EVALUATING ECONOMIC ACTIVITY OF RIVER PORTS AT BULGARIAN SECTION OF DANUBE AS A RESULT OF THE WORLD ECONOMIC CRISIS

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ABSTRACT

The main objective of the study is to evaluate economic activity of inland ports at Bulgarian section of the Danube as a result of the world economic and financial crisis. In this regard a system of economic indicators (cargo turnover of Bulgarian river ports; total revenues; average number of persons employed; average stay of a vessel at ports; average wage costs and investment costs for maintenance and development of Bulgarian inland ports) is analyzed. It is presented a model that evaluates efficiency of ports traditional and complementary services, as well as a matrix that reveals correlations among indicating factors and performance indicators. As a result of the research, problems that hinder development of Bulgarian river ports and their superstructure are summarized and relative measures are proposed.

Key words: economic activity; economic and financial crisis; indicating factors; performance indicators; inland ports

ABSTRACT

Этот доклад посвящен оценке экономической деятельности в болгарских портах реки в условиях глобального экономического и финансового кризиса. Это исследование анализирует систему показателей, в том числе: речной грузовой портов; заторов доходы и складирование; среднесписочная численность работников в речных портах; средняя продолжительность пребывания судна в порту; средние затраты на заработную плату персонала и инвестиционных затрат на содержание и модернизацию портов. В докладе предлагается модель для оценки эффективности хозяйственной деятельности в портах, который состоится из прямоугольную матрицу с указанием корреляции между влияющими факторами и показателями эффективности. В заключение коратко излагаются основные проблемы, которые препятствуют развитию и

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совершенствованию речных портов вдоль болгарского участка Дуная и предложили конкретные меры по их преодолению.

Key words: бизнес, глобальный финансово-экономический кризис, показатели эффективности, влияющих факторов.

1 INTRODUCTION

Traditional and complementary services[1] at ports characterize their economic activity in terms of efficient use of financial, material and human resources, so as to optimize the costs and maximize the revenues[2]. In this regard, the following factors are critical to the economic activity of port operators:

- Production activity at national and European level;
- Interaction between demand and supply of freight transportation services in the national and European transport market;
- Cargo and cash flows;
- Fluctuations in national economies in terms of economic downturn or economic growth.

To analyze the economic activity of ports at Bulgarian section of Danube, the following indicators are used: total revenues; average number of employees at ports, average stay of a vessel; average personnel costs, investment costs for maintenance and development of ports and cargo turnover.

2 ANALYSIS OF THE ECONOMIC ACTIVITY OF BULGARIAN RIVER PORTS

2.1 ANALYSIS OF THE CARGO TURNOVER AT BULGARIAN RIVER PORTS

Figure 1 presents cargo turnover at Bulgarian river ports of Lom, Vidin and Rousse.

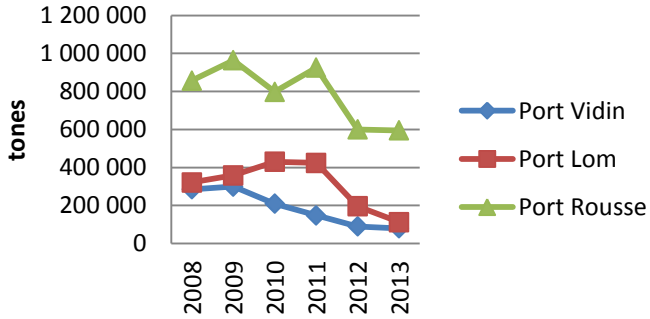

Figure 1 Cargo turnover of Bulgarian river ports
Source: Ministry of Transport, Information and Communication technologies

[1] PINE, Prospects for Inland Navigation within Enlarged Europe, full final report, 2004
[2] Spassov, Tr., "Macroeconomics" University Press "Economy", UNWE, Sofia, 2008;

The largest share in total volume of cargo handled is occupied by port Rousse - 60.4%, as most of the amount was transshipped in 2009 – 963 664. Its dominant position can be explained by the size of the available territory (the largest port terminal in the Bulgarian section of the river) and the variety of loading and unloading facilities for handling bulk, general and liquid cargoes, containers and Ro-Ro transport units. The rest of the cargoes are handled at ports Lom - 25.9% and Vidin - 13.7%.

The general observed trend in the amount of cargo turnover is of gradually decline, with large fluctuations at port Rousse and Lom. At the end of 2013 the volume of cargo handled decreases with 85.9% compared to 2008.

2.2 ANALYSIS OF TOTAL REVENUES OF BULGARIAN RIVER PORTS

Revenues are an important economic component of the financial activity of each enterprise and as such, their value is crucial for the future development of the business[3]. Revenues of port operators are formed mainly by incomes from charges, payable by stakeholders for the usage of port infra- and superstructure. Therefore, they are considered as derivatives of the amount of cargo handled at ports, as well as infrastructure charges levied for mooring and servicing of vessels. Consequently, the introduction of competitive pricing by port operators for berthing, transshipment and storage services is important to attract more cargo flows. Figure 2 shows the change in the amount of revenues from handling and storage operations at ports of Rousse, Lom and Vidin.

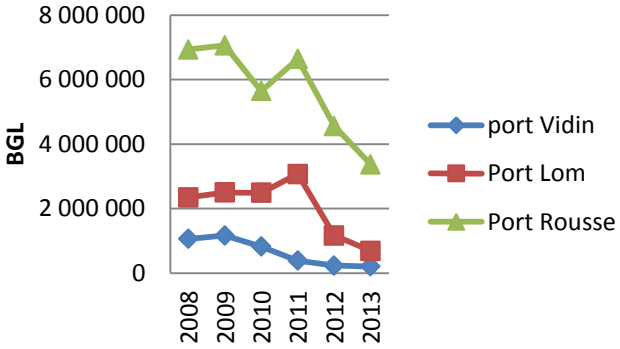

Figure 2 Revenues from handling and warehousing operations at Bulgarian ports
Source: Ministry of Transport, Information and Communication technologies

Seen from the figure above, the highest amount of revenues is at port Rousse – 66.9%. 71% of them are result of handling operations, and the other 29% - from warehousing. This highest share of port Rousse in total revenues is due to its dominant role in the formation of cargo turnover at Bulgarian river ports – 60.4%. The rest of the total revenues are divided between port of Lom (25.8%, of which 78.9% of loading and unloading operations and 21.1% of warehousing) and port of Vidin (7.3%, of which 98.9 % from transshipment operations and 0.11% of storage operations). The main trend in the total revenues from handling and warehousing operations is of continuous reduction. In 2013 their amount decreases 2.4 times compared to 2009.

[3] Koralova, P., "Opportunities for increasing the efficiency of river freight transportation", PhD thesis, UNWE, Sofia, 2013

2.3 ANALYSIS OF THE NUMBER OF EMPLOYEES AT BULGARIAN RIVER PORTS

Labor is one of the most important factors of production, and its quantitative and qualitative use is a crucial precondition for economic growth. The available workforce depends on the demographic conditions of the country and the quality of labor is determined by educational and professional competences and skills of the personnel. Structure and employment of staff at ports is determined by the volume of transshipped and stored cargoes as well as by the number of handling and warehousing facilities. The number of persons employed at ports depends also on the required time for transshipment operations. Figure 3 shows the average number of employees at Bulgarian river ports.

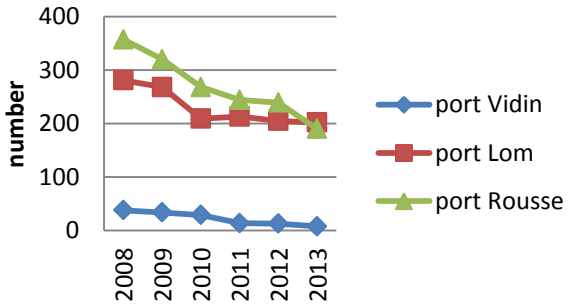

Figure 1 Average number of employees at Bulgarian river ports
Source: Ministry of Transport, Information and Communication technologies

The general trend that can be seen in the figure above is of continuous reduction in the number of employees at river ports. The number of employees at port Vidin in 2013 decreases approximately 5 times compared to 2008. At port Rousse the number of workers declines average with 27 employees per year and at port Lom their number is reduced to 202 persons in 2013 compared to 2008. The observed decline is determined by the reduction of cargo flows from one hand and the concession of several port terminals on the other.

2.4 ANALYSIS OF THE AVERAGE WAGE COSTS AT BULGARIAN RIVER PORTS

The analysis of average wage costs can be determined by the following:

- Efficient use of labor - any increase in its value is accompanied by an increase in labor productivity as a result of the improvement of working conditions and personnel management, application of information and communication technologies in the management and organization of logistics processes;
- Purchasing power of population - any increase in the amount of average personnel costs deals with increased disposable income of population which is directly related to social welfare;
- Competitive prices of transport services - any reduction in the amount of average personnel costs reflects in reduction in transport services price.

Figure 4 illustrates the changes in the amount of average wage costs at Danube ports. A trend of continuous increase in the average wage costs in Bulgarian river ports is observed at the figure above. In 2013 their amount increase with 65 % at port Lom, 19.2% at port Rousse and 12.3% at port Vidin compared to 2008.

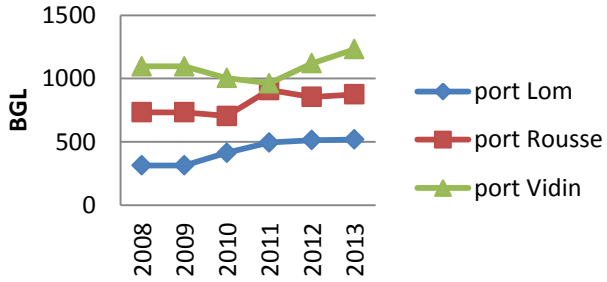

Figure 2 Average wage costs
Source: Ministry of Transport, Information and Communication technologies

Variable fluctuations can be seen at ports Rousse and Vidin. The growth in the amount of these costs is mostly driven by the established trend of continuous reduction in the number of employees (see Figure 3). Existing variations in the sum of wages at different ports due to the economic, social and demographic development of the various regions, as well as the changes in macroeconomic indicators such as GDP, inflation rate, unemployment rate and others.

2.5 ANALYSIS OF THE INVESTMENT COSTS FOR MAINTENANCE AND DEVELOPMENT OF RIVER PORTS

Investment costs in economic activity at ports can be defined as cash payments, which infrastructure operators carried out to build up new or improve the current state of their disposable fixed assets. These costs have complex effect on traditional and complementary services at ports, as the effect of their increase or decrease occurs over a long period of time[4]. The importance of these costs is primarily of improving quality of port services and enhancing safety and reliability of transshipment facilities. The development of ports corresponds to capacity utilization; introduction of modern handling equipments, application of intelligent transport systems and etc. Figure 5 shows the change in the sum of investment costs at ports of Rousse and Vidin.

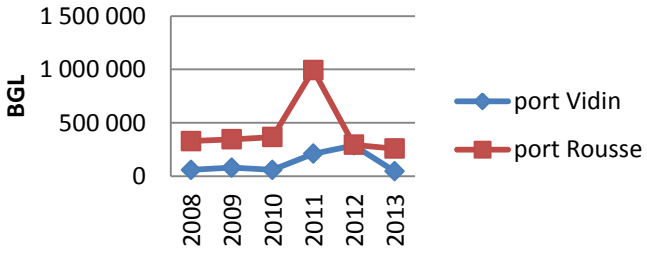

Figure 3 Investment costs for maintenance and development of ports Rousse and Vidin.
Source: Ministry of Transport, Information and Communication technologies

[4] TODOROVA, D, „Investments – key factor for sustainable development and competitiveness of transport sector “, e-magazine. „Mechanics, Transport, Communications”, vol 3 III -1-7, ISSN 1312-3823 2014

The highest share in total investment costs has port Ruse – 72.8%. Investment costs are the highest (994.000 BGL) in 2011due to the higher cargo turnover and total revenues at port Rousse for the same period. Concerning port Vidin, there is a sharp increase in the amount of investment costs in 2012 as they are approximately 3 times higher than in 2008. This trend marks positive coming out of the world economic crisis and indicates perspectives for increasing cargo turnover and revenues of ports.

2.6 AVERAGE STAY OF A VESSEL AT BULGARIAN RIVER PORTS

Average stay of a ship at river ports is essential for improving the quality of freight transportation on inland waterways. Duration of average stay of vessels at ports directly affects the delivery time of goods from consignor to consignee and the price of transport services, as well. Productivity and operational mode of transshipment facilities are other factors that directly influence the value of the indicator.

Figure 6 shows trends in average stay of vessels at Bulgarian river ports.

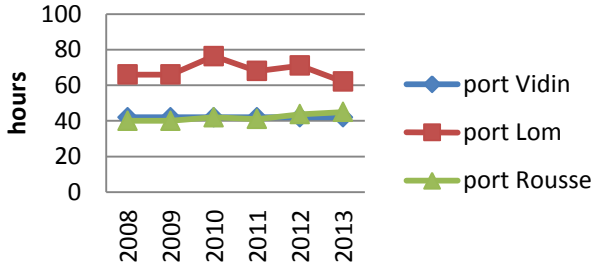

Figure 4 Average stay of a ship at Bulgarian river ports
Source: Ministry of Transport, Information and Communication technologies

Seen from the figure above, the average stay of vessels at port Vidin is constant - 42 hours. Various fluctuations are observed for the average stay of vessels at port Lom, where the values are in the range of 66 and 76 hours. At port Rousse a trend of gradually increase is observed and in 2013 five more hours have been necessary to serve a vessel compared to 2008. These results could be explained by the increase in the required time for handling operations due to the physically outdated transshipment facilities (most of the cranes are 65 years old).

2.7 EVALUATION OF THE EFFICIENCY OF PORT SERVICES IN BULGARIAN SECTION OF THE DANUBE RIVER

The analysis of the economic activity of Bulgarian river ports, which was presented in the previous section, can serve as a starting basis for determination of the efficiency of transshipment operations at ports. The main task of this paper is to present efficiency index so as to determine to what extent the current state and performance of ports as a result of the world and economic crisis is beneficial for port operators, consumers and society as a whole. For that purpose, a rectangular matrix (E), consistent of three columns and four rows is made. The influential factors (j) are situated in the columns (n) and performance indicators (i) are ranged in the rows (m). Each of the variables adopts certain values depending on the functions it performs.

Table 1 presents a model of the correlations among the influential factors and the performance indicators. The influential factors include: cargo turnover; average number of employees and average stay of a vessel at ports. The performance indicators include: transshipment and warehousing revenues, investment costs for maintenance and development of ports and average wage cost.

Table 1 Matrix of correlations among influential factors and performance indicators.

Indicators		**Influential factors**		
		Cargo turnover at ports	Average number of employees	Average stay of a vessel at ports
Performance indicators	Transhipment operations revenues	E_{11} (0,992)	E_{12} (0,811)	E_{13} (- 0,22)
	Warehousing operations revenues	E_{21} (0,959)	E_{22} (0,786)	E_{23} (- 0,551)
	Investment costs for maintenance and development of ports	E_{31} (0,143)	E_{32} (0,688)	E_{33} (- 0,838)
	Average wage costs	E_{41} (0,668)	E_{42} (0,589)	E_{43} (0,458)

Source: Idea of the author

To represent the interaction among the influential factors and performance indicators, the author exploits the Statistical Package for Social Sciences (SPSS), by applying multivariate statistical methods - regression analysis. Through this econometric method the correlations among factors and dependent variables are defined. The main objective of the analysis is to determine the direction and strength of the correlation among the above mentioned indicators and measure the quantitative variation of the performance indicators. As could be seen from table1, the most significant influential factors are cargo turnover at ports and average numbers of employees as the values of correlation coefficients are the. Consequently most of the measures proposed for development of river ports must be related with attraction of more national, international and transit cargo flows as well as employing qualified and experienced personnel. Each cell Eij of the matrix shows the correlation among the influential factors and performance indicators. Based on the proposed model, the efficiency of ports economic activity can be presented by the following equation:

$$I_{eff} = \frac{\sum_{j=1..4}^{i=1..3} E_{ij}}{m * n}, \quad (1)$$

Where:

$\boldsymbol{I_{eff}}$ is an efficiency index. It can take values from 0 to 1, and the closer is the value of the index to 1, the more efficient is the port economic activity;

$\sum_{j=1..4}^{i=1..3} \boldsymbol{E_{ij}}$ is the sum of the values of correlation coefficients**;**

i = 1 ... 3 indicates that i can take values in the range 1 - 3, i.e. the number of influential factors is 3;

j = 1 ... 4 means that j can take values in the range 1 - 4, i.e. the number of performance indicators is 4;

m is the number of rows in the matrix

n is the number of columns in the matrix.

After the necessary transformations in the presented equation are done, it can be concluded that I_{eff}= 0,373.

3 SUMMARY OF THE RESULTS

- The general observed trend in the amount of cargo turnover at Bulgarian river ports is of gradually decrease by the end of 2013, with a decline of 85.9% compared to 2009. The share of transit in total cargo turnover is negligible - about 1.17%;
- The sum of the total revenues of Bulgarian river ports is continuously declining in 2013 with a decrease of 60.2% compared to 2009;
- The number of persons employed in 2013 at port Vidin decreased approximately 5 times compared to 2008, at Lom and Rousse a decline by 27 and 63 employees respectively is observed. This leads to an increase in the unemployment rate in these regions;
- In terms of average wage costs their amount increased by 65% at port Lom, 19.2% at port Ruse and 12.3% at port Vidin in 2013 compared to 2008. This results in increase in population incomes in these regions, but also by an increase in infrastructure charges and port dues;
- The sum of the investment costs for maintenance and development of ports and their superstructure is characterized by a trend of continuous increase till 2012 and a decrease of 47.9% in 2013 ;
- At port Rousse average stay of a vessel increases approximately by 5 hours in 2013 compared to 2008, while at port Lom it varies between 66 and 76 hours. This immediately deals with delays in delivery time of transported goods;
- The efficiency index of port's economic activity is set to 0,373, which means that their efficiency is approximately three times less than 1 and should be increased.

4 CONCLUSION

Well kept transport infrastructure is a key factor for successful and effective management and exploitation of river ports. In this regard the development of economic activity of Bulgarian ports as a result of the world economic and financial crisis could be achieved by the following actions:

- ✓ Stimulating public-private partnership initiatives for management and maintenance of river ports as a factor for increasing intramodal competition and liberalization of ports services;
- ✓ Usage of high-tech transshipment methods and equipment so as the average stay of inland vessels to be dropped away to minimum and their serving maximized to 24 hours per day and 7 days in the week;
- ✓ Building of logistics terminals in the vicinity of Bulgarian inland ports which results in higher employment rate in the north-west regions;
- ✓ Introducing preferential infrastructure charges for wharfing of environmentally friendly inland vessels;
- ✓ Employment of highly qualified personnel and development of the working conditions for crews on board and at ports through application of river

information services; standartization of wage costs in different regions in North-west Bulgaria and provision of financial aid from national and european funds for human resources management.

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