Lower Danube Ports Development and Opportunities

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Abstract: Inland waterways and maritime transport network consists of two equally important elements: links and nodes. For an efficient and reliable functioning of the transport network both elements must be equally developed and harmonized. This paper aims to provide a comprehensive image of the status of the port infrastructure in the Danube area and clarify questions related to the usage, port development and rehabilitation plans and infrastructure gaps. For the purposes of transforming the Danube area ports into efficient and reliable logistics nodes, infrastructure gaps need to be dealt with in a coordinated manner, which needs to be embedded in the resulting common strategy and action plan for port development in the Danube area.

Keywords: business strategies; port operations; port development; port opportunities; Danube Region

JEL Classification: E660; M100

1. Introduction

Port development is seen as a catalyst to stimulate economic activity and create employment. In Europe, port developments relate mainly to building new terminals and upgrading the super- & infra-structure within existing ports rather than developing new greenfield sites. As such, much of the reform process has more to do with the organization and operational aspects of ports. This paper will assess the situation along the Danube and will focus on 3 pillars that contribute to transforming ports into key-hubs of the European transport network and help trigger the reform process: infrastructure investments, funding sources for stimulating investments and innovation. The goal is to provide a comprehensive package of the issues to be approached jointly in order to help compensate the unbalanced development level between the Upper Danube ports and the other river sections.

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Following ports are selected for detailed analysis in this paper:

- Austria: Enns and Vienna;
- Slovakia: Bratislava and Komarno;
- Hungary: Budapest, Baja, Dunaújváros and Győr-Gönyű;
- Croatia: Vukovar and Slavonski Brod;
- Serbia: Belgrade and Novi Sad;
- Bulgaria: Lom, Ruse and Vidin;
- Romania: Drobeta Turnu Severin, Giurgiu, Galati, Braila, Tulcea and Constanta.

Ports infrastructure is examined through an agreed set of introductory information on port position, ownership, administration and operation, followed by a number of infrastructure assets and elements. The vast majority of ports are publicly owned and privately operated. Private operators in ports are not necessarily companies owned by the private sector, but they can be publicly owned and operating under private company laws. Apart from the port land, the public sector (various governmental tiers – state, region, municipality) also owns the port infrastructure in most of the ports. This corresponds to the commonly accepted view that the port infrastructure is a strategic infrastructure asset, just like highways or railways. This, however, does not represent a barrier for their exploitation by the private sector. Almost all of the analysed ports are governed by a public entity having the role of a port authority which, in most of the cases does not provide port commercial services. Commercial exploitation of ports is entrusted, in most of the cases, to public port operators.

2. Theoretical Framework

Inland waterways and maritime transport network consists of two equally important elements: links and nodes. For an efficient and reliable functioning of the transport network both elements must be equally developed and harmonized.

For the purposes of transforming the Danube area ports into efficient and reliable logistics nodes, infrastructure gaps need to be dealt with in a coordinated manner, which needs to be embedded in the resulting common strategy and action plan for port development in the Danube area.

Prior to the assessment of current infrastructure facilities in selected ports along the Danube and its tributaries, with an addition of the seaport of Constanta as the maritime gate for the Danube ports, a set of general port data is examined for all selected ports.

Set of general port data is established as follows:

Port Land Owner

Depending on the port ownership legal setup and port governance (port administration, port management) systems in each riparian country, the ownership of the land within the port area may be of the state, region/province, municipality, private or of other entities. The port land owner (or the landlord) is usually the regulator of the exploitation of the port and regulates the conditions and obligations related to the governance (administration) and/or use of the port and its facilities. In this view, each of the selected ports is examined in the view of the land ownership.

Port Infrastructure Owner

For the purposes of the definition simplicity, it is adopted that the port infrastructure involves all port related infrastructure in the ground level, such as, quay walls, bank protection, port basins, berths, anchorages and/or mooring places, waiting areas, crane tracks, rail infrastructure and other publicly used infrastructure assets. Ports that are selected for this report are therefore examined from the point of view of infrastructure ownership. Such ownership is considered important as the owner of port infrastructure assets sets the rules of the type and scope of use of port infrastructure. As in the previous paragraph, owners of the port infrastructure can be the state, region/province, municipality or other entities (port authority, public companies for infrastructure construction and management, etc.) to which the ownership rights are given or transferred, by the supreme regulatory authority.

Port Authority (Port Governance, Port Administration)

Each port will elaborate on a body/entity (publicly owned company, governmental institution, organisation or similar) that acts as a port authority, a "roof" organisation for all port locations at a given place (city, municipality, region, etc.). Port authority may sometimes be the same legal entity as port operator, if the administrative functions of port governance (administration/management) are not organisationally separated from commercial activities of port operations / port exploitation.

Port Operator(S)

Port operators will be identified in all selected ports along the Danube and their ownership structure will be examined. Port operators nowadays are usually independent companies that may be public, private or even of mixed ownership. In a number of cases in Danube ports, port operators are the same as port authorities, organised as commercial entities with both governance and operating responsibilities.

Port Authority Name

Legal name of a body or entity having port authority functions will be identified for all selected ports along the Danube.

Port Authority Separated from Port Operator(s)

An examination of separation of governance and operating functions will be performed for all selected ports. Each port will present if these two functions are practiced within the same body/entity or if these two functions are organisationally and legally separated into two or more legal entities.

Number of Operators (Concessionaires, Lessors)

Depending on the size and type of the port, each port can have one or more operators. Number of different entities (public and/or private) operating a port (or its individual terminals) under any legal form (concession, lease contract, operating contract, etc.) will be identified for each selected port.

Total Port Area

Each port will present the surface (in hectares) of the entire port area under jurisdiction/responsibility of an entity acting as a port authority.

Free Space for Development within the Port Area

Surface of any land slots within the area under jurisdiction/responsibility of a port (or port authority), which is available for development under any form of use (own development, concessions, lease contracts, etc.).

3. Data Analysis

From the point of view of infrastructure assets, an indicator of the port size and its ability to serve its core business – waterside cargo handling (a.k.a. ship-to-shore operations) is the length of operational quays. In this case, ports show considerable differences in quay length, starting from just (currently) 120 meters in the Port of Slavonski Brod on the Sava River (Danube's largest tributary) in Croatia to 8.455 meters in Bratislava. Seaport of Constanta has, logically, the longest quay line of almost 30 kilometres. In port operations technology, vertical quays are often seen as a preferred way of quay wall layout for inland ports, in spite of the higher costs of their construction when compared to the old fashioned sloped (inclined) quay walls. Therefore, a convenient measure of the infrastructure advancement of a port is a share of vertical quay wall in the total quay length. Currently, only 3 ports have 100% of vertical quay length, while only 4 ports have more than 60% of the vertical quay length in their total quay length.

Most of the ports are faced with the problem of the lack of free space for further port development, except the port of Constanta. Available space for further port development stretches from virtually zero hectares in the ports of Vienna, Komarom, Vukovar, Novi Sad, Belgrade and Giurgiu, to maximum 50 ha in Enns and 95 ha in Bratislava.

When an average annual throughput over 10 years of available statistical records (where available) is calculated and compared to the reported capacity, an average utilization of port capacities is obtained. This indicator demonstrates a clear picture of the utilization of the analysed ports. In this view, 5 ports have the capacity utilization is above 50%. This, on the one hand, is positive in terms of business, but on the other hand, may be a signal of either outdated procedures or equipment, or of simply physical limitations of the port.

Proper port planning will not allow that the capacity utilization reaches maximum levels as the goods owners will simply move to either another port in the vicinity, or they will change the transport mode, whenever possible, due to the congestion problems that can become inevitable whenever the capacity reaches the levels above 50%.

Detailed statistics for each of the ports demonstrate that mass bulk cargo is still predominant cargo on the Danube. Cargoes that were transported were mostly agri-bulk cargoes, coke, coal, ores, fertilizers, oil and oil derivatives, as well as metal products. Although recorded in some ports as their regular cargo, sand and gravel usually do not need any port facilities to be loaded/unloaded and are very local (transported over relatively short distances), and are therefore not seen as attractive cargo for ports.

Unfortunately, there are no regular container shipping lines on the Danube. Container transport on the Danube is virtually non-existent, in spite of the two noticeable attempts in the past.

All nineteen Danube ports selected for this analysis demonstrated variations in terms of governance and ownership of port land and port infrastructure. It is considered that a selection of 19 Danube ports represents a statistically significant sample enabling a reliable basis for the overall assessment of all operationally significant ports on the Danube.

In this view, it can be safely stated that the land in by far the largest majority of Danube ports is publicly owned. This is, in the opinion of the responsible author of this report, the best possible solution since the port land represents a finite and strategic asset of any country and therefore needs to be governed by the public sector of different tiers (state, region or city/municipality). Among 19 selected ports, the state owns the port land in 15 ports, while the city (municipality) owns the land in one port. Private ownership of the port land was recorded in one port, while mixed ownership (public and private) was recorded in two ports. Following figure demonstrates the share of different ownership models in the selected Danube ports.

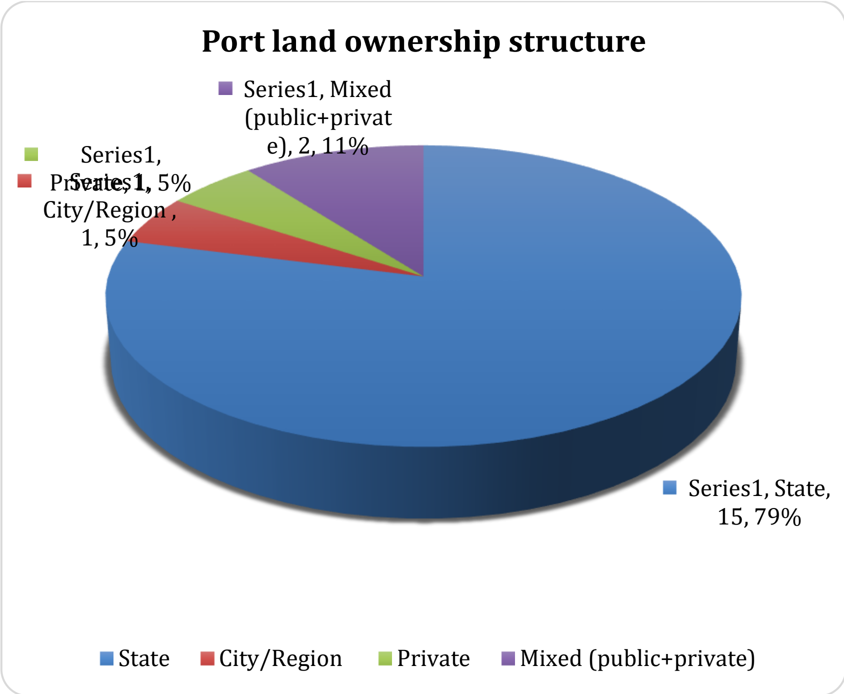

Figure 1. Port Land Ownership Structure

As regards to the ownership of port infrastructure (basins, bank protection, breakwaters, quays, piers, docks, etc.) the state owns infrastructure assets in 11 ports, city (municipality) owns infrastructure assets in 2 ports, while private ownership of infrastructure was reported in 4 ports and mixed ownership in 2 ports. Figure 2 represents results of the port infrastructure ownership analysis.

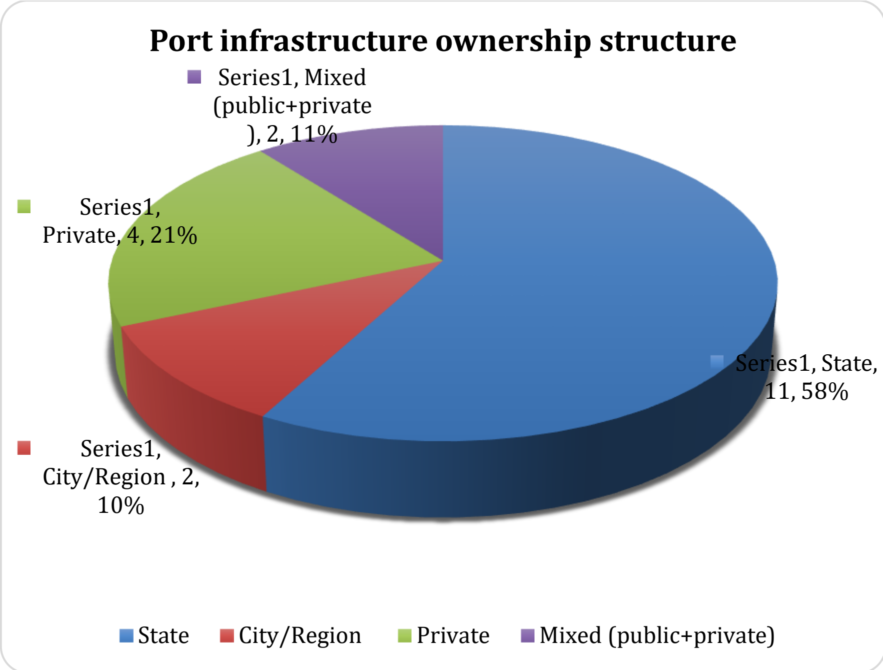

Figure 2. Port Infrastructure Ownership Structure in Danube Ports

When bodies and/or entities responsible for port governance (port authorities and similar entities) are concerned, it was reported that 15 port authorities were state owned bodies or enterprises, 2 were city/region owned, 2 were privately owned, while no mixed ownership was reported. Figure 3 shows the structure of ownership in port authorities.

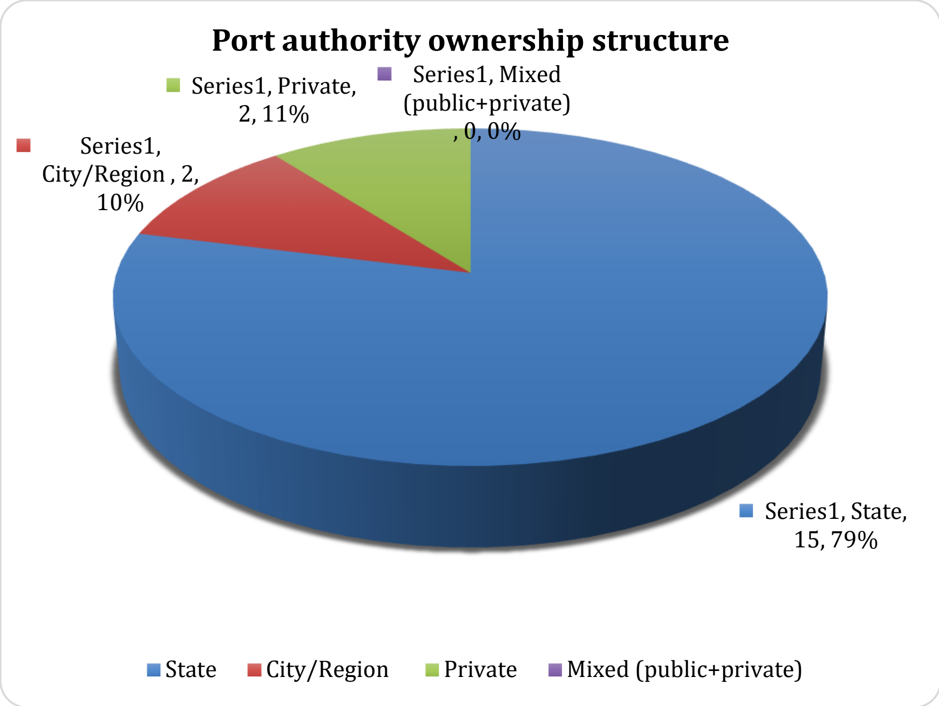

Figure 3. Port Authority Ownership Structure in Danube Ports

Commercial exploitation of ports is entrusted, in most of the cases, to private port operators. In this view, 13 port operating companies were privately owned, while 3 ports housed a mixture of public and private port operators. The city/region owned 2 port operators and only one port had a state owned port operator using the port. Figure 4 shows a distribution on public and private operators in the selected 19 ports on the Danube.

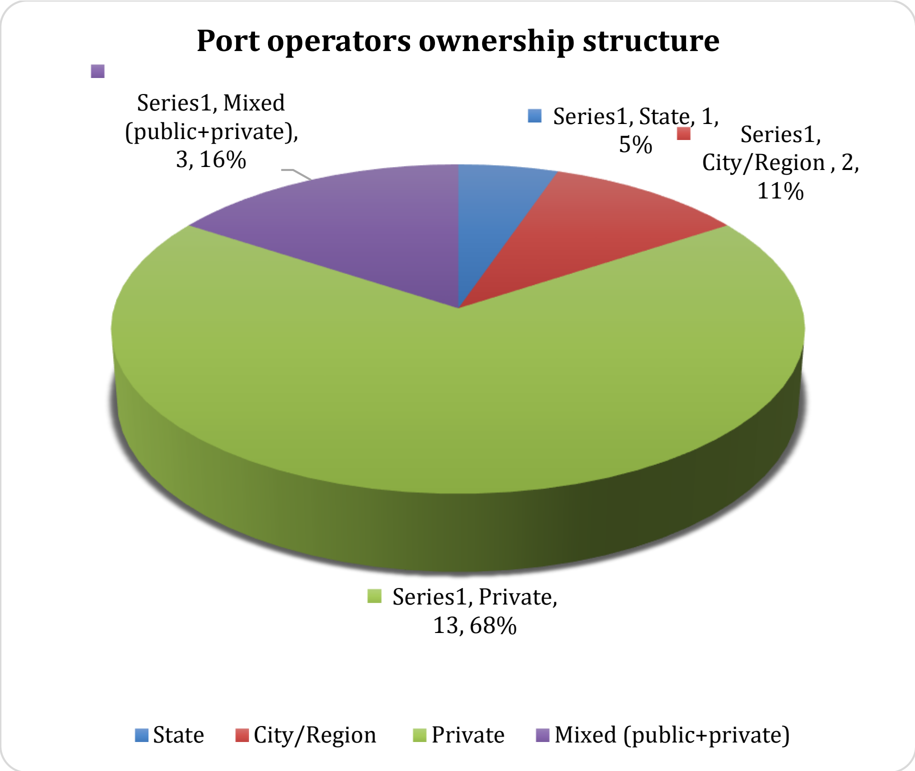

Figure 4. Ownership of Port Operators in Danube Ports

Port governing and port operating functions are separated in the vast majority of ports, more precisely in 17 our 19 analyzed ports. This separation of public (governance, administration) and private (operations, exploitation) functions is often seen as a perfect balance of public and private roles in the use of strategic assets such as ports.[1] Figure 5 demonstrates the distribution of separated port governance and port operating functions in the selected Danube ports.

Nevertheless, the fact that ports are usually operated by private operators, it does not have to mean that such port operators are always owned by private shareholders. Publicly owned companies working under private company laws can also successfully operate ports, as long as they are successfully corporatized or commercialized.

[1] World Bank, "Port Reform Toolkit" 2007.

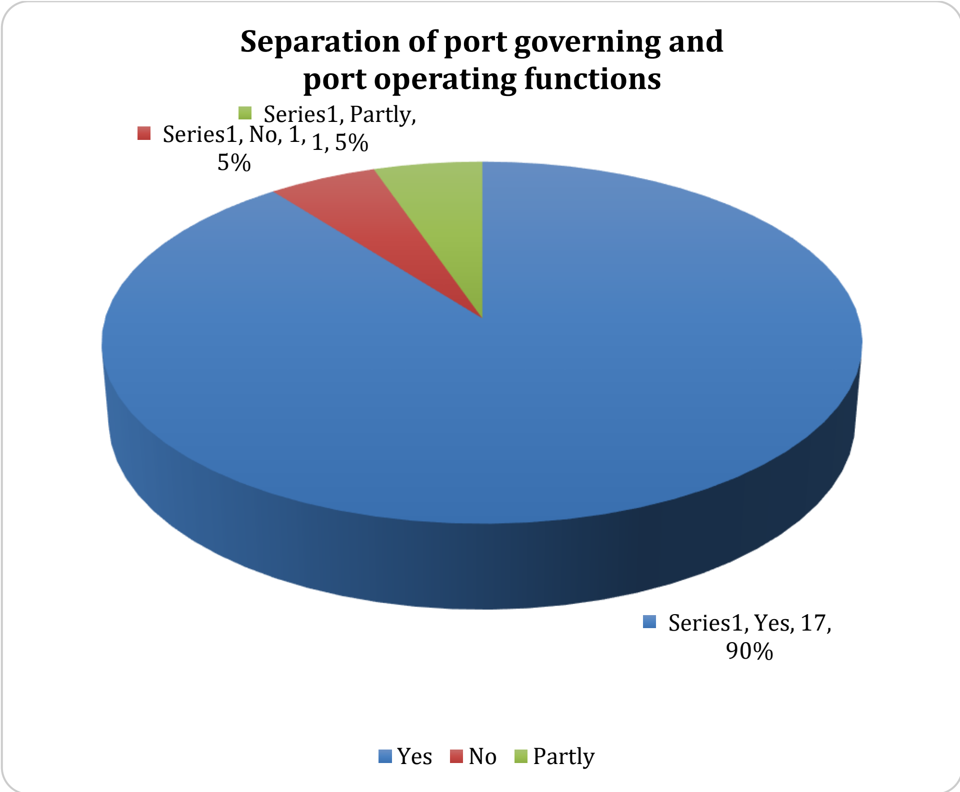

Figure 5. Separation of Port Governing and Port Operating Functions in Danube Ports

Danube ports demonstrate a large variety when it comes to the number of port operators. Most operators operate ports under a licensing agreement, contract or concession agreement. Figure 6 shows a number of port operators in the selected 19 Danube ports.

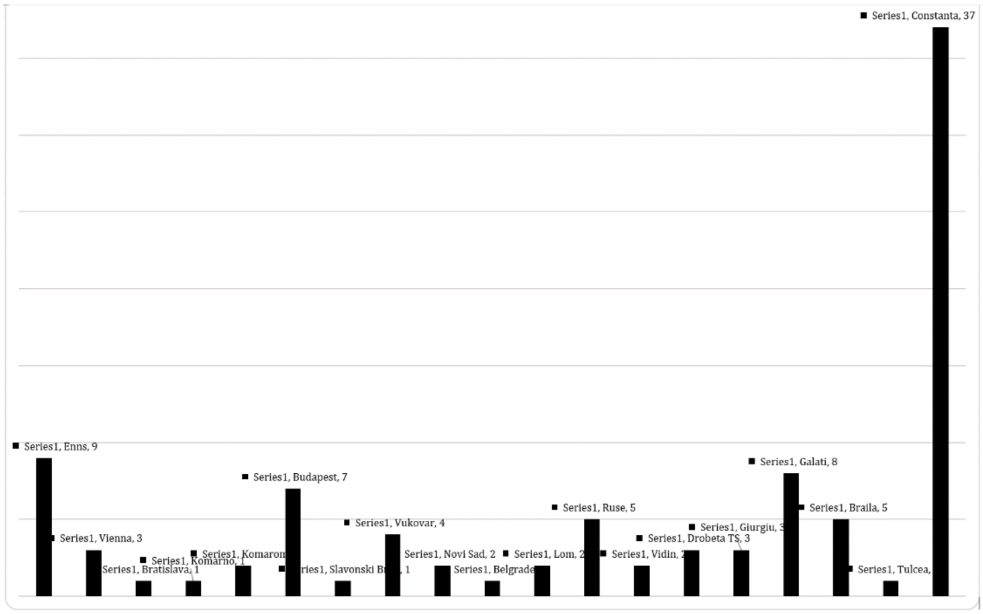

Figure 6. Number of Port Operators in the Danube Ports

It goes without saying that by far the largest number of port operators was reported in the Port of Constanta due to its sheer size. Port of Constanta, frequently referred to as the "Rotterdam of the East", is the largest seaport in the Danube region and is therefore a host to a very large number of different port operators.

Size of port areas vary significantly and stretch from small ports, such as Komarom (HU), having only 3 ha in the size of the port area, to very large river ports, such as Vienna and Enns (AT), each having ca. 350 ha of the port area. Seaport of Constanta is by far the largest port in terms of the port area, having the surface of 1.313 ha.

Figure 7 demonstrates the comparison of ports in terms of the size of port areas.

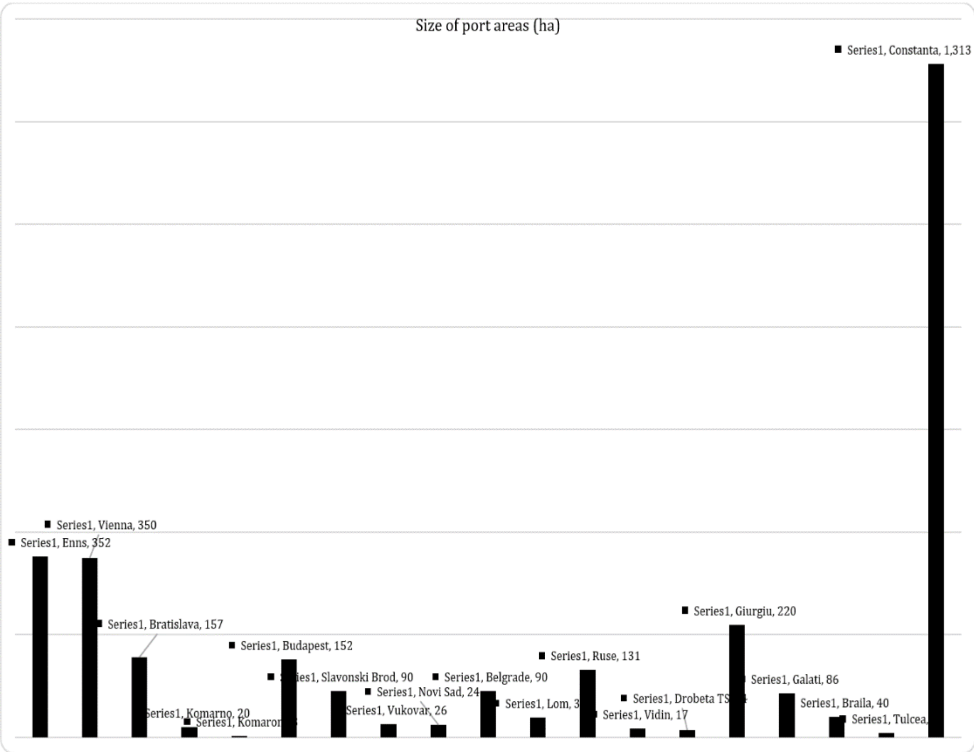

Figure 7. Comparison of Ports in Terms of Port Area Size

The situation with the free space for further port development, however, is not so convenient for most of the ports, with the exception of the Port of Constanta which, as a very large seaport, has significant development space available. Available space for further port development stretches from virtually zero hectares in the ports of Vienna (AT), Komarom (HU), Vukovar (HR), Novi Sad (RS), Belgrade (RS) and Giurgiu (RO), to maximum 50 ha in Enns (AT) and 95 ha in Bratislava (SK). Figure 8 shows the distribution of available space for port development in Danube ports.

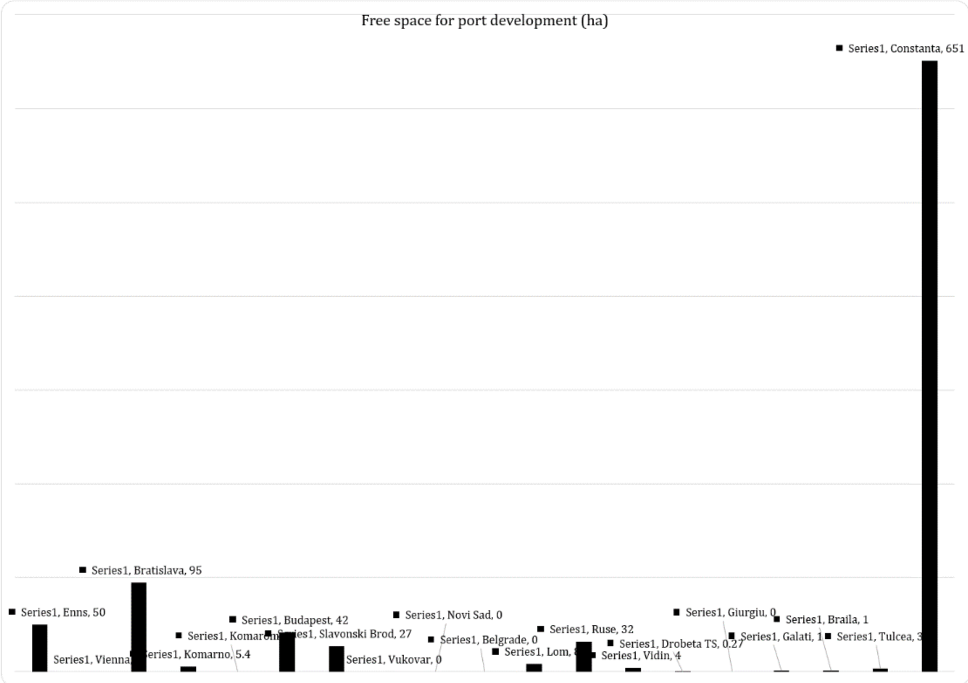

Figure 8. Available Space for Further Development in Danube Ports

Another indicator of the port size and its ability to serve its core business – waterside cargo handling (a.k.a. ship-to-shore operations) is the length of operational quays. In this case, ports show considerable differences in quay length, starting from just (currently) 120 meters in the Port of Slavonski Brod on the Sava River (Danube's largest tributary) in Croatia to 8.455 meters in Bratislava. Seaport of Constanta has, logically, the longest quay line of almost 30 kilometers. Lengths of quay walls in all ports in shown in Figure 9.

Another useful indicator or port's capability is its total capacity for cargo handling in a year. It is usually defined as a maximum cargo handling capacity of all terminals within a port area within a given port service pattern or a maximum quantity of cargo that can be un/loaded with the existing equipment. Port maximum capacity is also referred to as the technical capacity. However, one of the usual problems in defining and recording the port capacity in practice is the fact that, in spite of the commonly accepted definition, various ports understand the term port capacity in different ways. Some ports understand it, and record it, as the maximum waterside handling, while others (minority) calculate port capacity as a *throughput* in tons per unit length of quay wall per year. The former definition is the simplistic one and we will use it in this report for the purposes of simplicity. The latter definition, however, is more a measure of *efficiency* of port infrastructure, where port operators or port authorities measure the annual throughput of cargo in tons per unit length of a quay wall which *can* pass through the port under the assumed working hours, number of employed gangs, available land transport units (wagons and trucks) for inland distribution of unloaded cargo (or vice-versa), dwell time of cargo in the base or transit storages, reduced for the influence of downtimes, bad weather, inspections, closing and opening of hatches of every vessel, number of shifts, number of days worked in a week, etc. This capacity is also called the *throughput capacity*. It is, however, rarely measured by inland ports and used only in port planning and in academic research of port productivity. More commonly available figure is related to the aforementioned technical capacity for waterside handling (ship-to-shore operations.)

In this view, the technical capacity, or the cargo handling capacity of the selected Danube ports is demonstrated in Figure 9.

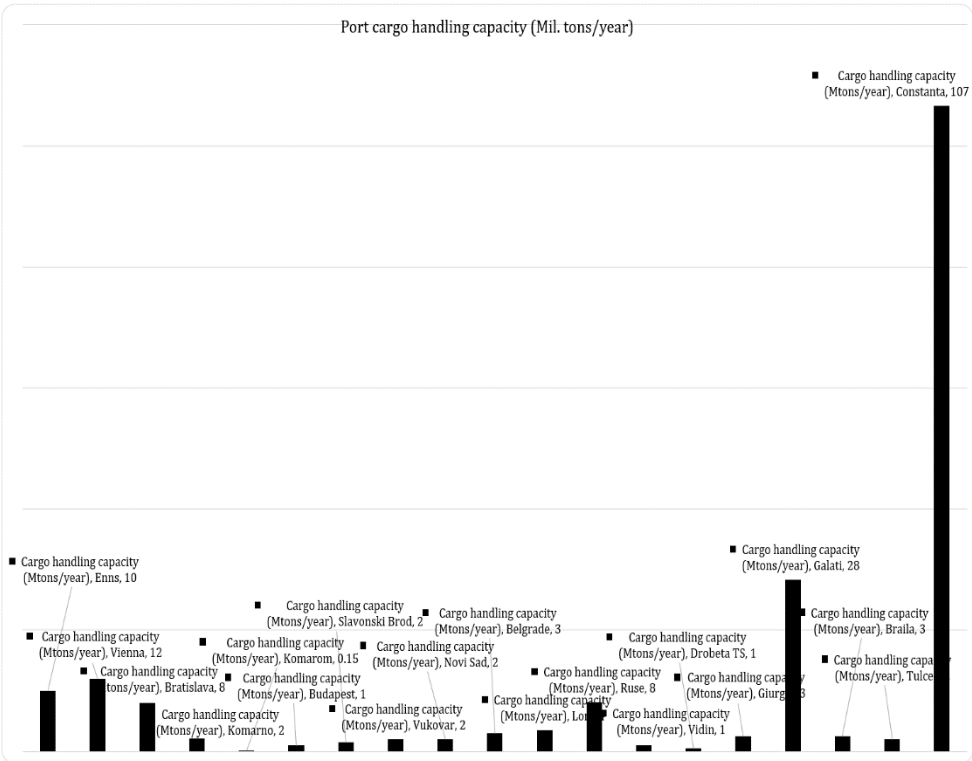

Figure 10. Cargo Handling Capacities in Danube Ports

When an average annual throughput over 10 years of available statistical records (where available) is calculated and compared to the reported capacity, an average utilization of port capacities is obtained. This indicator demonstrates a clear picture of the utilization of the port under analysis. Figure 11 shows average utilization of port capacities.

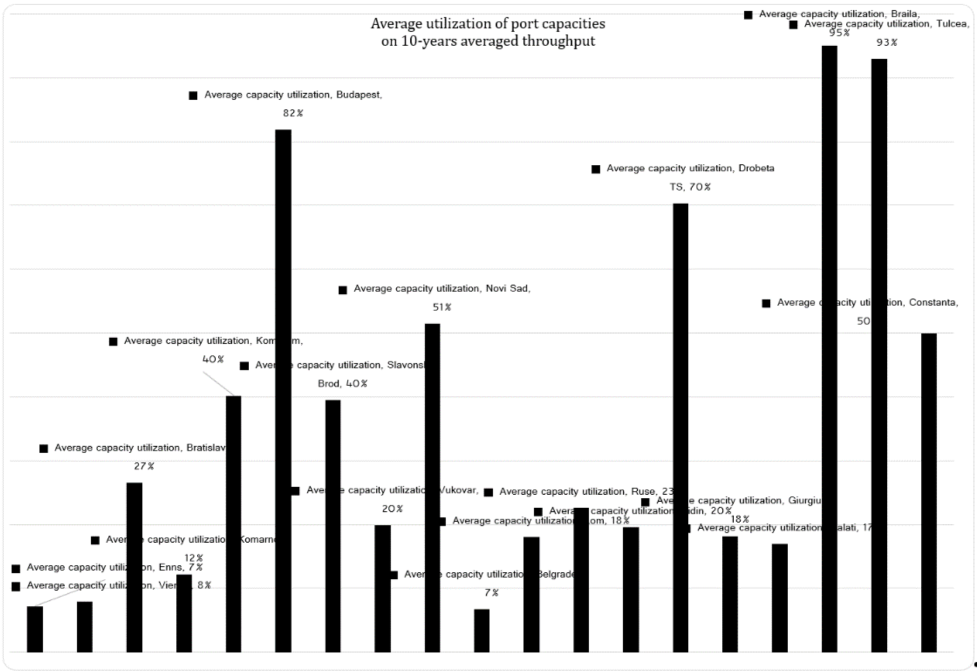

Figure 11. Average Port Capacity Utilization in Danube Ports on 10 Years Average

4. Recommendations

From the point of view of infrastructure assets, an indicator of the port size and its ability to serve its core business – waterside cargo handling (a.k.a. ship-to-shore operations) is the length of operational quays. In this case, ports show considerable differences in quay length, starting from just (currently) 120 meters in the Port of Slavonski Brod on the Sava River (Danube's largest tributary) in Croatia to 8.455 meters in Bratislava. Seaport of Constanta has, logically, the longest quay line of almost 30 kilometres. In port operations technology, vertical quays are often seen as a preferred way of quay wall layout for inland ports, in spite of the higher costs of their construction when compared to the old fashioned sloped (inclined) quay walls.

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Improvements to Romania's road and rail transport networks are needed in order to improve travel times and lower and more competitive transport costs. Effective route times will encourage more carriers to choose routes to or through Romania. Currently the transit of goods to landlocked countries such as Hungary and Austria is diverted through the Mediterranean Sea and the ports of Adriatic Sea (NAPA ports) without using the Black Sea ports. The most comprehensive is that many carriers use non-Romanian ports to import and transport freight to destinations in western Romania, such as Arad.

Improvements to road and rail facilities and multimodal terminal conditions at Constanta Port will increase efficiency, thus reducing costs and, as a result, encourage the revitalization of freight transport in port.

A network of over ten terrestrial multimodal terminals is needed in order to stimulate the domestic and international rail freight services network.

Thanks to the growing reintroduction of industrial production in the ports or in their immediate vicinity, Danube ports have the opportunity to exploit this phenomenon and use it to their own advantage, by offering the industry a quick, competitive and reliable service and the benefits of the economies of scale offered by inland waterway transportation. This implies that the ports efforts are combined with the efforts to improve the navigability, especially in the critical sectors on the Danube and Sava, and thus increase the overall reliability of inland waterway transportation in the Danube area. Additional opportunities at disposal of the Danube port industry are new markets, cargo flows that will emerge along the transport route from the Far East (“One belt one road”), as well as the growing interest of young professionals towards the port industry.

Unfortunately, apart from the above mentioned strengths and opportunities, Danube ports have a number of weaknesses which will need to be neutralized, minimized or completely eliminated when and if possible. Most notable weaknesses focus around the excess capacity or low utilization of the available capacities, as well as lack of resources for provision and improvement of high quality road and rail connections of ports with the rest of the network. Insufficient lobbying for interests of ports is also seen as one of the common weaknesses of the entire Danube port industry.

Last, but not least, port industry in the Danube area is faced with a number of threats which are external to ports themselves, but which call for measures to mitigate or remedy such threats. Most important threats for the Danube area port industry are still persisting navigation hindrances along the Danube, overall economic situation in Southeast Europe, fierce competition of road and rail sectors feeding the industrial and commercial sectors along the Danube directly from nearby seaports of Koper, Rijeka, Trieste and even from the farther ports in the Northwest Europe, like Rotterdam, Amsterdam, Antwerp, Hamburg and others.

5. Acknowledgment

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