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IMPACT OF CONTAINERIZATION DEVELOPMENT IN THE PORT OF RIJEKA ON THE RIJEKA TRAFFIC ROUTE

ABSTRACT

The Container terminal of the Port of Rijeka is highly promising due to the high rising trend of container traffic. The container terminal competitiveness of the Ports of Rijeka, Trieste and Koper shall be compared by competitiveness matrix demonstrating the justifiability of investments in containerization of the Port of Rijeka. The competitiveness also depends on the traffic connection between port and hinterland indicating the need to modernize traffic routes connecting the port to the traffic network. Investments in port and traffic infrastructure prove their justification in upgrading a level of container terminal quality and capacity as well as in increasing incomes that can be generated by implementing the development plans for modernization of the port, railroad and road infrastructure.

KEY WORDS

competitiveness matrix, containerization, traffic connection, development plans

1. INTRODUCTION

Seaports are very essential subsystem of maritime and transportation system affecting the acceleration of traffic flows. Ports give impetus to development of some activities (production, trade) and are precondition for development of other activities (industry, power supply).¹

For the purpose of better planning the containerization development of the Port of Rijeka, the container market of Northern Adriatic ports has been analyzed and a matrix has been developed patterned on the BCG matrix for market growth and market share from the year 2000 to the year 2005.

The precondition for higher operating profit taking is a capability to generate values, operating efficiency and existence of competitive advantage.² In addition to the precondition to keep the goods as short

as possible in the transportation process, also the consistency of achieved level of service, organization, price and rate of providing services within the port system are very essential for the goods transportation process.

The efficiency of port system shall be improved by high-grade port infrastructure and superstructure. The article establishes the hypothesis that for the purpose of attracting more cargo volumes the Port of Rijeka has to be modernized, new port infrastructure and superstructure have to be built and state-of-the-art transportation technologies have to be developed quickly.

2. COMPETITIVENESS MATRIX

Various techniques and models have been applied for operating analysis and planning, enabling the management to classify products or services and to present them visually in respect of growth rate of individual markets and relative market share. One of the models for growth analysis and share is the BCG matrix according to which a similar matrix for presentation of container market position of the Northern Adriatic traffic route has been developed. The results of that analysis have shown that the orientation of the Port of Rijeka towards containerization is justified. This hypothesis will be confirmed additionally with some further capacity and financial indexes.

The tables show the difference between trans-shipped containers volumes, but also the difference in the annual growth rate of trans-shipped containers at an individual port. The results have been shown in matrix for growth rate of throughput/market and the market share that the authors have designed and called – *competitiveness matrix*. By analyzing these results, the conclusion has been reached, that the Port of Rijeka is

Table 1. Total throughput (in tonnes) and average annual container growth of container traffic in the Northern Adriatic ports of Rijeka, Trieste and Koper in the years 2000 and 2005.

	2000	2005	Difference (%)	Annual Growth (%)
Rijeka	92.853	565.062	508,6	101,71
Trieste	2.163.204	2.314.304	7,0	1,40
Koper	915.575	1.762.569	92,5	18,50

Source: Port of Rijeka Authority, Port of Trieste Authority, Port of Koper

Table 2. Annual market growth rate (2000 - 2005) and relative share in the whole market of the North Adriatic ports of Rijeka, Trieste and Koper for container traffic (2005)

Kind of Cargo	Cargo Volume (t) and Relative Market Share			Market Growth Rate
	Rijeka	Trieste	Koper	
Containers	565.062 0.24	2.314.304 1.31	1.762.569 0.76	9,28%

Source: Port of Rijeka Authority, Port of Trieste Authority, Port of Koper

highly promising due to by several orders of magnitude higher annual growth rate, in spite of lesser share in container market of the Northern Adriatic ports. It can be concluded that the difference in trans-shipped volumes shall be reduced even more and the growth rate and income generated by this operating segment sustain the strategy of further investments in the Port of Rijeka containerization.

In this context, it is important to say that the four largest European container ports Rotterdam, Hamburg, Antwerp and Bremen have the annual container

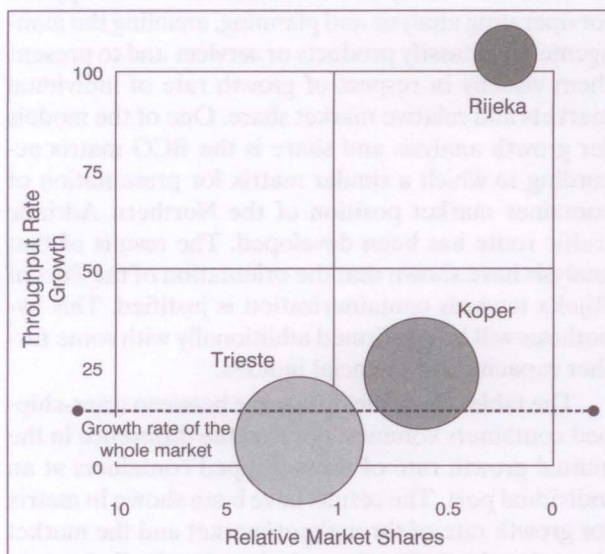


Figure 1 - Matrix of growth and container throughput share in Ports of Rijeka, Trieste and Koper

throughput growth between 8% and 15%. Comparing this data with annual growth of container throughput at the Port of Rijeka of 101 %, a great disproportion between annual growth rates in favor of the Port of Rijeka has been noticed. This high growth is the data on which the decision on further investment in port transshipment and traffic infrastructure capacities has been based.

The former analysis has proved the justifiability of investment in the Port of Rijeka, however, in order to establish competitiveness, the broader traffic aspect also has to be taken into consideration. The traffic routes connecting the Port of Rijeka with the hinterland which gravitates to it, should provide for their quality for undisturbed flow of goods between the port and the mentioned hinterland. There is a question of justifiability of investment in these traffic routes specially taking into consideration high costs of their construction.

In order to connect the Port of Rijeka with its hinterland market, the road connections have to be finished and a better railroad connection has to be built.

The motorway connecting Rijeka with the European motorway network will be constructed in full section in the near future, but in order to connect the Port of Rijeka with that motorway in an appropriate way, it is necessary to build the connection between the West part of the Port and the motorway. The road D403, as this road is called, is the „conditio sine qua non” for subsistence and development of the West part of the Port of Rijeka.

The eighty percent of containers being trans-shipped in the Port of Rijeka to destination on hinterland are transported by trucks which is much more expensive way of transportation than the railroad transportation. The target relation should be downright on the contrary, the 80 % of containers should be transported by railroad and only 20 % by road, respectively trucks. The document of the European Commission treating traffic policy states two substantial factors justifying this way of transportation: reducing the road route load and reducing the air pollution caused by exhaust gases of the trucks.³

On the other hand, the railroad line has been completely constructed, specifically its bigger part was already constructed in the 19th century. Nevertheless, regardless of the efforts for its maintenance and modernization/electrification, it is, with its upland-section, inappropriate for further transport of big cargo volumes, especially considering the need to maintain the competitiveness with the high-quality and modern railways of the united Europe. Therefore, it has to be looked for new, better solutions in this traffic segment and the answer is in construction of a new low-laying railroad that should create conditions for good transportation at the competitive railroad level.

The total construction costs of the traffic routes are high and assessed to more than 7.5 billions kuna and there is a question of justifiability of their construction and such an investment.

3. ANALYSIS AND CAPACITY CALCULATION

Below is the analysis of the container terminal potentials at the Port of Rijeka and incomes to be generated by their use as well as the survey of investment justifiability in terminals and the mentioned traffic infrastructure.

The development plans of Rijeka container terminals up to the year 2016 are directed to modernization/extension of the existing Brajdica terminal and the construction of a new container terminal in the West part of the Port – Zagreb and Prague quay.

It is foreseen that the extended Brajdica terminal shall have the quay 623 m long and that the total area of this terminal shall amount to 170.000 m².

The new container terminal on Zagreb and Prague quay shall be step-wise constructed ending with the quay apron length of 980 m and total area of 230.000 m². Referring to the mentioned terminal it is important to say that, due to the high draft, the quay apron shall be able to accommodate the biggest seagoing vessels in the world. Such terminal shall be ready to accommodate container carriers of a new generation being expected in near future.

The data in the study „*The Proposed Directive on Market Access to Port Services and Container Terminal Operations in Northern Europe*“, ⁴ published in May 2005, prepared by the *Ocean Shipping Consultants Ltd* have been taken into consideration for capacity calculation of these terminals.

Table 3. Productivity of container terminals at Northern Europe ports 1995 – 2004

	1995	2001	2002	2003	2004
TEU ⁵ /hect-are/year	12.287	14.244	15.530	16.607	18.511
TEU/quay length/year	621	760	781	874	973

Source: *Ocean Shipping Consultants Ltd*

The future container terminal capacity at the Port of Rijeka can be calculated by means of data shown in Table 3. Table 3 is characteristic for the Northern Europe ports and operating technology on terminals and level of port services in these ports is the standard to which the Port of Rijeka aspires.

By adding the sizes of the two container terminals of the Port of Rijeka it results that the quay apron shall have a total length of 1603 meters and the terminal

area shall be of 400.000 m². Applying Table 3 and productivity coefficient from the year 2004 for capacity calculation it follows that the Port of Rijeka shall have the container terminal capacity of 740.440 TEUs when calculating the capacity in proportion to terminal area, i. e. 1.559.719 TEUs in proportion to terminal capacity and quay apron length.

The question raised is why there is such a great difference in the obtained capacity when the calculation was made based on table showing situation in respectable ports of the Northern Europe. The answer follows from the fact that the Port of Rijeka has long length of quays in respect to relatively small associated terminal areas. One of the reasons of such a proportion is also the unfeasibility to implement development plans for the Port of Rijeka in whole, and included plans for demolition of outdated and inappropriate warehouses offering free space for further extension of terminal areas. The decision on preventive preservation of the mentioned warehouses due to their historical and cultural values, make it impossible to implement the plans for their demolition resulting in downsize of total areas for the future container terminal.

Bearing in mind the mentioned situation at the Port of Rijeka, the capacity and area proportion amounting to the mentioned approx. 740.000 containers has been taken into consideration for capacity calculation.

After the justifiability of investments in modernization and extension of Port of Rijeka's container terminals has been proved and after the future capacities have been calculated, a projection of the future incomes to be generated by completing the planned facilities has been prepared.

The 100 USD earned on the container terminal of the Port of Rijeka have been taken as the initial value for calculation of total incomes that can be realized from one container unit (TEU).

To obtain the data on the amount of total incomes that can be realized from one TEU transported on arbitrarily taken route Malta – Zagreb, it was necessary to do research resulting in obtaining multiplicative factor.

The business entities involved in TEU transport on the Malta – Zagreb destination generate the following incomes:

- *Port Company*: approx. 100 USD
- *Shippers*: approx. 270 USD
- *On-Shore Carriers*: approx. 600 USD
- *Forwarding Agents*: approx. 50 USD
- *Agents*: approx. 50 USD
- *Light Dues*: approx. 20 USD
- *Other Container Shipping Participants* (customs, police, port dues, pilotage, towing, shipchandlery,

garbage collection, berthing/unberthing, goods control, pest control): approx. 80 USD.

By adding the mentioned incomes the total income of 1170 USD will be achieved and generated by business entities involved in container transportation from Malta to Zagreb.

In addition to the mentioned regular incomes, incomes on storage, repair, washing, container distribution are generated on occasions.

The port company earns 100 USD from the mentioned business undertaking and other directly involved participants 1070 USD being even 11 times more. It can be concluded that the income of the port company will be multiplied 11 times.

HC and HAC, INA, HEP, trade, catering as well as local government and government administration through local rates, contributions and taxes generate income *indirectly* from the container transshipment.

The multiplicative factor 11 and total income amounting to 1170 USD are essential magnitudes with which total financial effect from container terminals of the Port of Rijeka can be computed. It has been already mentioned that the future capacity of container terminals has been assessed to approx. 740.000 TEUs and that the Port of Rijeka has very high annual rate of growth in container throughput. Terminal modernization, construction of new capacities and high level of providing services at the terminal, assure that the high level of throughput growth level shall be sustained. For that reason, the volume of 500.000 transported containers in one year has been taken for calculation of future incomes from Malta – Zagreb transported containers. This volume can be achieved by completing the planned construction and modernization. In determining these values the data has been taken into consideration that the terminal utilization should not exceed 70 % of the total terminal capacity if bottlenecks and congestion i. e. productivity decrease is to be avoided.

When multiplying the 500.000 TEU's by total income generated in transportation process of one TEU (1170 USD), the amount to 585 millions USD shall be generated as a value of annual financial income of all entities involved in the mentioned transport.

An amount of 128.7 millions USD can be earned just by computing the value added tax of 22 % amounting to 585 millions USD. An imponderable benefit would be earned not only for the Port of Rijeka and Rijeka traffic route but also for the Croatian traffic system as a whole by allocation of a part of these incomes to financing the construction of the above mentioned traffic routes (low-laying railroad and road D403 as a connecting road port – Rijeka beltway – motorway). The construction value of the mentioned roads has been estimated to 7.5 billion kuna. At rate of exchange 1 USD = 5.8 kn it follows that 7.5 billion

kuna amount approx. USD 1.3 billion. Annual debt servicing for this sum with time of repayment of 20 years and interest rate of 3 % would amount to USD 87.4 million.

Increase of container throughput volume has to be considered also through the broader social benefit. A positive trend of container throughput growth through the Port of Rijeka and increase of absolute transshipment container volumes have already today resulted in opening of new agencies and branch offices as well as the increase in employment in Rijeka and the Rijeka region. In just two new established shipping agencies being directly involved in container terminal operation, thirty-odd employees have been employed and the total number of new jobs that can be achieved by implementation of new construction plans can be measured in thousands. The mentioned social benefit and the data on the total financial gain from containerization are the facts that have to be taken into consideration when deciding about development of container terminal at the Port of Rijeka and the construction of the traffic route towards the countries of the Central Europe.

4. CONCLUSION

The development plans for the Port of Rijeka intended to modernize the existing container terminal and the construction of additional capacities can be realized if they contribute to the increase of transhipped volumes and operating efficiency. By implementation of the planned development programs, the new obtained capacities shall contribute to achieving the positive financial results. In the second chapter the high competitiveness of the Port of Rijeka due to the high growth rate of container throughput of 101 % has been proved by means of competitiveness matrix. With respect to the proved high competitiveness it was proper to analyze possible peak-capacities of container terminal at the Port of Rijeka in the third chapter. The annual throughput of 500,000 TEUs, representing 70 % of the container terminal peak-capacity, has been taken for computation of possible incomes of all entities involved in the container transportation between Malta and Zagreb. In this way the productivity remains at the high level and total incomes of all involved entities in this business enterprise is sufficient to justify investment in the port and traffic infrastructure connecting the Port of Rijeka with its catchment hinterland. In this manner, the previously established hypothesis that for the purpose to attract larger cargo volumes the Port of Rijeka has to be modernized, new port infrastructure and superstructure have to be build and contemporary transport technologies have to be developed as soon as possibly.

In the third chapter the multiplicative factor has been computed as magnitude that on 1 USD earned by the port company additional 11 USD can be earned by other entities involved in the container transportation between Malta and Zagreb. This broader social benefit present when considering a large port system, is additional element to be considered when deciding about investment in port/traffic system. It can be concluded that large investments in the mentioned system shall result in higher generated incomes and positive socio-economic indexes on town, region and wider level.

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SAŽETAK

UTJECAJ RAZVOJA KONTEJNERIZACIJE U RIJEČKOJ LUCI NA RIJEČKI PROMETNI PRAVAC I HRVATSKI PROMETNI SUSTAV

Kontejnerski terminal riječke luke je, zbog visokog uzlaznog trenda prometa kontejera, visokoperspektivan. Matricom konkurentnosti uspoređuje se konkurentnost kontejnerskih terminala luka Rijeka, Trst i Kopar, te dokazuje opravdanost ulaganja u kontejnerizaciju riječke luke. Konkurentnost ovisi i o prometnoj povezanosti luke sa zaleđem, što ukazuje na potrebu modernizacije prometnica kojima je luka vezana na

prometnu mrežu. Ulaganja u modernizaciju lučke i prometne infrastrukture opravdanje nalaze u podizanju nivoa kvalitete i kapaciteta kontejnerskog terminala, te u prihodima koje je moguće ostvariti realizacijom razvojnih planova modernizacije lučke, željezničke i cestovne infrastrukture.

KLJUČNE RIJEČI

matrica konkurentnosti, kontejnerizacija, prometna povezanost, razvojni planovi.

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5. TEU -" twenty feet equivalent unit" is the abbreviation relating to one 20 feet container

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