

The impact of the Durres Port performance in a sustainable intermodal transport chain across the Adriatic Sea

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Abstract

Intermodality has been a hot topic in the logistics sector for several decades, but expected business diffusion is still limited. The key to increasing intermodal stands on intermodal terminals. Ports as a link between different types of transport modes in global logistics chains are vital to the efficiency of the entire chain. In addition to its leading role in global trade network, the intensification worldwide competition of ports, states that the efficiency of container ports and terminals is a key issue for terminal operators.

The purpose of the paper

It is to identify the most important factors for improving traffic management and port performance. The study sets out the proposal that the high performance of the port of Durres as intermodal node, affects the growth of sustainable transport across the Adriatic Sea.

Methodology and results

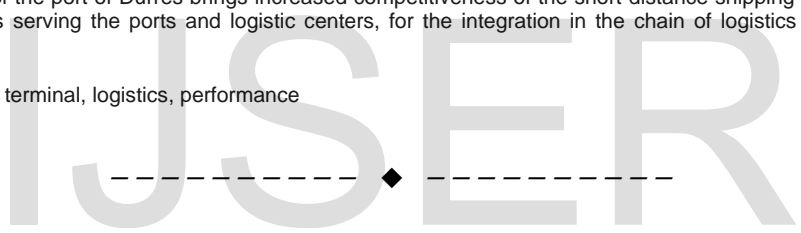
Based on the studied literature and the data collected directly in the field, this paper argues the importance of integrating the port of Durres into the Adriatic network of maritime highways and increases its attractiveness in the Mediterranean region.

Improving the efficiency of terminal operations and structure, we describe approaches for effective management of the port as intermodal hub. These performance improvements can facilitate port managers and terminal operators in designing their investment strategies more effectively. Policymakers can also regulate port design more effectively.

Conclusions

Improvement of the performance of the port of Durres brings increased competitiveness of the short-distance shipping and reinforces the attractiveness intermodal transportation solutions serving the ports and logistic centers, for the integration in the chain of logistics maritime routes that serve both Adriatic and Ionian regions.

Keywords: intermodality, port and terminal, logistics, performance



INTRODUCTION

Because of today's global competition and the concentration of logistics services in environment-friendly transport, the attention to intermodal transport is continuously increasing. In order to have effective intermodal transportation networks, it is necessary that the main flow of goods passing through the centralized hub, where goods are transferred efficiently to other transport carriers. Transfer may be simply between the same modes of the transport or different ones. Thus, to realize the intermodality, the port is keys to achieving competitiveness in the intermodal networks. The study was written as a conceptual point of departure with the vision to develop the port of Durres from a cost center to a central hub for creating the future of intermodal logistics network.

DEFINITION OF INTERMODALITY

Study on intermodality of the terminal is not a new subject. However, due attention should focus on the most costly element of intermodal service, the port. There are a variety of definitions of intermodality. In this study we consider the definition presented by COM 243/97 "Intermodality is a characteristic of a transport system that allows at least two different modes to be used in an integrated manner in a door-to-door transport chain". This supports the differences, between intermodality and multimodality, multimodality simply means transport in various ways and has existed for hundreds of years since the first shipments of goods by sea and later years by rail.

Intermodality, in turn, has been developed and increased since the 1980s and includes standardized interface and integrated between different modes. Intermodality is a policy tool enabling a systems approach to transport. In other words, intermodal transport is similar to multimodal transport, but puts more emphasis on connecting different modes of transport. It is this link or interconnectivity that provides an uninterrupted transport chain which is keys to the future success of intermodal transport. Intermodality

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that exists today is far from interconnectivity, as the most important issue is how to relate reducing transaction costs of cargoes transit into the transfer points. Thus, the interconnection link can be provided only in the terminal.

TRENDS FOR AN INCREASED INTERMODAL TRANSPORT

There are several reasons for the growth of intermodal transport systems. First, globalization encourages the growth of intermodal transportation through increased international trade agreements and trade union interactions that leads to free competition in national markets. In addition, global production the general transportation needs are significantly enhanced.

Technological innovations, containerization in particular, is the most obvious reason cited for increasing intermodality. Container, measured in TEU (twenty foot equivalent unit), allows the standardization and provides power predictability of global transport networks.

Other technological trends of the growing intermodality are advanced containers vessels and RO-RO, trains double-stacked, piggyback rail, developments such general ICT as web portals, EDI and advanced software business, Intelligent Systems Transportation, audio-visual technologies such as AVL, GPS technologies and processing equipment handling cargo such as gantry crane with a capacity of 40 container movements per hour.

Some recent political reforms and trade in the transport sector have also encouraged the growth of intermodal transport. The liberalization of the national transport market is an example of an institutional reform leading to free competition and the development of competitive intermodal transport. Further organizational reforms have led to new business models, among other establishing of specialized freight forwarders, concessioning of port terminals, custom house, port operators and logistics providers. Many of these new business models are willing to get the advantage of the best of intermodal infrastructure.

Finally, global trends in the manufacturing industry have become more efficient by changing the transport from push to pull logistics systems. Philosophy just-in-time introduced by Toyota in 1960 was captured by Western production industry in 1980 and today is more popular than ever.

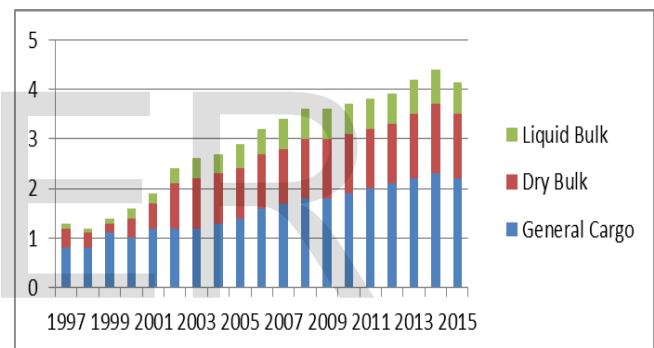
PORT OF DURRES

Port of Durres is located in the southwestern part of the city, on the northern edge of the Bay of Durres and 36 km east of the capital, Tirana. Its geographical coordinates are: latitude 41° 19.2' N and the longitude 19° 27.2' L. Main data of the port: total port area is 1.467 million m². The port is composed of two breakwaters, which protect an inner basin of 67 ha, with a depth of 7.5 to 11.5 meters and 11 berths with total length of 2200 m quays. The entire land

area is 80 hectares. Entrance to the port is realized through an access channel with a depth of 8.5 m, 3.68 nautical miles in length and width of 104 m, which easily provides access to ships in port. Grain silos capacity of 1.500 ton. Annual handling capacity is 5.000.000 tons/year. Port of Durres is the biggest port in the country and an important hub for the international market. It handles 77% of imports and 89% of exports to Albania; this is equal to 78% of all seaborne cargo at the national level. Durres port has a major impact on the country's economic growth. The development that has taken in the last decade (2003-2013) indicates the steady growth of 5.6% per annum of total traffic in the port, which is foreseen to be up to 4.3 million tons in 2017

Terminals:

- Passenger's Terminal / Ro-Ro
- Containers Terminal
- East Terminal (bulk cargo)
- West Terminal (general cargo)



Graphic 1 Traffic in port of Durres x million ton

Port Organization

Durres Port Authority: Land-Lord Port; It administers the territory and port assets; Develops port infrastructure; Guarantees Port security and the protection of the environment; Guarantees safe development and standards of port operations.

Private companies: Terminal operators; Stevedoring companies; Infrastructure maintenance; Pilotage service, Auxiliary vessels, Reception facilities, etc.

State institutions: the General Maritime Directorate; Customs; Border police, etc.

WHY port of Durres?

Geographical position in the region as part of the Pan-European Corridor VIII

The port has very good connections to the national road system in Albania

Port is certified under the ISPS Code

There is a contemporary infrastructure and superstructure

It has a management team with experience

Quality of services

High performance of stevedoring companies
Competitive tariffs
Flexibility, able to handle any kind of cargo
Largest port in Albania

In today's literature on intermodal terminals two groups of researchers are dominant:

- Operations Research (OR) in two views: macro - and micro network optimization - optimizing the operations of loading and unloading equipment/cranes
- Transport and communication infrastructure (often funded by the state with political implications)



Figure 1 The scheme of conceptual model

Common to both research streams is fundamental focus on performance, because improved performance (throughput, cost effectiveness, speed, quality, reliability, etc.) is the dominant factor for the creation of competitive intermodal terminals. To get a clear idea on the weight of the performance indicators of the port of Durres we have compiled different questionnaires. For this purpose they include questions on key performance categories such as port conditions, operating conditions, port equipment, the quality of services provided, quality of management, as well as the subsequent questions for each category. Sampling of respondents was identified on the basis of the case. Then 130 people were interviewed. Important port stakeholders were interviewed, as well as those related to direct or indirect connection with port operations in order to get feedback from people from different operating areas. Therefore, 36 of the respondents were terminal operators (44%), 17 were managers (20%), 20 were operators of free zones (24% and the rest (12%) were "others".

All questionnaires were collected and analyzed in order to weigh the importance of each factor on the performance of the port. For all of the elements in the study used a Likert scale of 5 levels (with edges 1 = totally not agree and 5 = totally agree). Questionnaires were elaborated in SPSS 18.0 software and Excel to analyze the results.

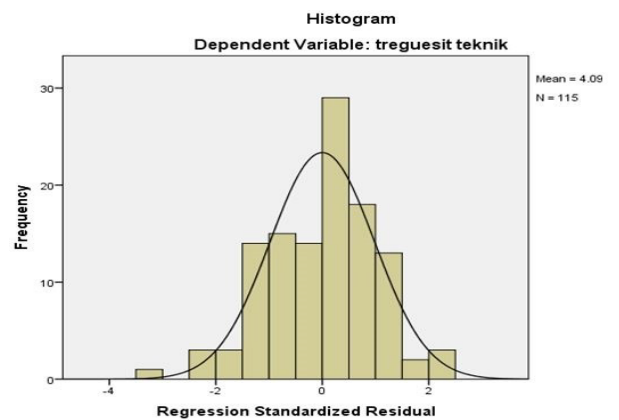
The first questionnaire is based on the four main sections of the assessment of the integration of the port in the global supply chain. The second questionnaire also assesses Durres port as a logistics center has been designed on the basis of four main sections that evaluate it.

By analysis of factors of first group questionnaire: infrastructure requirements, timeframe and spatial port performance, and relationships with stakeholders of the port, is rated port performance as one of the most important. In this subgroup of port performance we have included: technical indicator, the performance of the ship, performance of operations, equipment performance and time of intermodality. To test the performance level of connectivity with all other variables port is made linear regression.

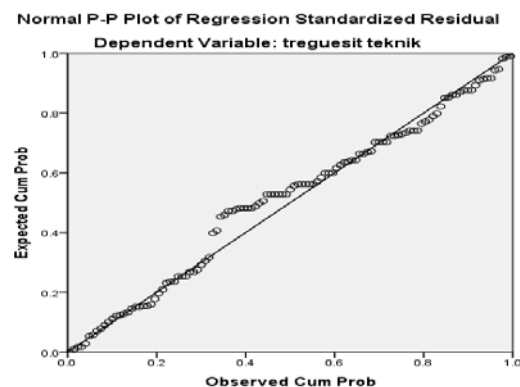
The analysis, have shown that the correlation between them is of significance.

This proves that for the first group the most important factor of performance indicators is technical indicators of the equipment.

Graphic 2 Histogram technical indicators of the equipment

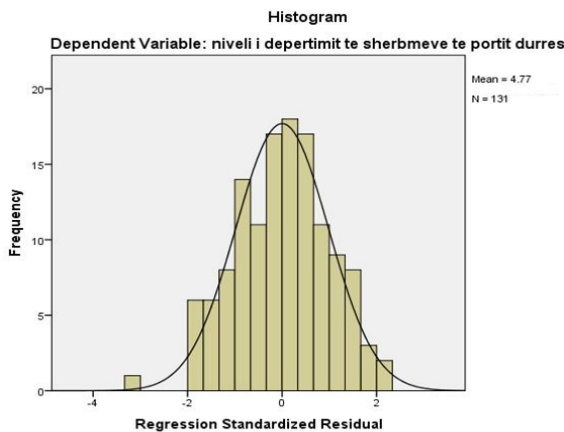


Graphic 3 Relationship of technical indicators of the equipment with other variables

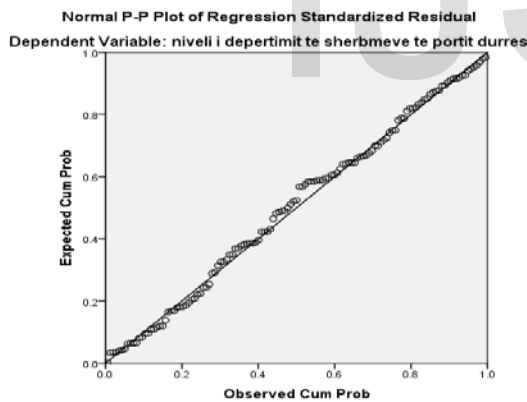


While from the analysis of questionnaire for the second group, as seen in graph 4 and 5, the most important factor of performance indicators is the level of penetration of the service port of Durres.

Graphic 4 Histogram hinterland and value-added activities



Graphic 5 Relationship of hinterland and value-added activities with other variables



Analysis for the port of Durres is evaluated on the basis of the following index:

Demand analysis; Analysis of supply; Transport services; Development scenarios. The map shown in Fig. 2 presents geographical location of the port of Durres in the Adriatic Sea, along with potential markets and competitive ports of the region.

The main competitive markets can be considered: Albania, Kosovo, Montenegro, Serbia, Bulgaria and Greece. The other ports competing in this region together with Durres

Port are: Bar (Montenegro), Thessaloniki (Greece); Varna and Burgas (Bulgaria).

Port of Durres is the main entrance for Albanian imports and furthermore the port handles the cargoes that go transit through Albania toward Macedonia and Kosovo markets.

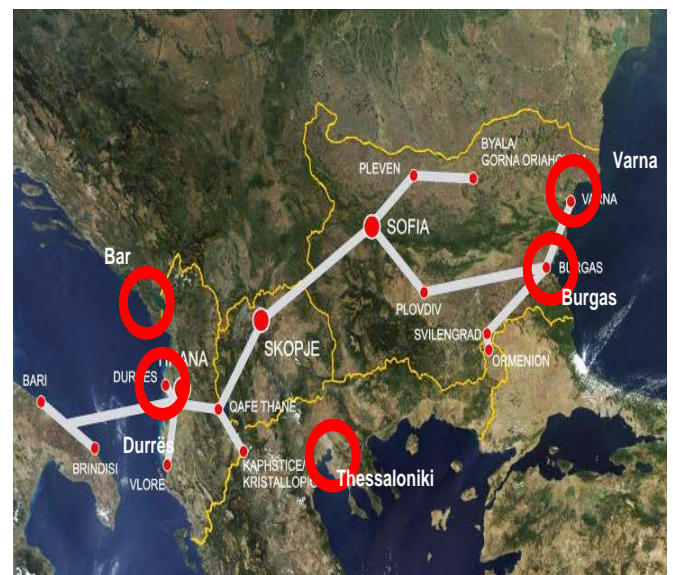
Evaluation of the regional Market

We have studied the road and railway networks situated between the port and the most important economic centers in the region in order to carry out a study of the competitiveness of ports and an assessment be made of the proportion the of Durres can win in the market share of transit cargoes in the Balkan region. The corridor VIII links the regions of Adriatic and Ionian regions of Black Sea countries and the Balkans (see Fig. 2 below).

From the economic point of view, the European Commission with the Trans-European-countries, aims at enlarging the EU, and thus enable the development of the movement of people and goods by objectives of "Single Market" and the principles of sustainable free movement of goods and passengers.

From the standpoint of transport, Corridor VIII is a transportation system multi-modal axis East-West, including sea and river ports, airports, ports with multi-modal system, road and rail, with a range of 1270 km railways and 960 km road. Main Line following axes: Bari-Brindisi-Durres-Vlore-Tirana-Skopje-Burgas-Varna. There are some ramifications leading to Greece and Turkey through the corridor VI.

Figure 2 Geographical location of Port of Durres, competitive ports and potential markets along the Corridor VIII



Road connections

The distance between the different ports to the markets is a good indicator for the location of the port towards competitive ports. Having all other factors of equal values, the port with the shortest distance from the market will attract the most traffic that is designated for that market or that is created by that market.

Ports	Markets			
	Albania Tirana	IRJ Macedonia Skopje	Kosovo Pristina	Serbia Beograd
Durres	40	320	355	710
Thessaloniki	375	225	310	635
Burgas	900	620	710	810
Varna	950	665	755	860
Bar	205	380	335	520

Table 1 Distance between ports and markets measured in km over roads

Distance of the most important ports with the most important economic centers of the region is measured and presented in the following table 1 (above). Cells highlighted in yellow to dark show with important connections. Cells highlighted in yellow indicate interesting alternatives open and show white cells less important lines.

From the table can be understood based on the distance, that Tirana can be considered an important market for the port of Durres since all other ports are 5 times away. Regarding other cities may be described that Thessaloniki has favorable location in fact it is closer to the market, except for Belgrade, which has the closest port of Bar.

Railway connections



Figure 3 Road and railway map of the Balkan

Connecting the port of Durres with the national rail network and beyond is another alternative with interest and an additional option for anyone who wants to develop trade through this network.

Railway line creates many facilities, one of which is the reduction of costs.

Total railway network consists of 447 km and 230 km railway primary and secondary rail. There is only one quay in Durres port which already has a rail connection. The operating system is active 24 hours for all operators who want to transport goods using this line.

The following picture 3 shows the rail network of the Balkan region. Base on this chart we have measured the rail distanced among ports and economic centers (markets).

Distances between ports and markets are shown in the following table 2 (below):

Table 2 Distance between ports and markets measured in km

Market-Port	Tirana	Skopje	Pristina
Durres	40 km by train	120 km by train; 200 km by road	120 km by train; 230 km by road
Thessaloniki	No direct rail connection	225 km by train	310 km by train
Burgas	1315 km by train	785 km by train	700 km by train
Varna	1360 km by train	930 km by train	745 km by train
Bar	205 km by train	715 km by train	630 km by train

Skopje is located very close to the port of Thessaloniki and can benefit from a direct rail link to the port. The railway line follows more or less the same track as road connection between them and the distance is 225 km. Durres is approximately 100 km away from Skopje and should face competition for the market share of port of Bar. For Pristina, the nearest port is Thessaloniki, however Durres port and Bari are more or less at the same distance. Thessaloniki has only one advantage compared to the port of Durres and Bar which is a direct train connection. There is a rail link between Durres, Bar (Montenegro) and Pristina, but it takes a transverse direction and passes by and Kraljevi Cacak in Serbia. We should also remember that a rail/road link becomes feasible when distances exceed 500 km, or the connection road will be more important than the railway line. Practically, the competition between these ports will be depended of the quality of processing of goods at the port and treatment of transit goods from customs in different countries. For Belgrade,

Bari is the nearest port, after which comes Thessaloniki and Durres. Besides road links, Bar port has the advantage that there is only a cross-border to be passed, while Thessaloniki are at least two and from Durres, as are two cross- borders. As a practical rule, railways constitute competition for road transport of goods generally for distances greater than 500 km. The distance between the port of Durres with neighboring markets (300-400 km in total) does not justify the overall transportation of goods by train. For this reason, it is assumed that in the case of normal transport of goods in transit in neighboring countries should be carried out through the road network.

The market share of the Port of Durres is discussed above and the distance between ports competitive markets. A frequently used model for calculating the percentage of the market, based on the correlation between the percentage of the market and capture market in which:

$$MarketShare = \frac{\left(\frac{1}{d_j}\right)^6}{\sum_i \left(\frac{1}{d_i}\right)^6}$$

d_j is the distance from the desired port, in order to calculate market share.

d_i the distance from the port to the market

This calculation has made it possible to have a theoretical market share as in the following table 3:

Table 3 Percentage of market share regarding different ports of the region

Port / Market	Tirana	Skopje	Pristina	Belgrade
Durres	100%	11%	22%	10%
Thessaloniki	0%	85%	48%	19%
Burgas	0%	0%	0%	5%
Varna	0%	0%	0%	3%
Bar	0%	4%	30%	63%

It should be noted that this graph calculation of 10% of Durres for Belgrade may be higher than reality. All goods headed to Belgrade should be transported from port of Durres by road or train to Podgorica, which is only 50 km away from Port Bar, and through the road that goes from Bari (Montenegro) in Belgrade. In practice, it is beyond reason to expect that Albania itself a very important market is the market of Kosovo and Macedonia. Traffic forecast for these two markets is expected to be respectively 20 % and 11 %.

Internal roads and connecting to the national road network

Port of Durres is the main gate of the Albanian market-entry being the main country's port in the Adriatic. As such, it becomes a very interesting alternative for landlocked countries such as Kosovo and Macedonia, which can use the services offered by the port of Durres. Albania's key position as a bridge to south-western and south-eastern European network, gives Durres port a very favorable geographical position in relation to major industrial centers in the country and the region. The Durres-Kukes-Pristine road as one of the greatest engineering works created a lot of communication facilities between Albania and Kosovo, making cooperation even stronger. Reducing costs is one of the main advantages arising from the relationship between the two countries, which historically been strong for centuries. Another important partner is our neighbor Macedonia, which is a great commercial potential.

Airport

If we refer to the old Roman expression that "all roads lead to Rome" in Albania this expression would be "All roads lead to Durres". This is because node Durres multimodal transport (all modes of transport cross there). The proximity of the airport to the city of Durres is another advantage for the port. National Airport "Mother Teresa" is located 25 km from the port of Durres. Ever present taxi service to the airport makes the reduced distance traveled and interurban road thanks Rinas-Durres, which took a completely new and modern in June 2009.

CONCLUSIONS AND RECOMANDATIONS

National policy

Port of Durres is the most important port of the country and an economic and trading hub of Albania. Port of Durres as the most important port (multimodal nodes) that will maintain a leading role among other ports will be supported by other indicators as: its connection with the transport network; Initiative TEN (Trans-European Network) to build Corridor VIII; Durres is already a developing maritime and commercial area; existence of a container's terminal. For these reasons its development determines the future of economic development and trade of Albania in national and international level. Moreover, looking at the importance of this port in the national system of ports, it is recommended to have a national strategic development plan for the development of the ports. This policy should indicate ways of developing this sector in the national economy, to have an integrated main port.

Sustainable Development

Sustainable development is a fundamental objective of the European Union. In this concept, all European Union policies regarding transport systems including maritime sector are unified. If Albania will adhere to these principles as requirements for sustainable development, needs to

build a coherent and coordinated policy, because it cannot be guaranteed only by market mechanism. It wants to be preceded by a national policy: environmental sustainability; Employment in the future; the quality of work; Safety and health; to observe maintenance of professional standards in all aspects of social policy.

Network Connection Management and National Urban Planning

An important aspect of port management is the management of surrounding areas. A port often creates an integral part of the densification of population around it. Development of the port should take into account the negative effects arising from its activities in its surrounding areas. For this it is important that the development of the port should be coordinated with that of the Durres city, therefore we recommend: future expansion in the area outside the actual territory of the port; Location of a green area outside the bulk cargo terminal; Increasing the depth of the basin and the access channel.

Often the port area is not only a place that causes disturbances in other urban functions and prevents new developments. From the financial point of view, the port area cannot have the same interest as a residential area and commercial area. Seafront developments are more attractive for the community than for expansion of the port. Through the National Port Strategy should be given a solution at high political levels, thus satisfying the local and national level interests.

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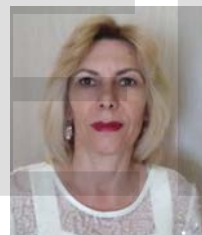
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