levels, as can be seen from the following graph. For this reason, too, the expected high growth (from a relatively low base) is attributed to this segment. In terms of specific materials and goods, the potential is not defined, due to the fact that the volume of individual containers is highly variable and can vary quite significantly depending on the region. However, the port of Bratislava already has a multimodal terminal in which containers are being transshipped. However, due to the current lack of demand, only at the level of modal split road <–> railway. Water transport is used only for the import of empty containers without cargo and their transshipment to another mode of transport.

When assessing the performance of container terminal, it has to be taken into the consideration that Bratislava is often the administrative seat of several companies, but neither the destination of real transport activities, nor production area.

Container terminal in the public port of Bratislava is he only trimodal container terminal in Slovakia. Trimodal terminal is operated by SPaP, a. s. that is a cargo port operator and an owner of infrastructure in Bratislava cargo port - roads, railway sidings, utilities (engineering networks - sewerage, water, power), transformer stations for supply of power, workshops, warehouses, ship lifts, etc.

Container terminal is open from 6:00 to 22:00 during working days and weekend as well.

Container terminal has a direct regular railway connection by means of container to shuttle trains: Bratislava – Mělník (CZ) and vice versa, Bratislava – Bremerhaven (DE) and vice versa, Budapest (HU) – Bratislava, Rostock (GER) – Bratislava, Koper (SLO) – Bratislava.

Due to the current lack of demand, only at the level of modal split road <–> railway. Water transport is used only for the import of empty containers without cargo and their transshipment to another mode of transport.

Usual way of container transport was impacted in 2020 due to occurrence of bark beetles in the region of central Europe what resulted in the increase of calamitous wood on the market. The most important buyer of this commodity is China. Consequently, a significant number of containers are currently being used in this segment.

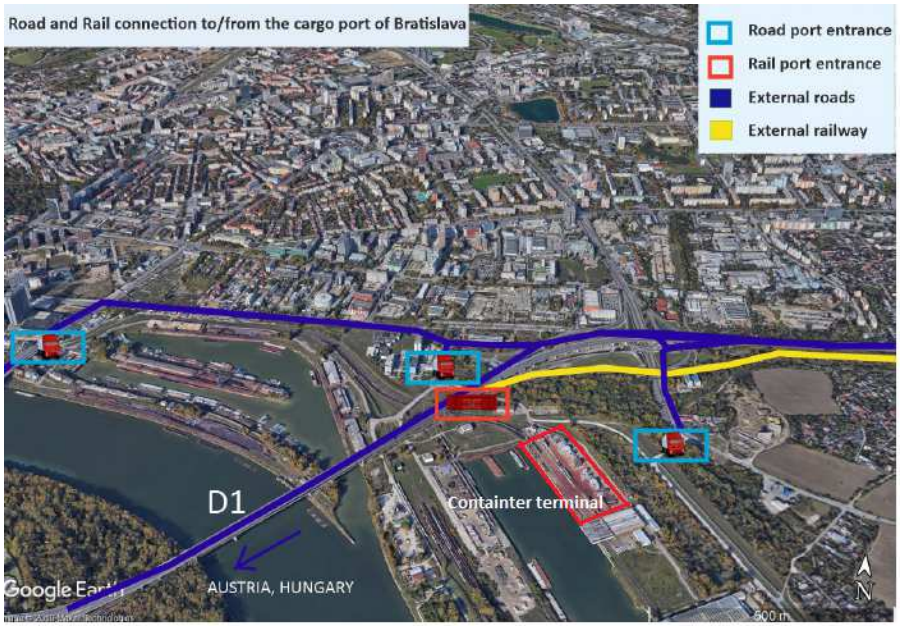

Figure 4: Road and Rail connection to / from the cargo port of Bratislava

Rail connection

Railway track, which is located in the port, is owned by dominant operator SPaP, a.s. It is connected to ŽSR (national rail transporter) railway at railway station Bratislava ÚNS (Central Freight Station). The construction length of all siding tracks is 28 828,6 meters, including 69 turnouts. The siding is predominantly electrified, with the siding and track no. 101, 102, 103, 104 and 105 are under the traction line. The total length of traction line is 5 500 m, the other part of siding is not electrified.

The railway infrastructure of the Port can be divided into the following integral parts:

- connecting rail between the Port area and Bratislava Central Freight Station,
- a track group 100, which represents an entry / exit group to / from the port,
- railroad groups in Winer port: the main flow of the Danube, the North and South basin,
- railroad groups in the Winter port.

Description	Value	Unit
Maximum number of trainsets per day	7	pc
Maximum train capacity	80	TEU
Number of working days per year	300	days
Annual capacity of railways	72237	TEU/year

Table 17: Rail capacities at Container terminal of Bratislava

Road connection

Road network in the Bratislava region is characterized by a radial-circular structure, the core of which is the territory of the Slovak Republic capital Bratislava and its nearest background. The main communication system of the road network consists of the motorways D1, D2 and the 1st and 2nd class roads, which radiate from the capital. The significance of Bratislava's location is further enhanced by the fact that three multimodal corridors run through the town:

- Corridor IV: Berlin/Nuremberg - Prague – Budapest - Constanta/Thessaloniki – Istanbul, leading from the motorway D2, state border with the Czech Republic – Kúty – Bratislava (Rusovce) – to the state border with Hungary. The I / 2 road is the parallel route to the corridor.
- Corridor Va: Bratislava - Žilina - Košice – Užhorod, state border with Austria – motorway D4 –junction D2 Jarovce –motorway D2 - junction D1 –motorway D1 – Trnava – with continuing in the direction to Žilina –state border with Ukraine, the I/61 road is the parallel route to the corridor.
- Corridor VII: The Danube river.

The European Transport Corridors type TEM (Trans-European North-South Motorway) and the International "E" Road Network are also passing through the Bratislava region:

- E 58 (D1, D2, D4) Trnava - Bratislava – a border with Austria – (Wienna),
- E 65 (D2) (Břeclav) – a border with the Czech Republic- Bratislava - Rusovce – a border with Hungary– (Rajka),
- E 75 (D1, D2) a border with Poland - Žilina - Trenčín - Bratislava - Rusovce – a border with Hungary – (Rajka),
- E 571 (II/572, I/61, I/62) Bratislava - Senec - Nitra -Zvolen - Lučenec –Košice,
- E 575 (I/63) Bratislava - Dunajská Streda - Medveďov – state border with Hungary.

Description	Value	Unit
Maximum number of vehicles per day	120	pc
Maximum load on the vehicle	2	TEU
Number of working days per year	300	days
Annual capacity of roads	72 000	TEU/year

Table 18: Road capacities

Traffic (TEU)	2016	2017	2018	2019	2020
Containers - waterside handling	2922	5729	3203	960	415
Containers - land to land	68000	71000	106 000	98 000	n/a
Containers - total handling	70 922	76 729	109 203	98 960	415

Table 19: Handling statistics

Figure 5: Container terminal Bratislava (photo: VPAS)

The total transshipment capacity for containers is used at the level of approximately 4% (2017). The total storage capacity of open storage areas is at the level of 3,500 TEU in one layer.

Ro-Ro ramp is also present in the area of public port of Bratislava. Port authority however does not track it´s usage. Due to the specification of the construction and character of port activities currently ongoing, estimated usage is very low.

6.1.1.1 Terminal infrastructure

Terminal has direct connection to water, rail and road. Main feature of the terminal is gantry crane capable of trimodal transshipment. In total there are 5 railway trucks, each of them is 280 m long. Three are under the gantry crane, two are out of its reach. Main track has 750m. Due to length of 5 tracks, standard train of 620 meters must be split before entering the terminal. Parking for semitrailers is located right next to the terminal. Ro-Ro ramp is present in the port but not in the same section as container terminal.

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	No	(Yes/No)	Main focus is on containers handling
Specialized intermodal terminal	No	(Yes/No)	
Total area	24000	(m^2)	
Storage area	4600	(m^2)	open storage - 3,500 TEU in one layer
Handling area	8577	TEU	Storage capacity within reach of cranes
Interim (transit) storage capacity	1400	TEU	
Depot (base) storage capacity	n/a	TEU	
Quay length at the terminal	288	(m)	
Rail length along the quay	288	(m)	
Capacity to handle block-trains	No	(Yes/No)	Block train must be split
Maximum length of complete block-train	288	(m)	
Number of rail sidings for loading/unloading	3	(n)	
Total length of rail sidings for loading/unloading	288	(m)	3x288m under crane + 2x 288m out of crane´s reach
Number of road lanes for truck traffic	2	(n)	
Number of road lanes for truck loading/unloading	2	(n)	
Parking space for trucks / semitrailers	Max 40	(n)	Max 40 semitrailers, max 150 TEU
Number of fixed ramps (Ro-Ro)	1	(n)	

Table 20: Terminal infrastructure characteristics

6.1.1.2 Terminal suprastructure

Trimodal container terminal is located in the area called Pálenisko, industrial part of the port built in 70´s of 20th century. Main rail leading to the area is split into 5 shorter parts. Since this part was built with intention of transhipment of (heavy) industrial goods and steel coils, suprastructure present reflects this objective. There is only one building located in the area that serves as interim custom warehouse and warehouse for storage of steel coils. The rest of the area is used for container handling, loading and unloading of trucks/trains and for semitrailer parking. There are no office buildings, workshops, or management buildings.

6.1.1.3 Terminal handling equipment

Main handling equipment of container terminal is gantry crane with lifting capacity of 25 tonnes mounted on rails, capable of transshipment between rail, road and water. Gantry crane was constructed around 1986. The rest of equipment contains 4 reach stackers, all with lifting capacity of 45 tonnes manufactured by HYSTER or KALMAR.

Forklifts and other smaller equipment are used only for secondary tasks, not on daily basis – upon necessity.

6.1.1.3.1 Waterside handling equipment

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Crane 1	15 TEU/h	25	KBS	1986

Table 21: Waterside handling equipment

Reach stackers (RS)	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
RS 1	n/a	45	KALMAR	2018
RS 2	n/a	45	KALMAR	2006
RS 3	n/a	45	KALMAR	Ca 2010
RS 4	n/a	45	HYSTER	Ca 2010

Table 22: Landside handling equipment – reach stackers

6.1.1.4 Maritime, inland waterway and rail liner and feeder services

Due to low demand for container transportation in recent years, majority of containers is being transported by either rail or road. In terms of connections between port of Bratislava and maritime ports, these connections are secured by railway.

There are currently 5 liner services operating providing connection to Czech Republic, Germany, Hungary and Slovenia. Two new liners are planned for 2021 towards Netherlands and Croatia.

Unfortunately, exact statistics about number of containers / TEUs transshipped through particular corridors, estimation is following:

- 1/3 Rostock
- 1/3 Koper / Rijeka
- 1/3 Bremerhaven / Mělník / Budapest

Rail shuttle services	Frequency	Traffic (TEU)				
		2016	2017	2018	2019	2020
Service 1 (Bratislava - Mělník (CZ)and back)	1 / week (Wednesday)	n/a	n/a	n/a	n/a	n/a
Service 2 (Bratislava – Bremerhaven (DE) and back)	1 / week (Monday)	n/a	n/a	n/a	n/a	n/a
Service 3 (Budapest (HU) – Bratislava	1 / week (Wednesday)	n/a	n/a	n/a	n/a	n/a
Service 4 (Bratislava – Koper (SL)	1 / week (Saturday)	n/a	n/a	n/a	n/a	n/a
Service 5 (Bratislava – Rostock (DE)	2 / week (Tuesday, Thursday)	n/a	n/a	n/a	n/a	n/a
Service 6 (Bratislava – Antwerp (NL) - planned	n/a as of 2021	n/a	n/a	n/a	n/a	n/a
Service 7 (Bratislava – Rijeka (HR) - planned	n/a as of 2021	n/a	n/a	n/a	n/a	n/a

Table 23: Rail shuttle services in the port of Bratislava

6.1.1.5 Services to cargo and containers

Container terminal in port of Bratislava provides standard services such as open-air storage and indoor interim storage in custom warehouse, cleaning and weighing on

road scale. Available is parking for semi-trailers. Operator of terminal offers custom clearance services. Upon request the installation of refrigeration and PTI testing is available. Maintenance of containers is not provided, however in case of sale, "neutralization" of container is available. Whole area is monitored with video surveillance with record. Access is monitored and controlled by private security service.

Services offered	Mark with X	Note
Storage	X	Loading and unloading
Picking	X	
Labelling	X	For dangerous goods (labelling/un-labelling)
Bar coding	X	
Return (of empties)	X	
Inventory	x	
Inspection	X	Inspection and cleaning
Customs clearance	X	JCD, JCDd, DCH documents, transit documents (T1, T2, T-) storage of goods in a private customs warehouse
PTI test...	X	Thermical containers
Connection to electricity	X	
installation of refrigeration equipment	X	Temperature adjusting
weighing containers on a road scale	X	
Railway service	X	Upon request
Custom storage	X	Up to 90 days
Neutralization	x	Numbers, codes, labels in case of sale
Container transportation on road	x	Upon request
Security	X	

Table 24: Services to cargo and containers in the port of Bratislava

7 Intermodal terminals in Hungarian ports

7.1 Port of Budapest

Freeport of Budapest is located in Csepel Island, the south part of the capital of Hungary. Csepel is the 21st district of Budapest. The address of MAHART Freeport Plc, the port land and infrastructure owner organization, is 1211 Budapest, Weiss Manfréd (formerly: Szabadkikötő) Road 5. The port is located in the Danube-Mainland Rhine waterway on the Danube section crossing the continent northwest to south-east in the inland waterways of Europe, at the 1.640 km of riverbank.

7.1.1 Mahart Container Center terminal Budapest

As the Freeport of Budapest is located in Csepel, on the edge of the metropolitan area, and is Hungary's second largest port and logistic centre, its hinterland is actually the whole country. There are important international corridors (TEN-T corridors) going through Hungary both east-west and north-south directions.

Csepel Island is surrounded by the River Danube. Freeport is located on its north part, accessible on water on the right branch. From the direction of Austria and Slovakia, it is the third freight port among the bigger ones in Hungary, after Győr-Gönyű and Komárom. On the way to the south, the biggest ports are in Dunaújváros and Baja on the River Danube. Close to the border of Serbia, Port of Mohács will be constructed and developed in the upcoming years to provide high-end services and become an excellent logistic centre as the first/last checkpoint in the country for vessels coming from/going to the direction of Constance.

The Freeport and Csepel Island are linked into the national railway networks by the Gubacsi bridge located on the north-eastern part of the island. On railway, Hungary has 9 border crossing points towards Slovakia, 6 to Austria, 1 to Slovenia, 3 to Croatia, 2 to Serbia, 5 to Romania and 2 to Ukraine. Besides there are 16 organizer stations in the country.

As regards road connections, Freeport is accessible on highways M1 from Austria, M7 from Croatia, Slovenia, M6 from the south, M5 from Serbia, Romania and M3 from the east, using the ring-road, M0 as well. Trucks can approach the port from the highways via either M0 – M51 – Ócsai Road/Grassalkovics Road/Helsinki Road (on the Pest side by the river) – Gubacsi bridge, or M0 – II. Rákóczi Ferenc Road (through Csepel downtown) – Weiss Manfréd Road, or from the city through Kvassay Jenő Bridge.

MAHART Freeport Plc., the owner of the port land and its infrastructure (quays, basins, berths, etc.) is a 100% state owned company owned by the Hungarian National Asset Management Inc. The port authority, responsible for port governance and port administration, is Freeport of Budapest Logistics Ltd. (hereinafter: BSZL). BSZL's legal successor called MAHART Freeport Corp. was set up on 1 September 2005. MAHART Freeport provides the right to BSZL to operate the Freeport of Budapest for 75 years within the pre-privatization and operation contract. This contract includes the possession and use of property owned by MAHART Freeport.

MAHART Container Center Ltd. (short name: M.C.C. Ltd.) is operating its neutral terminal for all client as an independent company from 1998 in Budapest Freeport. MCC is the first operating container terminal in Hungary due to fact that first container had arrived at Freeport in 1969. Container terminal became operational in 1972 after a 3-year test period. MCC became a limited company in 1998 from its predecessor - container department of Freeport, and from 2005 MCC became a neutral and independent terminal in Hungary. Terminal is owned by 2 private Hungarian company: 50% of shares owned by WINTCO Ltd., while remaining part is owned by High Yield Plc.

Opening hours of terminal

Our terminal id opened 24 hours / 7 days a week (except announced closing on Christmas / NewYear's / Easter Monday).

However, please, note that administration desks are opened on working days from 6:00 to 18:00, so orders for terminal have to be placed within opening hours of administration desks.

Day	ROAD opening hours	RAIL opening hours	Opening hours of administration desks
Monday	00:00-24:00	00:00-24:00	06:00 - 18:00
Tuesday	00:00-24:00	00:00-24:00	06:00 - 18:00
Wednesday	00:00-24:00	00:00-24:00	06:00 - 18:00
Thursday	00:00-24:00	00:00-24:00	06:00 - 18:00
Friday	00:00-24:00	00:00-24:00	06:00 - 18:00
Saturday	00:00-24:00	00:00-24:00	closed
Sunday	00:00-24:00	00:00-24:00	closed

Traffic (TEU)	2016	2017	2018	2019	2020
Containers - waterside handling	4.650	8.350	4.800	4.350	6.000
Containers - land to land handling	349.350	210.650	331.200	389.650	405.500
Containers - total handling	354.000	219.000	336.000	394.000	411.500

Table 25: Handling statistics

Figure 6: Mahart Container centre Budapest

7.1.1.1 Terminal infrastructure

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	No	(Yes/No)	
Specialized intermodal terminal	Yes	(Yes/No)	NIKRASA terminal
Total area	111.000	(m^2)	
Storage area	80.000	(m^2)	
Handling area	29.000	(m^2)	
Interim (transit) storage capacity	1700	TEU	laden storage
Depot (base) storage capacity	5400	TEU	empty depot
Quay length at the terminal	280	(m)	
Rail length along the quay	280	(m)	
Capacity to handle block-trains	Yes	(Yes/No)	Max. 680 m
Maximum length of complete block-train	680	(m)	
Number of rail sidings for loading/unloading	5	(n)	
Total length of rail sidings for loading/unloading	2.280	(m)	

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Number of road lanes for truck traffic	3	(n)	at gate
Number of road lanes for truck loading/unloading	3	(n)	
Parking space for trucks / semitrailers	20/70	(n)	outside 20 pp inside 70 pp
Number of fixed ramps (Ro-Ro)	0	(n)	

Table 26: MCC infrastructure assets

7.1.1.2 Terminal suprastructure

The available capacity of our terminal is 230.000 TEU/year.

Storage capacity: 7.100 TEU (empty + loaded capacity).

MCC has the following infrastructure:

- 11,1 ha total area (111.000 sqm)
- 2×690 m + 3×300 m rail sidings
- 220 m quay
- 74 × electric plugs for reefer containers
- Container repair shop
- Dedicated ADR/RID storage place
- Dedicated customs inspection and stuffing & stripping places

7.1.1.3 Terminal handling equipment

MCC has the following equipment:

- 1 × RMG (30 t)
- 6 × loaded reach stackers (Kalmar, 45 t)
- 4 × empty reach stacker (Kalmar, 10 t)
- 2 x Kalmar terminal tractor
- 4 × forklifts (various type, 3-18 t)

7.1.1.3.1 Waterside handling equipment

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Crane 1	26	35 t	Ganz-Mohr&Federhaff	1972
Total handling capacity	26	35 t		

Table 27: Waterside handling equipment

7.1.1.3.2 Landside handling equipment

Rail mounted gantry cranes (RMG)	Capacity (handlings/hour)	Lifting capacity (t)	Manufacturer	Production year
RMG 1	26	35 t	Ganz-Mohr&Federhaff	1972

Table 28: Landside handling equipment- RMG

Reach stackers (RS)	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
RS 1	22	45 t	Kalmar DRF	2013
RS 2	22	45 t	Kalmar DRF	2013
RS 3	22	45 t	Kalmar DRF	2014
RS 4	22	45 t	Kalmar DRG	2017
RS 5	22	45 t	Kalmar DRG	2019
RS 6	22	45 t	Kalmar DRG	2020
RS 7	22	11 t	Kalmar DRF	2011
RS 8	22	11 t	Kalmar DRF	2013
RS 9	22	11 t	Kalmar DRF	2014
RS 10	22	11 t	Kalmar DRG	2019

Table 29: Landside handling equipment – reach stackers

Forklifts	Capacity (handlings per hour)	Lifting capacity (t)	Manufacturer	Year of production
Forklift 1	-	18	Hyster	2021
Forklift 2	-	13,6	Kalmar	1997
Forklift 3	-	6	Nissan	2015
Forklift 4	-	3	Komatsu	2010

Table 30: Landside handling equipment – reach stackers

7.1.1.4 Maritime, inland waterway and rail liner and feeder services

Trimodal - road-rail-river - connection is a great opportunity to MCC, and co-operating with several barge owners and shipping companies, MAHART Container Center had a regularly, bi-weekly running barge service from Constanta with potential stopping at Galati and Beograd. Nowadays, MCC has on-demand barge transports from MCC up to Austria for the main Austrian ports like Wien, Enns, Linz. MCC handles barges on spot basis from/to Regensburg and Bratislava as well.

Barge (IWW) shuttle services	Frequency	Traffic (TEU)				
		2016	2017	2018	2019	2020
Constanta-Budapest	bi-weekly - monthly	Figures are not public.				
Budapest-Bratislava-Enns-Linz	weekly-bi-weekly					

Table 31: Barge shuttle services in MCC

MAHART Container Center Ltd. has a wide range of block train network to several places in Europe. Our terminal has direct connection - by block trains of the co-operating railway operators - with the significant harbours and terminals in Europe (Hamburg, Bremerhaven, Cologne, Herne, Rotterdam, Trieste, Koper, Rijeka) and spot trains launching from/to Salzburg, Linz, Paskov, China etc. The presently operational block train network is the following:

Rail shuttle services	Frequency	Traffic (TEU)				
		2016	2017	2018	2019	2020
Budapest-Trieste	14	Figures are not public.				
Budapest-Koper	2					
Budapest-Rijeka	4-6					
Budapest-Bremenhaven	3					
Budapest-Malaszewicze	Spot					
Budapest-Arad	1					
Budapest-Herne	6					
Budapest-Brno	2					

Table 32: Rail shuttle services in MCC

7.1.1.5 Services to cargo and containers

MCC provides the following services to cargo and container:

- Road haulage of containers
- Testing, cleaning and electricity feeding of reefer containers
- Installing (GOH, Flexi-tank, inliner, insulated liner)
- Handling, storing of ADR containers (only ADR 2, 3, 6.1, 8, 9 classes)
- Container repairing
- Container inspection
- Steam cleaning of containers
- Cargo handling in case of customs checking per random sample or per article
- Cargo handling/transloading from container to truck
- Customs services
- Used, empty containers (20', 40', 40'HC) for sale

Services offered	Mark with X	Note
Storage	X	
Picking	X	
Labeling	X	
Return (of empties)	X	
Breaking shipments	X	
Inventory	X	
Inspection	X	
Customs clearance	X	

Table 33: Services to cargo and containers in MCC

8 Intermodal terminals in Croatian ports

8.1 Port of Vukovar

Port of Vukovar is situated on 1335+000 rkm on the right bank of the Danube River. The port stretches towards the East and West and it is 1700 meters long and 45 meters wide. The port is very well situated on the Danube which makes it possible for the port to be accessible during the entire year regardless of the water level. This is so even during the period of the lowest water levels. Port of Vukovar is accessible by road, as well as by railway.

Total port area of Vukovar port is around 26 ha with no space for the further development. The railway infrastructure modernization and electrification project is in progress and it will reduce the existing port area for approximately 5,8 ha. Port of Vukovar is an open shore type port with no port basins. It has a maximum draft of 2,6 meters and a cargo handling capacity of 2 mil. Tons per year. There are no capacities for container handling in the port at this moment. There are capacities for high and heavy and out-of-gauge cargoes.

There are 7 terminals in the port: Bulk cargo terminal, Grains terminal, Break bulk (general) cargo terminal, Two liquid cargo terminals, Multipurpose cargo terminal and Palletized cargo terminal.

8.1.1 Multipurpose terminal Vukovar

Port of Vukovar does not have Container terminal, but Multipurpose terminal located in port of Vukovar can be used as a multimodal facility. Terminal with its location on the Danube river is accessible by IWW and connected by highway A3 over state road D55, as well as with main international railway corridor RH1(former Pan-European corridor X) by railway.

Port services at the multipurpose cargo terminal can be operated according assigned concession, while Public institution Port Authority Vukovar is in charge for concession assigned. According to concession agreement Port of Vukovar Ltd operate at Multipurpose cargo terminal and operator is allowed to provide port activities related to loading/unloading cargo, cargo handling, as well as cargo storage.

Terminal working hours form Monday to Friday are from 7:00 to 23:00, while on weekend terminal is open for port activities according to previously appointment with terminal operator.

No container transshipment was recorded in the last five years.

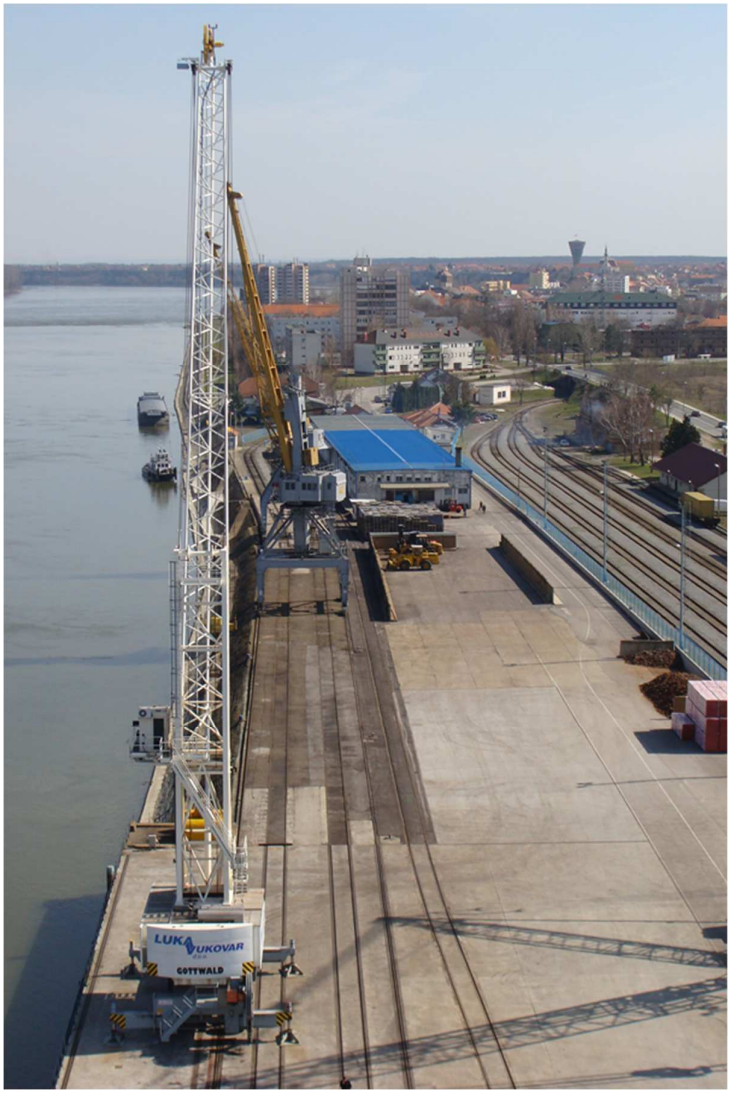

Figure 7: Multipurpose cargo terminal in port of Vukovar

8.1.1.1 Terminal infrastructure

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	Yes	Yes	
Specialized intermodal terminal	No	No	
Total area	7000	(m^2)	Total port area is 38ha, where it is 22ha of land, while 16ha is water part of the port area.
Storage area	2000	(m^2)	Not strictly defined, value is approximately calculated.
Handling area	5000	(m^2)	
Depot (base) storage capacity		TEU	
Quay length at the terminal	105	(m)	55 m vertical quay and 50 m sloped quay
Rail length along the quay	140	(m)	Length along the terminal, while total length along the quay in port is 800m
Capacity to handle block-trains		Yes	
Maximum length of complete block-train	400	(m)	In this case block-train is stretched over two different terminals.
Number of rail sidings for loading/unloading	3	(n)	Rail sidings located on two different terminals
Total length of rail sidings for loading/unloading	420	(m)	Total length of all 3-rail siding for loading/unloading is 3000m
Number of road lanes for truck traffic	2	(n)	Port road for access to terminal
Number of road lanes for truck loading/unloading	2	(n)	Port road for access to terminal
Parking space for trucks / semitrailers	26	(n)	Parkin is not located at the terminal, then at entrance in port.
Number of fixed ramps (Ro-Ro)		(n)	No ramps

Table 34: Port of Vukovar – Multipurpose cargo terminal infrastructure assets

8.1.1.2 Terminal suprastructure

Terminal is operated by concessionaire port of Vukovar Ltd who provides port activities on Multipurpose cargo terminal, as well as on Break bulk (general) cargo terminal, which are next to each other.

Multipurpose cargo terminal covers area of about approximately 7.000 m2, while 2000 m2 is open storage area and 5000 m2 is handling area. As it is stated, the terminal has only open storage area and handling area, while there are no warehouses, workshops, office space... However, Break bulk (general) cargo terminal contains closed warehouse capacity 3000 m2, open storage area 10000m2, as well as workshop and office building.

8.1.1.3 Terminal handling equipment

8.1.1.3.1 Waterside handling equipment

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Mobile crane	17,5	63	Gottwald	1999
Level luffing portal crane	17,5	16/25	Ganz	2006
Total handling capacity	35			

Table 35: Waterside handling equipment

8.1.1.3.2 Landside handling equipment

As regard handling equipment, there are only 8 forklifts available, while five of them have capacity of 2 tons. Remaining 3 forklifts are described in table below.

Forklifts	Capacity (handlings per hour)	Lifting capacity (t)	Manufacturer	Year of production
Forklift 1	N/a	5	Linde	2019
Forklift 2	n/a	5	Linde	2019
Forklift 3	n/a	20	Linde	2008

Table 36: Landside handling equipment – forklifts

8.1.1.4 Maritime, inland waterway and rail liner and feeder services

There are no regular IWW or rail shuttle services in the Port of Vukovar.

8.1.1.5 Services to cargo and containers

As above indicated, Port of Vukovar does not have container terminal, as well have not had transhipment of container cargo, but some of the existing services can be applied on container cargo at the Multipurpose cargo terminal which are listed in table below.

Services offered	Mark with X	Note
Storage	x	Open storage of the container
Inspection	x	Quality control of goods by authorized and certified company
Customs clearance	X	Custom office located in port of Vukovar

Table 37: Services to cargo and containers in the port of Vukovar

9 Intermodal terminals in Serbian ports

At the moment, the only one intermodal terminal in Serbian ports is within the Port of Belgrade. Though, certain number of containers has been transported by rail through ports in Pančevo, Novi Sad and Sremska Mitrovica (river Sava), but these ports are still limited for waterside container handling. Ongoing and planed projects are focused on development of intermodal terminals in ports and enabling container handling for all three modes of transport.

9.1 Port of Belgrade

Located on the intersection of the rail/road corridor X and Rhine Danube corridor, the Port of Belgrade has international importance. Laid along the right bank of the Danube River at km 1168, port has one basin and covers surface of approximately 90ha. Its maximum designed cargo handling capacity is 3.000.000 tons/year and 12.000 TEU/year. Maximum available draft is maintained at 4 meters, but waterway limitation is usually less (2,5m).

Figure 8: Port of Belgrade

Republic of Serbia is the owner of the port land, while the infrastructure is owned by the private company operating the port, “Port of Belgrade” joint stock company.

In the period from 2007 to 2016 total throughput of the port was between 200.000t and 350.000t. Most frequent cargoes handled are salt, metal products, steel scrap, coal and fertilizers. Overall cargo volume is decreasing due to the urban development around the port and traffic limitations. Therefore, authorities started planning activities for development and construction of the new port in Belgrade, on different location.

9.1.1 Container terminal Belgrade

Container terminal has been established in mid 80s. Using mostly the existing multipurpose facilities, and with procurement of some necessary equipment all conditions were met to set up intermodal terminal. With the wave of the containerization, in this period terminal has reached its maximum capacity, transhipment of 12.000 TEU on a yearly basis.

Unstable political conditions, country disintegration, civil war and later bombing campaign of the major transport infrastructure in 90s caused the market disruption and even closure of the Danube navigation.

At the beginning of the 21st century, there were two good attempts to restore container traffic on the river Danube, and both times Port of Belgrade was included in these liner services. However, for different reasons these services did not persisted.

Terminal is connected to the national railway network and further to TEN-T corridor X.

Due to expansion of the urban surrounding and heavy weight truck limitations in the city centre, terminal has only one link with the city ring-road and further to highways. This link is old Pančevo bridge, often overloaded with traffic.

Port operator, Port of "Belgrade" jsc, is the holder of the right to operate the terminal, though the ownership of the company has changed in the privatization process in 2005.

Container terminal covers the area of 12.000 m2, excluding manipulation area and covered warehouses used to store goods from containers.

Working hours of the container terminal are from 08:00 to 20:00 every working day, on Saturday from 08:00 to 16:00. Sundays and public holidays are subject to special agreement and upon proper announcement.

Traffic (TEU)	2016	2017	2018	2019	2020
Containers - waterside handling	0	0	0	0	106
Containers - land to land[4]	0	0	0	310	106
Containers - total handling	0	0	0	310	212

Table 38: Handling statistics

[4] Movements are double counted: first from ship to shore and then from shore to wagon or truck.

Figure 9: Port of Belgrade container terminal

9.1.1.1 Terminal infrastructure

Even though it is set as container terminal, it is equipped for handling different kind of multimodal units (containers, trailers etc.) and different kind of general and dry bulk cargo.

Terminal covers the area of 15.000 m2, out of which 12.000 m2 is storage area. Truck loading/unloading is usually done inside storage area. Approximately 700 TEU can be stored at the same time. Handling area (waterside and rail) covers 3.000 m2.

Length of the vertical quay is 610m. Two rail sidings of the same length are laid alongside the quay, enabling handling of 1300m long block trains.

Using the main gate, trucks are reporting straight to the terminal. There is no specific parking space for trucks waiting for loading/unloading at the moment. In the period of the higher frequency traffic, trucks are using parking space for the customs terminal and central parking area at the port.

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	Yes	(Yes/No)	
Specialized intermodal terminal	Yes	(Yes/No)	
Total area	15.000	(m^2)	
Storage area	12.000	(m^2)	Including handling area
Handling area	3.000	(m^2)	Waterside handling area
Interim (transit) storage capacity	/	TEU	
Depot (base) storage capacity	700	TEU	
Quay length at the terminal	610	(m)	
Rail length along the quay	610	(m)	
Capacity to handle block-trains	Yes	(Yes/No)	
Maximum length of complete block-train	1300	(m)	
Number of rail sidings for loading/unloading	2	(n)	
Total length of rail sidings for loading/unloading	1220	(m)	
Number of road lanes for truck traffic	1	(n)	
Number of road lanes for truck loading/unloading	3	(n)	
Parking space for trucks / semitrailers	/	(n)	No dedicated parking space for the container terminal, but one parking for all users.
Number of fixed ramps (Ro-Ro)	/	(n)	

Table 39: Container terminal Belgrade infrastructure assets

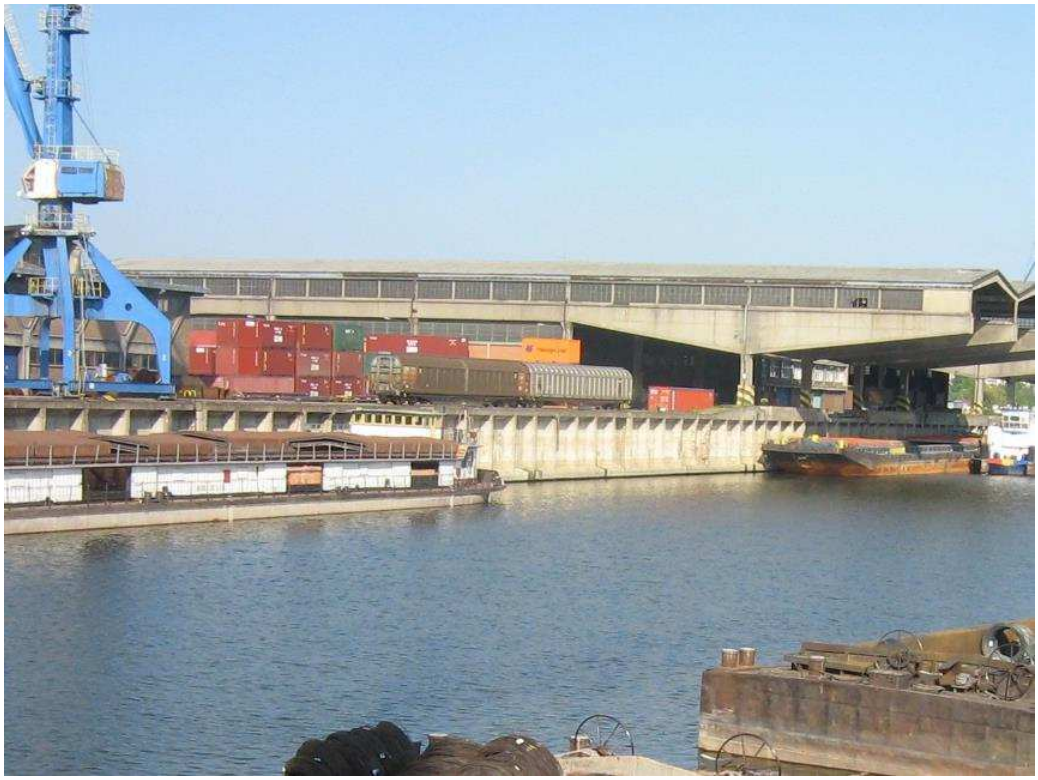

Figure 10: Vertical quay with cranes, rail sidings and container terminal in Belgrade

9.1.1.2 Terminal suprastructure

Beside the mentioned infrastructure, two large, covered warehouses are located next to the container terminal. With more than 5.000 m2 each, they are suitable for storing the goods loading to/unloading from containers. Covered area in front of one warehouse, as well as the warehouse itself, is within the reach of the overhead (bridge) crane used for waterside handling of containers. This enables loading/unloading of goods in/out of containers during all weather conditions.

Office space is also located in this warehouse. There are offices of port operator's commercial department, operations and container terminal department, along with offices of shipping companies, custom agents etc.

Weighing scale for trucks is located nearby the container terminal, while the repair shop is within maintenance department on the periphery of the port area.

Figure 11: Unloading goods from container in the covered area

9.1.1.3 Terminal handling equipment

Being integral part of the multipurpose port, container terminal is in favourable position to use overall port operator's equipment and facilities. However, specific technical conditions are limiting what equipment will be used.

9.1.1.3.1 Waterside handling equipment

Overhead crane with lifting capacity 50t ensures safe and efficient loading/unloading of containers from river barges and railway wagons.

Empty containers can also be loaded in barge using portal slewing crane.

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Overhead (bridge) crane	10	50	"Metalna" Maribor, Slovenia	1964
Portal slewing Crane (empty containers only)	15	5	Veb Kranbau Eberswalade, Germany	1964
Total handling capacity				

Table 40: Waterside handling equipment

Figure 12. Waterside handling of containers

9.1.1.3.2 Landside handling equipment

Main equipment for land side handling of containers is Forklift with spreader, lifting capacity 32/27t.

Four other forklifts with lifting capacity 14t/12,5t are used for handling of empty containers, while Unimog vehicle is used for shunting the railway wagons.

Forklifts	Capacity (handlings per hour)	Lifting capacity (t)	Manufacturer	Year of production
Forklift 1 (with spreader, can handle containers up to 3 rows)		32t	Luna	1977
Forklift 2 (empty containers handling only)		14t	Yale	1977
Forklift 3 (empty containers handling only)		12,5t	Litostroj	1982
Forklift 4 (empty containers handling only)		12,5t	Litostroj	1982
Forklift 5 (empty containers handling only)		12,5t	Litostroj	1986
Unimog- vehicle for shunting wagons		600t	Mercedes	1989

Table 41: Landside handling equipment – forklifts and shunting vehicles

Figure 13. Forklift with spreader handling 20' container in Belgrade

9.1.1.4 Maritime, inland waterway and rail liner and feeder services

Currently, there are no inland waterway and rail liner and feeder services.

As already mentioned, two liner services were established but neither one survived for different reasons. First one started in 2006, jointly operated by Jugoagent and BRP (Bulgarian River Shipping co.) connecting Belgrade and Constanta, had one weekly departure with transit time 5 to 7 days. Due to unstable navigable conditions causing prolonged transit times, and changes occurred in direct maritime services connecting Constanta with far East, this liner service was closed after several years. Second one started in 2010, operated by Helogistics, had one weekly departure connecting Budapest, Belgrade and Constanta. This service maintained planned schedule, but company owners decided to close the line after several years.

Figure 14. Barge with containers in the Port of Belgrade

9.1.1.5 Services to cargo and containers

Container Terminal in the Port of Belgrade offers a full range of services to ensure optimum container handling.

Beside the handling of containers arriving/departing by road/rail/IWW, all applicable services for goods are available, including loading/unloading of goods in/out of containers, storage of goods/containers, weighing of goods/containers, road transportation of goods/containers etc.

Services offered	Mark with X	Note
Storage	X	
Picking	X	
Labeling	X	
Return (of empties)	X	
Breaking shipments	X	
Inventory	X	
Inspection	X	
Customs clearance	X	

Table 42: Services to cargo and containers in the port of Belgrade

Figure 15. Unloading barrels from a container in Belgrade

10 Intermodal terminals in Romanian ports

10.1 Port of Galati

The Galati port is the largest sea-river port, respectively the second largest port in Romania, with access to the Danube maritime sector and the Black Sea through the Sulina Chanell and the Danube-Black Sea Chanell. Galati Port is located on the left bank of the Danube, from Km 160 to km 144+500, is managed by the National Company Maritime Danube Ports Administration SA Galati; has a total of 56 operating berths. Port of Galati is accessible by river and sea vessels (max. 15,000 DWT). However, the capacity and draught of ships admitted to operation and which may reach the port are conditioned by the minimum depth of the Danube recorded at Sulina Channel.

The port operator operating in the Bazinul Nou Port, respectively Port Bazinul Nou SA (PBN), has some port equipment for the operation of ships and cargo (e.g. four 30-50 tons car cranes, 23 forklifts, 2 self-loading trucks) but does not have facilities for the operation of intermodal flows, such as special cargo handling cranes, cranes for handling operations of the type of those used for ship-to-shore operations (STS) and those used for the used for transshipment of loading units between rail and road (RMG), these following to be achieved through the implementation of the Project Galați Multimodal Platform (the ”Project”).

The Project aims the development of a multimodal platform with a capacity of 150,000 TEU/year in the port of Bazinul Nou (from the Galati port), is being implemented with a completion deadline of 2023, the first year of operation 2024.

10.1.1 Multimodal terminal Galati

Currently, the port infrastructure and its facilities are in an inadequate technical state. The substantial upgrading of existing infrastructure will eliminate bottlenecks in two ways.

Firstly, the port infrastructure will be upgraded, contributing to: (1) the increase of the efficiency of handling modern ships with higher capacities and the increase of the safety and security conditions; and (2) facilitating rail interconnection between Russia and the European Union via Ukraine by integrating two types of gauge (1435 and 1520 mm) into the terminal’s operations. This is of strategic importance and can initiate new multimodal services between Europe and Russia, Ukraine and the Republic of Moldova.

The access in the port platform is performed directly from the European road E87 (on the road) and from CFR triage through a railway line. The upgrade of the existing public road infrastructure (by building a highway passage and a roundabout) is performed in order to streamline road traffic on the E87.

The implementation of the intermodal and IT & C facilities will enhance the capacity, efficiency, safety and security of the port operations. The upgrade of the terminal will

provide a sustainable alternative to the road transport between the Central Europe and the Black Sea region, especially Turkey and Greece.

Currently, most freight transport on these routes is made by road. The efficient combination of the modes of shipping, river, rail and road will open up new possibilities for the multimodal services.

According to the Romanian legislation in force, the land, docks and access infrastructure is public property. The port infrastructure (docks) that will be upgraded of the Project is property of the Romanian state and is managed through the Ministry of Transport. The same infrastructure is subject of a concession contract concluded between the Ministry of Transport and NC MDPA (respectively the concession contract No. 3447 of 12.09.2008), the latter substituting the Ministry of Transport and acting as administrator of the infrastructure, including fulfilling the public power prerogatives that the state itself would have fulfilled.

The duration of the concession agreement between the Ministry of Transport and NC MDPA is of 49 years, starting with the execution date of the contract (respectively, 12.09.2008).

The Romanian legislation provides that the land - as an infrastructure element belonging to the public domain managed by the NC MDPA (based on the concession contract concluded with the Ministry of Transport), can be leased to private entities and especially to those entities that have infrastructure and suprastructure located on that land. As a consequence, such lease agreements were concluded between the NC MDPA and all the operators operating on the land (infrastructure element) belonging to the public domain managed by the NC MDPA.

PBN is a port operator established in 1991 as a joint stock company with state capital, owning the entire superstructure, but also infrastructure elements in the Port Bazinul Nou Galati.

Through a privatization process finalized in 1999, which took place through public procedures, PBN became a private joint stock company, which undertook a series of investment obligations within this privatization process.

Term of the Lease Agreement for PBN – is 2043.

Provisions regarding the prolongation of the term of the Lease Agreement: we mention that according to *Law no. 235/2017 amending and supplementing the Government Ordinance no. 22/1999 regarding the administrations of ports and waterways, the use of the naval transport infrastructure part of the public domain*, as well as the naval transport activities in ports and internal waterways, Article 35, para (2) and (3), **the lease agreements for the lease of the naval transport infrastructure** will be concluded for a period that cannot exceed the concession period and if the lease agreement regulates the lessee's obligation to carry out investment program whose depreciation period exceeds the limited period of the concession contract, the successor in rights of the administration is obliged to conclude with the lessee a lease agreement under the same conditions, for a period equal to the remaining period until the full depreciation of the investments performed.

Based on these legal provisions, in case through the lease agreement it has been regulated the obligation of the lessee to perform investments which depreciation

period exceeds the term of the agreement, it will be concluded a lease agreement under the same conditions for a term equal with the duration left until the full depreciation of the investments performed.

The handling operations will be performed on the multimodal platform hereby also named „terminal". For the Project it was allocated an area of 85,506 sqm from the platform existing at shore, out of which 25,000 sqm are deemed as „expansion area" that will be used for extra deposit spaces, specifically for semi-trailers that can be handled by cranes. The expansion of the quay inside the port basin will add a free space of 29,974.024 sqm according to the Technical Project to the existing of 85.429 sqm. The platform from the quay will be equipped with storage and stacking areas that are designed in order to ensure a handling capacity of 150.000 TEU/year.

Currently, the entire infrastructure/suprastructure from the 85,506 m² land allocated to the Project is the private property of the port operator –PBN. All the infrastructure/suprastructure elements that will be developed on the water shore and on this land and that will integrate as much as possible the existing buildings are the property of PBN. For the avoidance of any lack of clarity/possible confusions, we mention that the company name is the same as the port name where the Project will be implemented (the Bazinul Nou Port).

PBN owns as property the port infrastructure/suprastructure located on the land leased from NC MDPA, infrastructure/superstructure that will be included within the Galati Multimodal Platform project, being the only operator from the area of the port of Bazinul Nou that owns superstructure that fulfils the technical requirements and needs imposed for the platforms located on the Core Corridors. PBN offers handling and storage services to all the port customers in a non-discriminatory manner. After the implementation of the Project, all the facilities resulting will be opened to the public access for the port's customers that request port services, on a non-discriminatory basis.

It will work from Monday to Friday, 16 hours a day.

The Port of Galați is a river-maritime port allowing the access for barges, river and sea vessels with a capacity of maximum 15,000 dtw. We mention that the capacity of the ships actually depends on the maximum capacity allowed at the entrance on the Sulina channel, the current maximum admitted capacity being of 12,000 dtw.

In this sector, under normal conditions, the navigation of ships with lengths of maximum 180 m and of the floating constructions with wideness of maximum 40 m is allowed.

Depending on these parameters, on the Sulina Channel can enter ships dedicated to the container traffic on short relations – the basin of the Black Sea and of the Mediterranean Sea – with a capacity of 300-500 TEU.

Considering the draught limitations, it was taken into account the optimum scenario with a ship of 300 TEU, respectively of 8,000-9,000 tdw, considering all the containers loaded at capacity (an average of 28-30 tons/TEU).

In practice, the port-container ships transport both loaded and empty containers, generating an average of approximately 15 tons/TEU that would conduct to the possibility of the transportation of a higher number of TEUU/ship. Depending on the

proportion of empty and loaded TEU, the ships that will enter within the terminal can have a transportation capacity between 300 and 500 TEU, the proportion empty/loaded being determined by the container line considering the weight and the maximum accepted draught mentioned above.

From the Traffic Study, the estimated potential is as follows:

Potential	2022	2032	2037	2042
TEU's international OD relations	47871	144513	178429	216133
TEU's Moldavia RO, Republic of Moldavia, Ukraine (containers already from 2017)	18276	55172	68120	82515
TEU's Moldavia RO, Republic of Moldavia, Ukraine (non containers in 2017, 30% of the total in containers in the future)	11133	33608	41495	50263
Total TEUs	**77280**	**233293**	**288044**	**348911**

Table 43: Forecast traffic at the future terminal.

10.1.1.1 Terminal infrastructure

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	No	(Yes/No)	
Specialized intermodal terminal	Yes	(Yes/No)	
Total area	115.480	(m^2)	
Storage area	34702	(m^2)	
Handling area	48986	(m^2)	
Interim (transit) storage capacity	10.000	TEU	
Depot (base) storage capacity	14.000	TEU	
Quay length at the terminal	868	(m)	

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Rail length along the quay	0	(m)	
Capacity to handle block-trains	Yes	(Yes/No)	
Maximum length of complete block-train	750	(m)	
Number of rail sidings for loading/unloading	3 rails EU type 2 mixt rails EU/CSI type	(n)	
Total length of rail sidings for loading/unloading	4635	(m)	
Number of road lanes for truck traffic	3	(n)	
Number of road lanes for truck loading/unloading	4	(n)	
Parking space for trucks / semitrailers	12	(n)	
Number of fixed ramps (Ro-Ro)	0	(n)	

Table 44: Multimodal terminal infrastructure characteristics

10.1.1.2 Terminal suprastructure

a) Constructions – the platform, runways, technological roads, utilities networks located within the port area

All these shall be located on the area of 115,480 sqm out of which 85,506 sqm from the current land, respectively 29,974 sqm the newly created area5.The location of the Project is currently occupied by the constructions owned by PBN: buildings, access ways, technological roads, concrete platforms that will be demolished.

For the functional solving of the flow proposed for the handling capacity of 150,000 TEU, it was chosen to build a general platform, which shall embed in its constructive solution:

- The area under the portainer (STS), inclusively the crane runways; normally, no containers are stored on the area between the portainer's runways. This area is used for the standing and the circulation of the semitrailers that transport the containers. This shortens the route of the Portainer's trolley which transports the container between the ship and the mean of transportation, and thereby the productivity of the Portainer is increased and the ship's standing time at the quay is decreased;
- Storage area under the transtainer (RMG), including the crane's runways;
- Storage area - refrigerated containers;
- In-house technological roads;
- Utility networks, electrical networks, lighting.

b) Industrial railway lines: 5 lines (3 lines with standard track gauge - 1435 mm, 2 lines with combined track gauge 1435 mm/1524 mm). The charge/discharge lengths of the lines under the transtainer are of approximately 704 m for Line 1 and higher, 725 m for lines 2, 3, 4 and 5.

For the operation of the transport means (river, road and railway type) the following equipment for the handling of the containers on the multimodal platform is provided:

- a portainer (STS) used for the loading/unloading operations, on/off the ships, on/off the platform;
- a transtainer (RMG) used for loading/unloading operations on/off the wagons, on/off the platform;
- telescopic arm forklift - full containers manoeuvring - 2 pieces;
- telescopic arm forklift - empty containers manoeuvring - 1 piece;
- tractor unit - 2 pieces;
- semi-trailers - 8 pieces.

Also, a Terminal Operation System (TOS) will be purchased. Its primary purpose is to control the movement and storage of the goods inside and around the terminal.

Through a set of computerized procedures, the system will allow a better use of the goods, workforce and equipment, as well as an efficient monitoring/management of the flow within and around the terminal. The procurement contract for TOS will also include training services for the staff that will use the system.

10.1.1.3 Terminal handling equipment

The minimum characteristics of the cranes will be established by our consultants to reach the proposed freight traffic (they will be purchased in 2022).

10.1.1.3.1 Waterside handling equipment

No info available at the moment.

10.1.1.3.2 Landside handling equipment

No info available at the moment.

10.1.1.4 Maritime, inland waterway and rail liner and feeder services

There are no regular maritime, barge or railway shuttles to any of the seaports on the continent.

10.2 Port of Constanta

The Port of Constanta is located on the Western coast of the Black Sea, at 179 nM from the Bosphorus Strait and 85 nM from the Sulina Branch, through which the Danube flows into the sea. It covers 3,926 ha of which 1,313 ha is land and the rest of 2,613 ha is water. Constanta Port has 156 berths, of which 140 berths are operational. The total quay length is 32 km, and the depths range between 8 and 19 meters.

These characteristics are comparable with those offered by the most important European and international ports.

10.2.1 Constanta South Container Terminal

Constanta South Container Terminal - DP World offers a 5,000 sqm undercover storage and inspection facility for Customs, Government Authorities, brokers, and forwarders.

Traffic (TEU)	2016	2017	2018	2019	2020
Containers - waterside handling					
Containers - land to land					
Containers - total handling	568,440	558,746	534,036	526,388	328,767

Table 45: Handling statistics of CSCT

Figure 16: Constanta South Container Terminal[6]

10.2.1.1 Terminal infrastructure

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	Yes	(Yes/No)	
Specialized intermodal terminal	Yes	(Yes/No)	
Total area	520000	(m^2)	
Storage area	330400	(m^2)	
Handling area	n/a	(m^2)	
Interim (transit) storage capacity	n/a	TEU	
Depot (base) storage capacity	1200000	TEU	

[6] https://www.dpworld.com/constanta Accessed 22.03.2021.

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Quay length at the terminal	640 m (berths 121-123) 380m(Berth 124-125)	(m)	
Rail length along the quay	n/a	(m)	
Capacity to handle block-trains	Yes	(Yes/No)	
Maximum length of complete block-train	n/a	(m)	
Number of rail sidings for loading/unloading	2	(n)	
Total length of rail sidings for loading/unloading	n/a	(m)	
Number of road lanes for truck traffic	4	(n)	
Number of road lanes for truck loading/unloading	3/1	(n)	
Parking space for trucks / semitrailers	n/a	(n)	
Number of fixed ramps (Ro-Ro)	n/a	(n)	

Table 46: CSCT infrastructure assets

10.2.1.2 Terminal suprastructure

No info available.

10.2.1.3 Terminal handling equipment

3 x QGC Mitsubishi: lift capacity 40.6 tons under spreader single lift, 50 tons under hook beam; outreach 45 m; rows across vessel 16; back reach 11m; spreader height above crane rail 34 m crane gauge 30.5m

2 x CGC ZPMC: lift capacity 40.6 tons under spreader single lift, 62.5 tons under spreader twin lift, 70 tons under hook beam; outreach 52.1 m; rows across vessel 19; back reach 11m; spreader height above crane rail 36 m; crane gauge 30.5m

1 x MHC Gottwald; lift capacity 40.6 tons under spreader single lit, 50 tons under spreader tin lift, 100 tons under hook beam; outreach radius 50m

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
QGC Mitsubishi		40,6	**Mitsubishi**	
QGC Mitsubishi		40,6	**Mitsubishi**	
QGC Mitsubishi		40,6	**Mitsubishi**	
QGC ZPMC		40,6	ZPMC	
QGC ZPMC		40,6	ZPMC	
MHC Gottwald		40,6	MHC Gottwald	
Total handling capacity		243,6		

Table 47: Waterside handling equipment at CSCT

10.2.1.3.1 Landside handling equipment

13 x rubber tyred gantries RTG: 8 Mitsubishi (under single lift 40.6 tonnes; span 6+1 vehicle line; stacking height 1 over 4); 5 Kone(under spreader single lift 40.6 tonnes; span 6+1 vehicle line; stacking height 1 over 5)

2 X rail mounted gantries RMG: Mitsubishi (under spreader single lift 40,6 tonnes; stacking height 1 over 2);

3+1 x empty handlers ECH: 1 Kalmar(lift capacity 10 tonnes)

3 x reach stakers RS: Kalmar (lift capacity 45 tonnes)

55 x terminal tractors ITV: 55 Kalmar

35 x terminal tractors: 33 Terberg; 2 Terberg Ro RO

60 x terminal chassis TC

Rail mounted gantry cranes (RMG)	Capacity (handlings/hour)	Lifting capacity (t)	Manufacturer	Production year
RMG 1		40,6	Mitsubishi	
RMG 2		40,6	Mitsubishi	

Table 48: Landside handling equipment- RMG

Rubber tyre gantry crane (RTG)	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
RTG 1 x 8 Mitsubishi		40,6	**Mitsubishi**	
RTG 2 X 5 Kone		40,6	Kone	

Table 49: Landside handling equipment- RTG

Reach stackers (RS)	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
RS 1 x 3 Kalmar		45	Kalmar	

Table 50: Landside handling equipment – reach stackers

10.2.1.4 Maritime, inland waterway and rail liner and feeder services

Data in the below table refer to the regular container lines for all container terminals, not just CSCT. No sufficient data was available to divide the below lines per terminals of call.

Seagoing liner shipping services
BEX (OCEAN ALLIANCE): Busan - Shanghai -Ningbo - Khaoshiung - Xiamen - Shekou - Singapore - Port Said -Beirut - Pireus -Izmit -Avcila - Constanta - Odessa -Avcilar – Mersin - Port Said-Jeddah - Port Kelang
BSMAR Odessa -Constantza - Ambarli - Aliaga - Pireu - Malta - Valencia -Algeciras - Casablanca - Algeciras - Malta - Pireu - Gebza - Odessa
BLACK SEA EXPRESS (BSX): Pireu – Kumport – Poti – Constantza – Kumport - Pireu
EMES FEEDERING/ARKAS LINE: Yuzhny - Poti - Constantza
MAERSK LINE AS 404/E4: Pipavav-Hazira-Jawaharlal Nehru-Jebel Ali -Salalah-Suez -Port Said - Damietta-Canakkale-Izmit Korfezi-Ambarli - Constanta-Novorossiysk-Odessa-Chornomorsk - Constanta-Ambarli-Canakkale -Iskenderun -Damietta-Port Said-Jeddah -Salalah Jebel Ali - Pipavav
MSC: Constanta - Odessa - Chornomorsk - Novorossiysk -Tekirdag - Istanbul - Derince - Gemlik -Izmir - Mersin -Haifa -Ashdod - Port Said East - Alexandria - Constanta
MSC - ADRIATIC TO GREECE AND TURKEY: Genova - Gioia Tauro - Tessalonik - Evyap - Tekirdag - Istanbul - Constanta - Novorossiysk - Tekirdag - Evyap - Gemlik - Aliaga - Pireu -

Seagoing liner shipping services
Genova
TURKEY BLACK SEA EXPRESS (TBX): Pireu – Haydarpasa – Novorossiysk – Constantza – Varna – Istanbul – Pireu
YANG MING MARINE TRANSPORT: Trieste - Constantza - Odessaa - Trieste
ZIM Integrated Shipping Services Ltd: Haifa - Port Said East - Alexandria - Mersin - Novorossiysk - Constantza - Aliaga - Mersin - Haifa
WBS (WEST – BLACK SEA): Kumport - Marport - Burgas - Constantza - Marport - Kumport - Gemlik - Pireu - Tanger - Casablanca - Pireu - Gemlik - Izmit - Yarimca - Marport - Kumport

Table 51: Liner shipping services at the CSCT

There are no regular barge feeder services from this terminal.

Rail shuttle services[7]	Frequency	Traffic (TEU)				
		2016	2017	2018	2019	2020
Constanta - Suceava	n/a	No info available				
Constanta - Bacau	n/a					
Constanta – Rastolita	n/a					
Miercurea Ciuc - Constanta	n/a					
Ploesti - Constanta	n/a					

Table 52: Barge shuttle services in the CSCT

10.2.1.5 Services to cargo and containers

Services offered	Mark with X	Note
Storage	x	
Picking	x	
Return (of empties)	x	
Cross-docking	x	

[7] Based on: http://www.railcontainer.ro/en/7-rail-container-romania (accessed 09.04.2021)

Services offered	Mark with X	Note
Inventory	x	
Inspection	x	
Customs clearance	x	

Table 53: Services to cargo and containers in the CSCT terminal

10.2.2 SOCEP Container terminal

SOCEP is defined by two distinct terminal structures and also developing its operations in Constanta South Port, where performs stuffing/stripping operations.

Main operated cargo: containers; dry bulk products; break bulk products.

Traffic (TEU)	2016	2017	2018	2019	2020
Containers - waterside handling					
Containers - land to land					
Containers - total handling	146.530	139.087	136.536	138.348	101.271

Table 54: Handling statistics

Figure 17: SOCEP Terminal8

[8] https://www.socep.ro/container Accessed 22.03.2021.

10.2.2.1 Terminal infrastructure

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	yes	(Yes/No)	
Specialized intermodal terminal	yes	(Yes/No)	
Total area	120.000	(m^2)	
Storage area	n/a	(m^2)	
Handling area	n/a	(m^2)	
Interim (transit) storage capacity	n/a	TEU	
Depot (base) storage capacity	10000	TEU	
Quay length at the terminal	466.7(berth 51-52)	(m)	
Rail length along the quay	n/a	(m)	
Capacity to handle block-trains	Yes	(Yes/No)	
Maximum length of complete block-train	n/a	(m)	
Number of rail sidings for loading/unloading	n/a	(n)	
Total length of rail sidings for loading/unloading	n/a	(m)	
Number of road lanes for truck traffic	n/a	(n)	
Number of road lanes for truck loading/unloading	n/a	(n)	
Parking space for trucks / semitrailers	n/a	(n)	
Number of fixed ramps (Ro-Ro)	n/a	(n)	

Table 55: SOCEP infrastructure assets

10.2.2.2 Terminal suprastructure

No info available.

10.2.2.3 Terminal handling equipment

- 2 x RTG (Rubber Tired Gantries) – stacking capacity: 5+1, with 6+1; gantry span: 23.5m
- 2 x Transtainers (tons): 32
- 8 x Reach stackers
- 2 x Empty handlers
- 19 x trucks with chassis
- 4 x forklifts (tons): 20-25

10.2.2.3.1 Waterside handling equipment

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Panamax crane 1		40.6	Panamax	
Panamax crane 1		65	Panamax	
Panamax crane 2		40.6	Panamax	
Total handling capacity		146.2		

Table 56: Waterside handling equipment at SOCEP

10.2.2.4 Maritime, inland waterway and rail liner and feeder services

No information available.

10.2.2.5 Services to cargo and containers

Services offered	Mark with X	Note
Storage	x	
Picking	x	
Inventory	x	
Inspection	x	
Customs clearance	x	

Table 57: Services to cargo and containers in the SOCEP terminal

11 Intermodal terminals in Bulgarian ports

Bulgaria, with its strategic location, is used as a transport link between Europe and Asia and the country has huge potential for multimodal and intermodal transport. The intermodal terminals in the Danube region are few and are not working in the last years. The only operating dedicated intermodal terminals in Bulgaria are located in Southern Bulgaria. These are the intermodal terminals in Plovdiv and Stara Zagora.

The Integrated Transport Strategy for the period until 2030 underlines the main aspects for the development of the Bulgarian national transport system for the period until 2030. The strategic priorities of the transport sector include the development of intermodal transport in Bulgaria. The policy focus will remain on improving the overall technical condition of the port infrastructure, as well as the Bulgarian section of the Danube waterway. Efforts will continue to enhance the condition of the existing multimodal and intermodal transport infrastructure, which does not qualify for modern transhipment and transport activities.

The planned in the draft "National Plan for Development of Combined Transport in the Republic of Bulgaria until 2030" construction of 2 intermodal terminals in Ruse, equipped in accordance with the requirements for intermodal transport, will facilitate the overall development of transport and trade in the country.

11.1 Port of Ruse

The port of Ruse is a multimodal transport hub and provides a suitable connection between three modes of transport – waterway, rail and road transport.

The port is directly connected to the national rail and road network of Bulgaria.

The port of Ruse has 3 cargo terminals: Ruse-East (comprising 1 conventional and 1 Ro-Ro terminal), Ruse-West, Port Bulmarket and a passenger quay.

Port complex – Ruse consists of the following Port Terminals – Ruse-East, Ruse-Center, Silstra and Tutrakan.

The main part of the complex - Port Terminal Ruse–East – is situated between km. 489,287 and km. 490,993 along the Danube. It is the largest Bulgarian port terminal on the Danube and the only one from the port complex in Ruse, which handles cargo. Among the offered port services are the loading and unloading of bulk cargo (dry and liquid), general and containerized cargo, mooring services; supply of electricity, water and communications to vessels; ship chandling, warehousing services, as well as repairs.

Berths: 14

Cargo handling Capacity: 2 500 000 t/y.

Total Length of Berths: 1490 m

Maximum actual depth in front of berths: 2,50 m

This port terminal is the biggest in the Bulgarian part of the Danube river**.** River-sea vessels can call at Ruse-East at high water level**.**

Port of Ruse-East is the only Bulgarian Danube port equipped for transshipment of heavy cargo units of up to 60 tons. Out-of-gauge and heavy-lift cargoes of 60 to 100 tonnes unit weight can be handled using the available 100-tonnes-SWL floating crane solely or jointly with 2 rail mounted port cranes of 32 tonnes SWL each. Synchro lifts of heavier units from 100 to 200 tonnes (depending on the lifting scheme) can be carried out using the 100-tonnes-SWL floating crane jointly with an externally hired heavy mobile crane of over 250 tonnes SWL.

The Ro-Ro terminal is located to the west of the conventional cargo terminal. It provides simultaneous mooring of 2 Ro-Ro vessels and can be used for either liner Ro-Ro services or horizontal transshipment of extremely large heavy-lift or OOG units on wheels

11.1.1 Multipurpose terminal Ruse East

Containerized cargo is handled in the port, but there is no specialized container terminal per se. It is expected that one will be built within the next few years, after the new concessionaire is determined, which is expected to happen before the end of 2021.

The port itself is connected to the national road network, as well as to the national railway network. Pan-European corridors VII and IX, as well as the TRACECA transport corridor, also pass through the city of Ruse and respectively – through the port.

The port is also 2 km away from Bulgaria's road connection to Romania – the Danube Bridge.

Figure 18: Ruse East

The port operator, Port Complex Ruse EAD, has received a Certificate for Operational Suitability from the Ministry of Transport of the Republic of Bulgaria on June 6th, 2018,

allowing the company to temporarily manage the port until a concession procedure has been launched and a concession is granted to another port operator, which is expected to take place at some point in 2021.

Working hours: Monday – Sunday 08:00 – 19:30. No overtime charges are applied for cargo handling on Saturdays and Sundays. The terminal does not operate on major holidays such as Easter, Christmas, and 1st January

Traffic (TEU)	2016	2017	2018	2019	2020
Containers - waterside handling	N/A	N/A	N/A	N/A	N/A
Containers - land to land	N/A	N/A	N/A	N/A	N/A
Containers - total handling	6428	2082	0	0	N/A

Table 58: Handling statistics

11.1.1.1 Terminal infrastructure

Port terminal Ruse-East is part of a public transport port of national importance - Ruse. It is specialized in general and bulk cargo, Ro-Ro and containers; mooring services; supply of electricity, water and communications to vessels; ship chandling. The total storage area of the terminal is 825 533 sq.m., where the open storage area is 190 500 sq.m. and covered storage area - 15 800 sq.m. Port terminal Ruse-East has connection with the national rail and road network of Bulgaria. The port also has 17 cranes with lifting capacity between 5 and 32 tons, but only 12 of these cranes are currently active.

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	Yes	(Yes/No)	
Specialized intermodal terminal	No	(Yes/No)	
Total area	825 533	(m^2)	
Storage area	196 300	(m^2)	
Handling area		(m^2)	
Interim (transit) storage capacity	200	TEU	
Depot (base) storage capacity	200	TEU	
Quay length at the terminal	1618	(m)	
Rail length along the quay	2354	(m)	

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Capacity to handle block-trains	Yes	(Yes/No)	
Maximum length of complete block-train	400	(m)	
Number of rail sidings for loading/unloading	6	(n)	
Total length of rail sidings for loading/unloading	2354	(m)	
Number of road lanes for truck traffic	2	(n)	
Number of road lanes for truck loading/unloading	8	(n)	
Parking space for trucks / semitrailers	160	(n)	
Number of fixed ramps (Ro-Ro)	1	(n)	

Table 59: Ruse container related infrastructure assets

11.1.1.2 Terminal suprastructure

The port has both covered warehouses (with an area of 15 800 m^2) and open storage area (with an area of 190 500 m^2). Besides the stevedoring company, the terminal's administrative building also accommodates the local railway station staff, the Customs house servicing the whole river cargo traffic through all port terminals in Ruse, as well as freight forwarding agencies regularly involved in cargo operations via the terminal. There are also dedicated road and rail weighbridges. A workshop for maintenance and small repairs of handling equipment also operates at the terminal.

11.1.1.3 Terminal handling equipment

11.1.1.3.1 Waterside handling equipment

Ship to shore cranes capable of handling containers	Capacity (tons/ hour)	Lifting capacity (t)	Manufacturer	Production year
Takraf portal crane	200	32	Takraf, Germany	1989
Takraf portal crane	200	32	Takraf, Germany	1991
Kirovets portal crane	150	16	Kirovets,	1973

Ship to shore cranes capable of handling containers	Capacity (tons/ hour)	Lifting capacity (t)	Manufacturer	Production year
			Russia	
Kirovets portal crane	150	16	Kirovets, Russia	1976
Kirovets portal crane	150	16	Kirovets, Russia	1981
Kirovets portal crane	150	16	Kirovets, Russia	1984
Kirovets portal crane	150	16	Kirovets, Russia	1989
Kirovets portal crane	120	10	Kirovets, Russia	1976
Kirovets portal crane	120	10	Kirovets, Russia	1976
Ganz portal crane	100	5	Ganz, Hungary	1967
Ganz portal crane	100	5	Ganz, Hungary	1969
Total handling capacity	1440			

Table 60: Waterside handling equipment

11.1.1.3.2 Landside handling equipment

Rail mounted gantry cranes (RMG)	Capacity (tons/hour)	Lifting capacity (t)	Manufacturer	Production year
Albrecht	120	20	Albrecht Autokran, Germany	1967
Albrecht	120	20	Albrecht Autokran, Germany	1969

Table 61: Landside handling equipment- RMG

Reach stackers (RS)	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Kalmar		45	Kalmar Industries, Finland	2012
Kalmar		42	Kalmar Industries, Finland	1999
Kalmar		12	Kalmar Industries, Finland	2006
Kalmar		12	Kalmar Industries, Finland	2020
Kalmar		10	Kalmar Industries, Finland	1980

Table 62: Landside handling equipment – reach stackers

Forklifts	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Year of production
Toyota		5	Toyota, Japan	2007
Toyota		5	Toyota, Japan	2007
Mitsubishi		5	Mitsubishi, Japan	2012
Mitsubishi		5	Mitsubishi, Japan	2012
Mitsubishi		5	Mitsubishi, Japan	2012

Table 63: Landside handling equipment – Forklifts

11.1.1.4 Maritime, inland waterway and rail liner and feeder services

There are no regular line services for containers in any transport mode.

11.1.1.5 Services to cargo and containers

Long-term and short-term storage options for large bulk and breakbulk shipments are available especially for inbound cargo as many importers arrange deliveries to end users by trucks directly from the terminal.

Certain transshipments, taking place at the terminal, are not related to waterway transportation, e.g. railcar-to-truck operations or vice-versa.

Cargo tallying is provided by the stevedoring company while independent surveyors are hired for dedicated cargo and draft surveys.

Customs clearance services are rendered by freight forwarding agencies and customs brokers operating at the terminal.

There is enough capacity for stuffing and stripping services though same contribute insignificantly to the cargo turnover due to the lack of container traffic via the terminal.

Services offered	Mark with X	Note
Storage	X	
Picking	X	
Labeling	X	The service is usually provided by independent surveyors
Breaking shipments	X	
Cross-docking	X	
Inspection	X	Cargo tallying is provided by the stevedoring company while independent surveyors are hired for dedicated cargo and draft surveys.
Customs clearance	X	Rendered by freight forwarding agencies and customs brokers operating at the terminal.
Stuffing/Stripping	X	
Container Repair	X	

Table 64: Services to cargo and containers at the Ruse container terminal

12 Intermodal terminals in Moldovan ports

12.1 Port of Giurgulesti

Giurgiulesti International Free Port is situated at 133.8 km / 72.2 nautical miles from the Black Sea on the maritime section of the river Danube, with available water depths of up to 7m. GIFP benefits from its strategic location in close proximity to Moldova's borders with Romania and Ukraine. Due to its easy access to the Black Sea with maritime vessels, to countries located along the Danube with river barges as well as inland rail connections to both the CIS and EU countries, GIFP is developing into a major logistics hub not only for Moldova, but for the entire region. GIFP is capable of receiving both inland and sea going vessels. GIFP serves its client as a regional logistics hub on the border of the EU with access to road, standard-gauge railway and broad-gauge railway, as well as to river and sea vessels. It is the only direct sea/river-borne transshipment and distribution point to and from the Republic of Moldova and due to its strategic location an excellent location for business development with a unique customs and tax regime.

12.1.1 Container terminal Giurgiulesti

The Container Terminal in Giurgiulesti International Free Port is owned and operated by Danube Logistics SRL. In fact the terminal is a multi-purpose terminal, named General Cargo and Container Terminal as it is also used for transshipment of dry bulk cargo and general cargo.

The terminal area comprises 6650 m2 and consists of a berth with a quay wall capable of operating vessel of up to 140 meters length and a minimum water depth of 5m, and a short-term container storage area of about 2000 m2. In addition, there is a second container storage area of about 6000 m2 in short distance to the terminal.

The Container Terminal is located on the Prut River 800m upstream from the Danube accepting river and sea going vessels. It is connected on land to Moldova's road and rail infrastructure. A railway line is located directly on the terminal allowing for direct transshipment of containers from and onto vessels.

The terminal works in a 24/7 regime without holidays.

Traffic (TEU)	2016	2017	2018	2019	2020
Containers - waterside handling	9458	6273	6791	8047	1885
Containers - land to land	-	-	-	-	222
Containers - total handling	9458	6273	6791	8047	2107

Table 65: Handling statistics

Figure 19: Container terminal picture

12.1.1.1 Terminal infrastructure

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	Yes	(Yes/No)	The terminal operates both containers and general cargo / bulk cargo
Specialized intermodal terminal	Yes	(Yes/No)	The terminal can conduct direct transhipment of cargo from ship, rail and trucks (in and out)
Total area	12650	(m^2)	
Storage area	8000	(m^2)	Both storage areas
Handling area	4650	(m^2)	
Interim (transit) storage capacity	300	TEU	

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Depot (base) storage capacity	900	TEU	
Quay length at the terminal	160	(m)	
Rail length along the quay	100	(m)	
Capacity to handle block-trains	YES	(Yes/No)	
Maximum length of complete block-train	275	(m)	For direct transhipment 7 platforms, other in shunting line
Number of rail sidings for loading/unloading	1	(n)	For long-term storage area
Total length of rail sidings for loading/unloading	400	(m)	For long-term storage area
Number of road lanes for truck traffic	2	(n)	
Number of road lanes for truck loading/unloading	1	(n)	
Parking space for trucks / semitrailers	5	(n)	Inside the port area, more space outside
Number of fixed ramps (Ro-Ro)	1	(n)	90% finished Ro-Ro, finished at demand

Table 66: Giurgiulesti container terminal infrastructure assets

12.1.1.2 Terminal suprastructure

The container terminal consists of an open platform next to the quay, where the containers are being stored after discharge from vessel and for preparation of loading (2000m2). Most of the containers are stored of the secondary storage area in close proximity of about 600 m distance (6000m2). Next to the storage area is a container stuffing zone with equipment for the grain exports in containers. There are further stuffing zones within the business park. The stripping area for containers is located inside the port, closer to customs office.

The building for field workers is located next to the berth, while the office building is located in the administrative area of the port.

In the port there are truck and rail weighbridges, that are used for containers and other cargo operated in the port.

12.1.1.3 Terminal handling equipment

- 1 mobile harbour crane with 80 to capacity
- 1 reach-stacker with 45 to capacity;
- 2 trucks with 40" platforms for port internal transport to storage area

12.1.1.3.1 Waterside handling equipment

In the Container Terminal there is a Mobile Harbour Crawler Crane, Sennebogen 6130R-HD. It is used for loading and unloading of containers, general cargo and dry bulk cargo. The crane with a crawler based undercarriage can move along the entire length of the berth and the platform in order to reach the target cargo. The harbour crane can be re-located to other terminals and to the second container storage area. Several attachments and grabs can be connected to the crane, for example various spreaders with different sizes in order to handle 20' /40' / 40' HC containers, as well as spreaders for handling big bags, electro-hydraulic bulk cargo grab, and other specialized attachments for heavy bulk cargo.

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Mobile Harbor Crane – Senneboghen 6130R-HD	18	80 T	**Sennebogen**	2011

Table 67: Waterside handling equipment

12.1.1.3.2 Landside handling equipment

The Kalmar Reach Stacker is used in the port to handle the containers in the storage area, as well as load them on trucks or rail platforms. The Reach stacker is also equipped with special spreader to handle big bags.

Reach stackers (RS)	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Kalmar DRF450 -60S5	n/a	45 T	**Kalmar**	2005

Table 68: Landside handling equipment – reach stackers

12.1.1.4 Maritime, inland waterway and rail liner and feeder services

Danube Logistics SRL, general investor and operator of Giurgiulesti International Free Port, is operating a container feeder transportation service between Giurgiulesti International Free Port and the Port of Constanta.

Volume: acc. to above table; all containers transshipped water-land via Danube Logistics feeder service;

Service: usually on weekly basis, adjustable to demand, up to max. 6 times per month;

Destinations: Constanta South Container Terminal DP World, SOCEP Terminal;

Containers: 20", 40", 40" HC, Reefer, Tank-containers

Fleet: is chartered depending on demand, two options:

(1) Short-sea maritime vessels taking the route via Sulina channel; or

(2) River barges, self-propelled or non-self-propelled, with one or two barges taking the route via Cernavoda channel;

The containers with POD Giurgiulesti are brought by liner vessels to port Constanta, from there are loaded onto the feeder vessel for delivery to Giurgiulesti International Free Port. The same applies the other way; containers with POL Giurgiulesti are loaded on feeder up to Constanta, from there loaded on big maritime vessels to be delivered to POD worldwide.

The container feeder service is currently suspended due to the poor harvest in the actual agricultural season 2020/21 and subsequent significant decrease of export volumes.

Seagoing liner shipping services	**Frequency**	**Traffic (TEU)**				
		2016	**2017**	**2018**	**2019**	**2020**
Service 1 **Giurgiulesti-Constanta-Giurgiulesti**	1 voyage a week	9458	6273	6791	8047	1885

Table 69: Liner shipping services at the GIFP Container terminal

12.1.1.5 Services to cargo and containers

Besides operating the container terminal in Giurgiulesti International Free Port Danube Logistics acts as an international freight forwarder organizing for their clients the logistics services of delivering the containers from the requested loading point up to the final destination.

Also, in the port can be performed the following operations:

- Container stuffing
- Container Stripping
- Unloading of Vehicles from Containers
- Weighing of cargo / container
- Installation of flexitanks for liquid cargo

- Container cleaning and disinfection
- Container repair works (noncomplex jobs)
- Reefer container temperature management/ electricity supply

Services offered	Mark with X	Note
Container Stripping	x	If requested by client, the cargo is discharged from container / transshipped to other means of transportation
Container stuffing	x	Stuffing and lashing of the cargo inside the container using workers / forklift
Unloading of Vehicles from Containers	x	Unlashing of vehicles from containers, placing them on the ground back on wheels
Weighing of cargo / container	x	Weighing of the containers for VGM
Installation of flexitanks for liquid cargo	x	Services of container selection for flexitank, installation of the flexitank.
Container cleaning and disinfection	x	Cleaning the container solid particles / washing / disinfection
Container repair works	x	Repair of light damages, welding holes, changing handles / locks / bars
Storage	x	Short term storage of cargo, in covered warehouse of outside.
Inspection	x	If requested by customs

Table 70: Services to cargo and containers at the GIFP Container terminal

13 Intermodal terminals in Ukrainian ports

13.1 Port of Reni

Reni port's territory includes the part of fenced bank line along the left Danube bank from 123.6 to 128.3 km., covers 940000m², with 440000 m² boot basin`s area and located at the junction of the Ukrainian, Romanian and Moldovan borders and at the intersection of 4 international transport corridors: Crete No. 7 and No. 9, TRACECA, and the Black Sea. The total length of the moorage line is 3927 m, depth at the berths of up to 12 m. The total square of covered storage areas is 30000 m², open storage areas - 195000 m². The port consists of three cargo sectors, oil harbor and ferry complex. Design cargo turnover 14,500 million tons per year.

Figure 20: Reni port`s boot basin, 1 – berth No 17, 2- Ro-Ro terminal

13.1.1 Container terminal Reni

Because of absence of container's transshipments, there is no container terminal in the port of Reni at the moment, but, in case of availability of container cargo flows, berth No. 17 and open warehouses (total area - 5598 m²) of Ro-Ro terminal, can be carried out for handling, storage, repair of containers, as well as the other services.

Reni port is located 63 miles from the mouth of the Danube. Navigation in the port lasts all year round; communication with the Black Sea is carried out through the Danube-Black Sea canal and the Sulinsky canal.

The port has a railway connection to Galati (Romania), construction of the Reni-Izmail railway is planned.

Reni port is equipped with a developed network of railways, berths No.17 has paths for 2 railways. The international highway M-15 passes along the fence of the port.

The technical exploitation of berth No 17 is carried out by the SE Seaport Reni, Ro-Ro terminal – by SE USPA. Development of Reni port is provided by SE USPA as a part of the Ministry of Infrastructure of Ukraine.

Container`s traffic have been absent in Reni port in 2016-2020 years.

Figure 21: Reni port. 1- Berth No 17, 2 - Ro-Ro terminal

13.1.1.1 Terminal infrastructure

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	Yes	Yes	
Specialized intermodal terminal	No	No	
Total area	5729	(m^2)	
Storage area	3000	(m^2)	
Handling area	2000	(m^2)	
Interim (transit) storage capacity	250	TEU	

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Depot (base) storage capacity	1000	TEU	
Quay length at the terminal	150	(m)	
Rail length along the quay	300	(m)	
Capacity to handle block-trains	No		
Maximum length of complete block-train	150	(m)	
Number of rail sidings for loading/unloading	2	(n)	
Total length of rail sidings for loading/unloading	600	(m)	
Number of road lanes for truck traffic	2	(n)	
Number of road lanes for truck loading/unloading	2	(n)	
Parking space for trucks / semitrailers	2	(n)	
Number of fixed ramps (Ro-Ro)	1	(n)	

Table 71: Berth No 17 infrastructure assets

13.1.1.2 Terminal suprastructure

On the proposed site (berth No. 17) of the Reni port, there is a covered warehouse No. 1 (area 1,309 m^2, consists of three sections with a capacity of 34,725.6 tons), a management office, railway and auto weighting complexes, a repair shop.

On the territory of Ro-Ro terminal, there is a guarded parking for trailers with an area of 12,000 m^2. The following services can be provided at the request of clients: cargo declaration, fumigation of contaminated cargo, loading and unloading operations and forwarding services, border and customs consultations, technical assistance.

Figure 22: Reni port. Berth No 17

13.1.1.3 Terminal handling equipment

13.1.1.3.1 Waterside handling equipment

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Crane 1 Gantry crane Condor	12	40	CEB Kranbau Ebersvalde	1986
Crane 2 Gantry crane Condor	12	40	CEB Kranbau Ebersvalde	1986
Crane 3 Gantry crane Socol	12	20	CEB Kranbau Ebersvalde	1986
Total handling capacity	24			

Table 72: Waterside handling equipment

13.1.1.3.2 Landside handling equipment

The port has auto and electric forklifts of various carrying capacities, special trailers, an overhead crane with a lifting capacity of 250 tons, terminal vehicles, truck cranes and other handling equipment that can be used to reload containers.

Forklifts	Capacity (handlings per hour)	Lifting capacity (t)	Manufacturer	Year of production
Forklift 1	10	4	Toyota	1987
Forklift 2	10	4	Hyster	1990
Forklift 3	10	4	Mitsubishi	1993

Table 73: Landside handling equipment – forklifts

13.1.1.4 Maritime, inland waterway and rail liner and feeder services

There were not maritime, inline waterway, rail liner and feeder services in 2016-2020 years in Reni port.

13.1.1.5 Services to cargo and containers

There is no container terminal in the port of Reni at the moment, but given the availability of transhipment capacities, berth No 17 and the Ro-Ro terminal, in the presence of container cargo flows, can carry out: reloading, storage, repair of containers, as well as the following types of services:

Services offered	Mark with X	Note
Storage	x	
Picking	x	
Labelling	x	
Bar coding	x	
Return (of empties)	x	
Breaking shipments	x	
Cross-docking	x	
Inventory	x	
Inspection	x	
Customs clearance	x	

Table 74: Services to cargo and containers in the Port of Reni

13.1.2 Ro-Ro terminal Reni

Main technical characteristics of the Ro-Ro Reni terminal:

Year of commissioning – 1993;

Length - 92 m;

Design depth - 7.16 m;

Structural width - 21 m;

Specialization - cargo, acceptance of Ro-Ro vessels.

The international highway M-15 passes along the fence of the port.

The following services can be provided at the request of clients: cargo declaration, fumigation of contaminated cargo, loading and unloading operations and forwarding services, border and customs consultations, technical assistance.

Due to lack of cargo, Ro-Ro terminal have not been operating in recent 10 years.

Ro-Ro terminal may be given for a leasing by the Reni branch of the SE USPA, for the Ro-Ro ships servicing, including carrying out operations for transshipment of goods.

According to the available detailed design, it is possible to lengthen the Ro-Ro berth, for receiving vessels of the "RO-RO" type up to 190m long, for working with wheeled vehicles in the export / import / transit mode. Planned capacity - 0.67 million tons / year.

The form of implementation is public-private partnership, lease or other.

Stakeholders: Ministry of Infrastructure of Ukraine, SE USPA, SE "Commercial Sea Port Reni".

Ro-Ro terminal Reni has not been operating in 2016-2020.

Figure 23: Ro-Ro terminal Reni

13.1.2.1 Terminal infrastructure

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	No	(Yes/No)	
Specialized intermodal terminal	Yes	(Yes/No)	
Total area	22591	(m^2)	
Storage area	11541	(m^2)	
Handling area	11050	(m^2)	
Quay length at the terminal	92	(m)	
Rail length along the quay	-	(m)	
Capacity to handle block-trains	No	(Yes/No)	
Number of road lanes for truck traffic	2	(n)	
Number of road lanes for truck loading/unloading	2	(n)	
Parking space for trucks / semitrailers	120	(n)	
Number of fixed ramps (Ro-Ro)	1	(n)	

Table 75: Ro-Ro terminal infrastructure assets

13.1.2.2 Terminal suprastructure

On the territory of Ro-Ro terminal Reni, there is an Administration building, guarded parking for 120 trailers with an area of 12000 m^2, 4 pits for inspection of trailers.

13.2 Port of Izmail

The port of Izmail (44 ° 2'N, 28 ° 5'E) is located on the left bank of the Kiliysky mouth of the Danube, within the boundaries of 84.6-85.6 and 90.0-94.0 km from the entrance to the Danube-Black Sea channel, see figure 19.

State Enterprise "Izmail Sea Commercial Port"- multidisciplinary enterprise engaged in transshipment of a wide range of bulk (iron ore, coal, construction and other bulk cargo) and general (metal, cargo in packages) , big bags and containers) cargo. There are 23 berths in the port, with the total length of the berth front of 4841 m, incl. equipped berths - 3374 m, sloped quay - 1467 m. Depths at the cargo berths of the port - up to 7.5 m. Port's project annual turnover – 6.5 million tons.

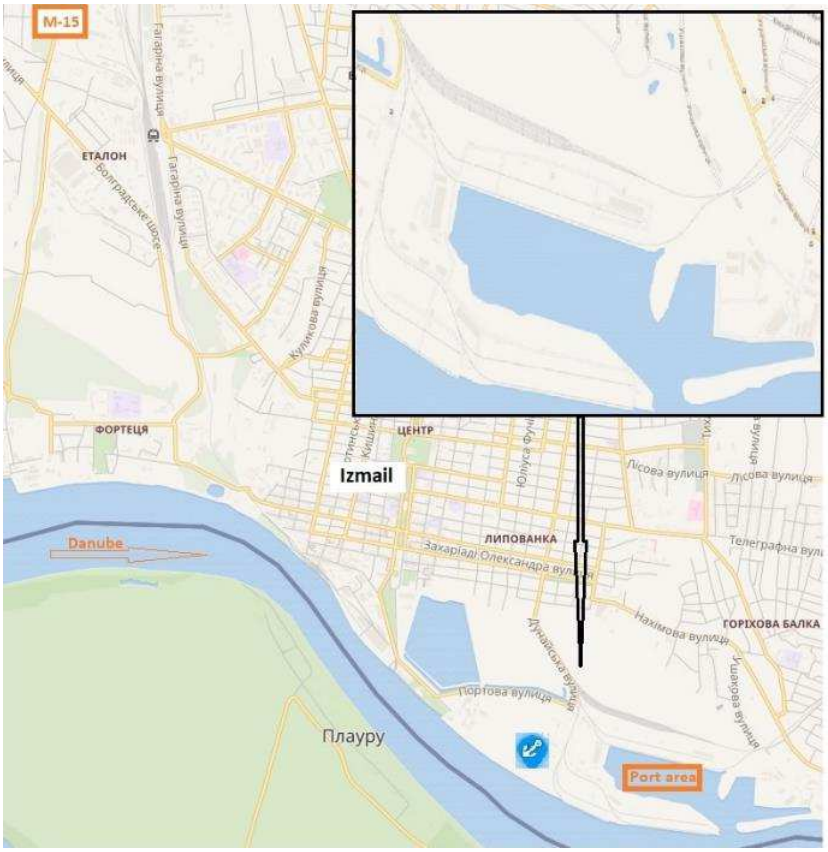

Figure 24: Port of Izmail, situational plan, road and rail links

13.2.1 Container terminal Izmail

Container terminal Izmail, operates a State Enterprise "Izmail Sea Commercial Port". Port works 24 hours a day all year round.

The container terminal is located at berth №14, see fig. 20. In 2013, works on its reconstruction were carried out (modernized storage sites and engineering infrastructure). The total area of the container site is 7470 m², intended for reloading and storage of 416 containers. The length of the berth №14 is 150 m, the design depth near the berth is 7.5 m. The project rate of loading / unloading of containers is 120 units a day.

Container terminal is connected to the international highway M 15 Odessa-Reni and the Odessa-Izmail railway.

Figure 25: Port of Izmail, 1- Berth No 14, 2- Berth No 13

Due to absence of container cargo in Izmail port, container terminal has not been operating in 2016-2020.

13.2.1.1 Terminal infrastructure

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Multipurpose terminal	No	(Yes/No)	
Specialized intermodal terminal	Yes	(Yes/No)	
Total area	20470	(m^2)	
Storage area	17470	(m^2)	
Handling area	3000	(m^2)	
Interim (transit) storage capacity	400	TEU	

Terminal infrastructure characteristics	Value	Unit/ Description	Notes
Depot (base) storage capacity	416	TEU	
Quay length at the terminal	150	(m)	
Rail length along the quay	150	(m)	
Capacity to handle block-trains	No	(Yes/No)	
Maximum length of complete block-train	150	(m)	
Number of rail sidings for loading/unloading	2	(n)	
Total length of rail sidings for loading/unloading	300	(m)	
Number of road lanes for truck traffic	2	(n)	
Number of road lanes for truck loading/unloading	2	(n)	
Parking space for trucks / semitrailers	100	(n)	
Number of fixed ramps (Ro-Ro)	2	(n)	

Table 76: Izmail container terminal infrastructure assets

13.2.1.2 Terminal suprastructure

The area for storage of containers is covered with concrete plates, fenced and provided with two railway ramps.

There is a warehouse with an area of 648 m2 for customs inspections.

At the container site of SE “Izmail Sea Port”, services are provided for transshipment of 20 and 40 foot containers from land to water transport and vice versa: storage of containers; movement of containers, including for customs control; weighing of containers on automobile scales of TNTSP "TOM" with a loading capacity of 50 tons and railway scales with a loading capacity of 150 tons; round-the-clock security; means of video surveillance - 9 video cameras (2 units - round rotary, 7 units - stationary).

13.2.1.3 Terminal handling equipment

13.2.1.3.1 Waterside handling equipment

Ship to shore cranes capable of handling containers	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
Crane 1 Condor	12	40	CEB Kranbau Ebersvalde	1986
Crane 2 Condor	12	40	CEB Kranbau Ebersvalde	1986
Crane 3 Condor	12	40	CEB Kranbau Ebersvalde	1986
Total handling capacity	36			

Table 77: Waterside handling equipment

13.2.1.3.2 Landside handling equipment

Rail mounted gantry cranes (RMG)	Capacity (handlings/hour)	Lifting capacity (t)	Manufacturer	Production year
RMG 1 Condor	12	40	CEB Kranbau Ebersvalde	1989
RMG 2 Socol	12	20	CEB Kranbau Ebersvalde	1989
RMG 3 Socol	12	20	CEB Kranbau Ebersvalde	1989

Table 78: Landside handling equipment- RMG

Reach stackers (RS)	Capacity (handlings/ hour)	Lifting capacity (t)	Manufacturer	Production year
RS 1 Kalmar	12	25		

Table 79: Landside handling equipment – reach stackers

Izmail port has a container handler with a capacity of 40 tons, forklifts of capacities up to 25tons in a quantity sufficient to ensure loading and unloading operations at container terminal in case of container cargo flow.

13.2.1.4 Maritime, inland waterway and rail liner and feeder services

There are no feeder services of any kind in the Port of Izmail.

13.2.1.5 Services to cargo and containers

Because of absence of container cargo flows, container terminal in the port of Izmail has not been working last years. Nevertheless, given the availability of transhipment capacities, berths No 13 and No 14, in the presence of container cargo flows, can carry out: reloading, storage, repair of 20ft and 40ft containers, as well as the following types of services:

Services offered	Mark with X	Note
Storage	X	
Picking	X	
Labelling	X	
Bar coding	X	
Return (of empties)	X	
Breaking shipments	X	
Cross-docking	X	
Inventory	X	
Inspection	X	
Customs clearance	X	

Table 80: Services to cargo and containers at the port of Izmail

13.2.1.6 Special case - Ferry crossing Orlovka-Isaccea

The Orlovka ferry complex is located on the left bank of the Danube, 4 km away. with. Orlovka town, Reni district (22km from Reni), Odessa region, 2 km from the international highway M-15 (E 87), 40 km from Izmail. Located on an area of about 6 hectares, and has a unique in the Ukrainian part of the Danube, a universal berth structure for all types of river ferries and sea and river vessels.

Ferry "Orlovka-Isakcha" is a public-private partnership project, built by private investors and opened by the order of the Cabinet of Ministers of Ukraine No. 229-r dated 04/10/2019. The ferry has an international checkpoint across the state border for ferry, passenger and freight traffic between the settlements Orlovka (Ukraine) - Isakcea (Romania) with a capacity of about 200 units of trucks, 500 units of light transport and a passenger traffic of about 1500 people. Additionaly, four ferries will operate here for passengers without a car. The distance between the Ukrainian and Romanian banks of the Danube in the Orlovka area is about 900 meters and will be covered by a ferry in 10 - 15 minutes.

Ferry crossing "Orlovka-Isakcha" is currently not operational, but is planned to be reinstated after the end of Covid quarantine.

Figure 26: Ferry crossing "Orlovka-Isaccea"

14 Conclusions

The analysis of multimodal facilities in various ports along the Danube demonstrated heavy disbalance between the ports on the upper, and partly middle Danube on the one hand, and lower Danube ports, on the other, whereas the former are significantly better developed than the latter. This is not just in terms of multimodal facilities (infrastructure and suprastructure), but also in terms of intermodal services connecting seaports and inland ports. The upper Danube and middle Danube ports, down to Budapest, benefit from their geographical position and relative nearness to North Sea ports and Adriatic ports, enabling them to harvest the benefits of economies of scale and use frequent rail shuttles to and from seaports. Moreover, these ports are physically closer to large industrial centres of high-tech products capable of generating containerized cargo flows of higher value goods and have excellent railway connections. Last, but not least, the high economic development of their host countries serves as a perfect generator of both inbound and outbound flows of goods suitable for containerization and therefore for intermodal supply chains.

Nevertheless, most ports of the upper and middle Danube cannot perform their usual role of being a fully tri-modal intermodal centres and nodes of intermodal supply chains due to the lack of any regular liner services by barge between any Danube ports themselves or between any Danube ports and Constanta as the sea gate for the Danube inland waterway. Instead, they serve mostly as nodes and intersections of rail and road transport, hosting intermodal terminals that are actually bi-modal terminals. Occasional transports of empty containers by barge are still far away from creating and embryo of future stable regular barge shuttles between the seaport of Constanta as a “gate” for the region, or between the Danube ports. This, however, does not prevent these ports to develop as bi-modal intermodal terminals with waterside access, at least for occasional or future transport of containers by barge. In fact, these ports (e.g. Enns, Vienna, Budapest, etc.) handle large volume of containers both in import and export directions and thus attract numerous value added services related to containers. Operators of such services tend to locate their businesses in, or at least close to, ports, thus creating the spatial concentration of cargo and logistic activities. This, in turn, enables the creation of economies of scale and related logistic and economic benefits to all parties involved.

While upper and middle Danube ports suffer from the lack of barge shuttles from Constanta as the only sea gate for the Danube waterway towards the Black Sea, ports on the middle Danube (downstream from Budapest) and the lower Danube suffer from the lack of both rail and barge shuttles to/from Constanta or any other port. Practically, none of the Danube ports downstream from Budapest are connected to any of the seaports on the continent, neither by barge nor by rail. In Croatia, for example, it is easy to note that the country has very favourable access to the Adriatic Sea and all its seaports, thus enabling the geographical shift of spatial concentration of containerized cargoes to the west side of the country, closer to the sea and, for example, the large container terminal in the seaport of Rijeka. Any containers that

originate (or have destination in) from the eastern part of the country (with the Danube being its eastern border) are hauled in and out of the region much faster either by rail or by truck.

On the other hand, Serbia, for example, is in a very specific situation, being a land locked country, and with an unusual dispersion of (generally limited) containerized cargo flows to various bi-modal terminals, whereas some of them are located very close to either Sava or Danube waterway, but without physical access to them. The capital of Belgrade, for example, until recently had at least 4 intermodal terminals – 3 existing and 1 planned, whereas only one, in the Port of Belgrade, is a real tri-modal terminal with physical and equipped access to water, but has no regular barge or rail shuttles to any of the seaports Serbia uses for its imports or exports. Such dispersion of containerized cargo flows prevents the spatial concentration and the consequent formation of the economies of scale in any of the existing or planned intermodal terminals.

Last, but not least, the Danube waterway and its region are currently not in a favourable position for the development of stronger and more stable inland waterways transport of containers for a number of reasons, inter alia:

- geographical distribution of seaports in and around Danube countries;
- long distance of highly developed industrial and consumption centres and logistic hubs from the seaport of Constanta;
- railway competition from seaports not connected with the Danube,
- insufficiently developed railway infrastructure connecting the seaport of Constanta with inland ports,
- navigational hindrances on the Danube: shallow sections, low water, high waters, etc.
- lack of large urban agglomerations and consumption centres along the Danube before (downstream of) Belgrade.
- lower level of industrialization, especially of high-tech industries requiring containerization of cargo flows,
- low level of availability of intermodal infrastructure, suprastructure and equipment in many ports of the middle and lower Danube,
- lack of cooperation between modes and spatial planning organizations.
- etc.

These reasons, among others, prevent large logistic operators, maritime shipping lines or seaport based terminal operators to take part in operation and/or development of intermodal or container terminals in the Danube ports. Had the situation been different in terms of the above listed barriers for development of intermodal transports on the Danube, many logistic operators, shipping lines and terminal operators in seaports would likely compete for operation and development of intra-port intermodal terminals. This is based on the experiences from the inland port intermodal terminals in the Rhine area, where majority of such terminals have been operated for a long time by large logistic operators. In addition to that, number

of seaport terminal operators are present in the container terminals along the Rhine, such as Hutchison Ports Holding (HPH) or Dubai Ports World (DPW).

All the aforementioned reasons negatively influence the creation and development of intermodal terminals in the ports of the middle and lower Danube, which is a kind of a paradox as they are located significantly closer to the seaport of Constanta. However, as already analysed, geographical nearness of a seaport is neither the only nor the crucial condition for the development of intermodalism in the Danube ports.

References

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