

IMPACT OF THE INDUSTRY IN THE REPUBLIC OF BULGARIA ON THE TRANSPORT MARKET DEMAND

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ABSTRACT

The conjunction of the transport market is functionally dependent on the structure of production, goods' exchange and consumption of industrial and agricultural products. The paper is dealing with structural analysis of the industry as well as exchange analysis which consequently enable determining the volume of the material flows, their product structure and destinations. For the purposes of the analysis statistical data will be summarized, characterizing the current state and development trends of the sectors "Mining and quarrying" and "Manufacturing", generating the basic product flows and determining the freight transport market demand parameters.

Key words: functional relations, linear models, industrial development indices

ABSTRACT

Спрос на рынке грузовых перевозок находится в зависимости от структуры производства и потребления промышленной продукции. Разработка "Добыча полезных ископаемых" и "Обрабатывающие производства", которые генерируют основные потоки продукта определяют параметры спроса на грузовые перевозки. Цели настоящего анализа установить функциональных связей, силу и направление воздействия промышленности на физическом объема основного потока продукта, формирование спроса на рынка транспортных услуг.

Key words: функциональные отношения, линейные модели, индексы промышленного развития

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1 INTRODUCTION AND OBJECTIVES

The demand on the freight transport market is functionally dependent on the production and consumption structure of industrial products. The development of sectors “Mining and quarrying” and “Manufacturing”, generating the basic production flows determine the parameters of the freight transport market demand. The purposes of the presented analysis are to determine the functional relations, the strength and the direction of industrial influence over the volume of the basic industrial flows determining the market demand.

2 DATA AND METHODS

The analysis enhances the industrial influence over the market demand on the imports and exports to and from Bulgaria towards EC countries and countries not belonging to the Community.

The object of survey are railway, road, maritime and IWW transport³.

The state and tendencies of industrial development are studied by statistical data on the Industrial Production Indices in the sectors “Mining and quarrying” and “Manufacturing”. The reference period of the analysis is 2007 - 2013. According to the methodology applied by the National Statistical Institute⁴ for the calculation of the Industrial Production Indices, the values are corrected by isolating the price (inflation) alterations, so that the virtual production changes could be presented.

Object of the study are the import and export flows of goods in the direction Bulgaria towards third countries outside EC 27 by modes of transport and the corresponding alteration indices compared to the levels of 2007.

The analysis is based upon Eurostat data after nomenclature SNT/R⁵ for the period 2007-2013. The degree of industrial influence over the flows of goods is evaluated by qualifying the linear correlation ratios (R) and determination ratios (R²).

The changes in industrial production as a whole have been studied; the mining & quarrying industry and the manufacturing are looked upon as factors affecting freight flows per transport modes and directions (import and export). The assessment of the impact strength and the degree of determination of the variables is based upon using the following scales

Table 1

Correlation strength	Determination degree
$0 < R < 0,3$ – weak	$0,1 < R^2 < 0,25$ - moderate
$0,3 < R < 0,5$ – moderate	$0,25 < R^2 < 0,49$ - considerable
$0,5 < R < 0,7$ – considerable	$0,49 < R^2 < 0,81$ - high
$0,7 < R < 0,9$ – high	$0,81 < R^2 < 1$ - very high
$0,9 < R < 1,0$ – very high	

³Inland water ways

⁴Bulgarian National Statistical Institute

⁵Standard Goods Classification for Transport Statistics/Revised (NST/R).

The results' authenticity has been proved by F-test. Critical values of F-test for Alpha = 0.1 is 4.54. For the dependencies selected as reliable a set of parameters of linear regression equations is chosen and the results are presented by means of graphs.

3 RESULTS AND DISCUSSIONS

The results of the correlation ratio' calculations are presented on Figure 1.

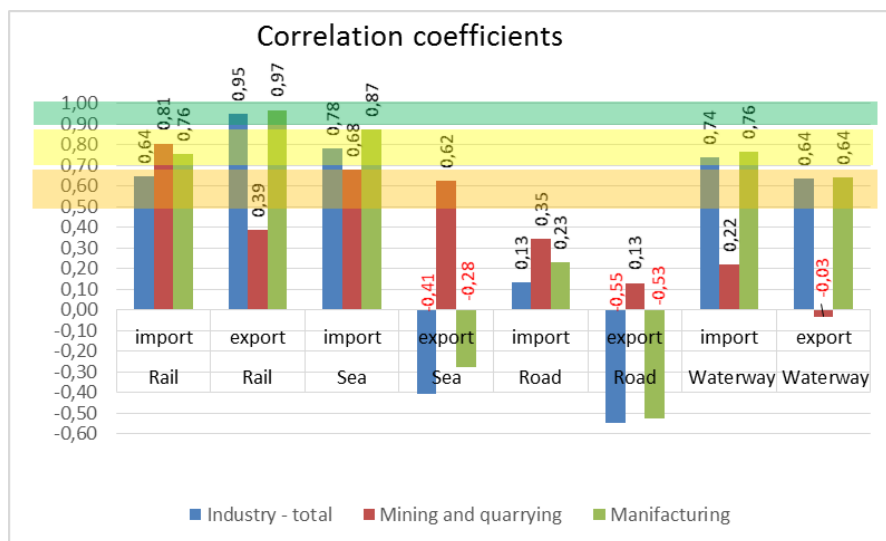


Figure 1

The results indicate a very high correlation ($R > 0.9$) between the export flows by railway transport on one side and on the other side the industry as a whole and manufacturing.

With high and considerable correlation between the freight flows and industry as a whole are characterized the railway transport imports, the maritime imports as well as both imports and exports by IWW transport.

High and considerable is the correlation between the freight flows and mining & quarrying observed in the railway imports, as well as both imports and exports by maritime transport.

High and considerable is the correlation between manufacturing and freight flows, observed in railway, maritime and IWW imports as well as IWW exports.

The correlation ratios for road transport show a weak import correlation and inverse relationship in exports.

The degree of determination of the settled correlation dependences is presented by the calculated values of the determination ratio (R^2) on figure 2.

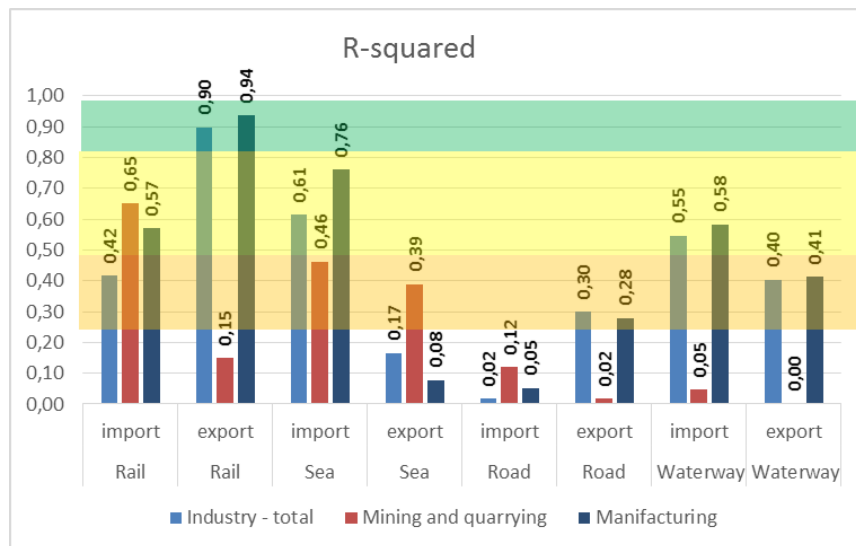


Figure 2

The imports by railway transport is highly determined by the industry and manufacturing.

The imports by railway and maritime transport are to a high degree determined by industry and the sub-sectors mining and quarrying as well as manufacturing.

The imports and exports with waterway transport are accordingly with a considerable and high determination by the manufacturing and industry as a whole.

The test results for their verification by means F-test are presented in Table 2.

Table 2

Results from the F-test	Rail	Rail	Sea	Sea	Road	Road	Waterway	Waterway
$\alpha=0,1$; $F_{cr}=4,54$;	import	export	import	export	import	export	import	export
Industry - total	no	yes	yes	no	no	no	yes	no
Mining and quarrying	yes	no	no	no	no	no	no	no
Manufacturing	yes	yes	yes	no	no	no	yes	no

The possibility the results to be random and thus the conclusions to be faulty is denied by the following studied dependences: Top of Form

Industry – total/Rail- export; Industry – total/Sea- import; Industry – total/Waterway-import; Mining and quarrying/Rail-import; Manufacturing/Rail-import; Manufacturing/Rail- export; Manufacturing/Sea-import; Manufacturing/Waterway-import Bottom of Form.

These dependences could be sufficiently well depicted by through linear functions presented on the figures below:

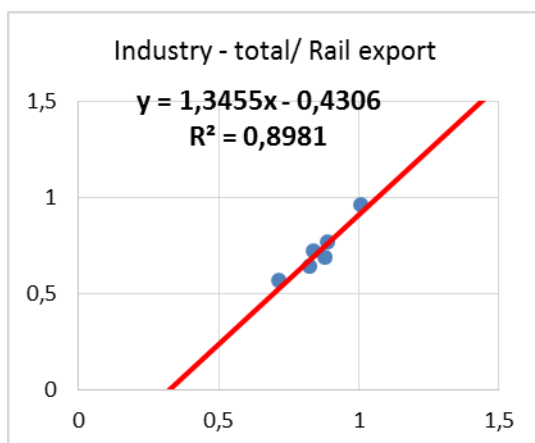


Figure 3

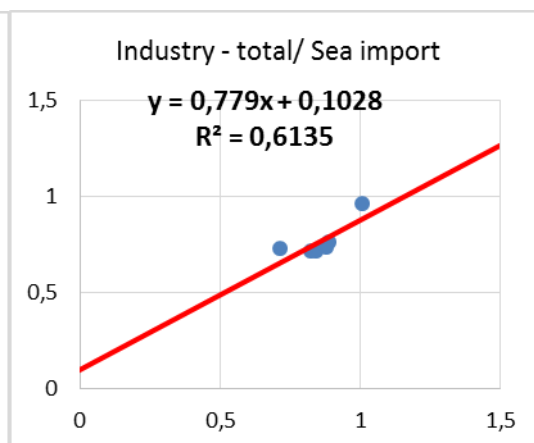


Figure 4

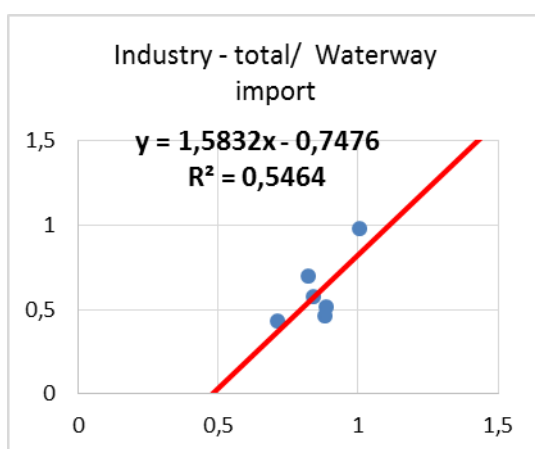


Figure 5

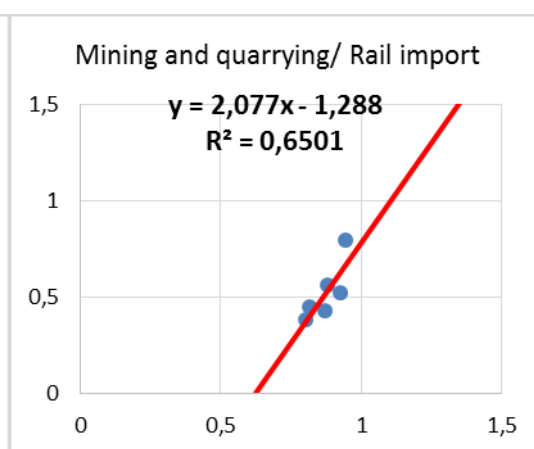


Figure 6

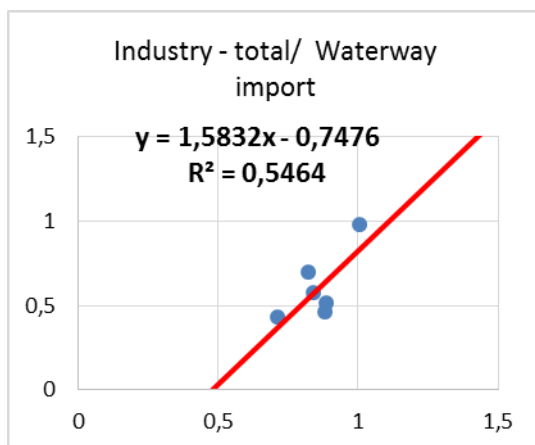


Figure 7

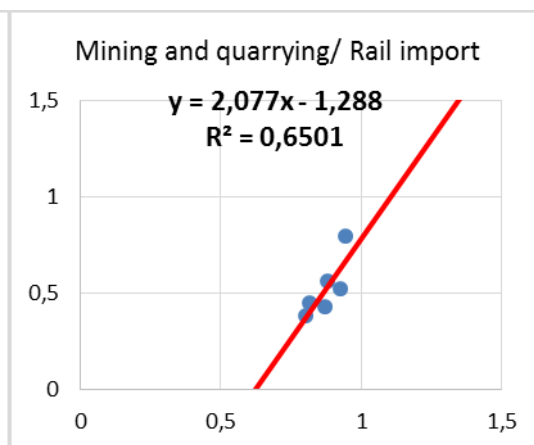


Figure 8

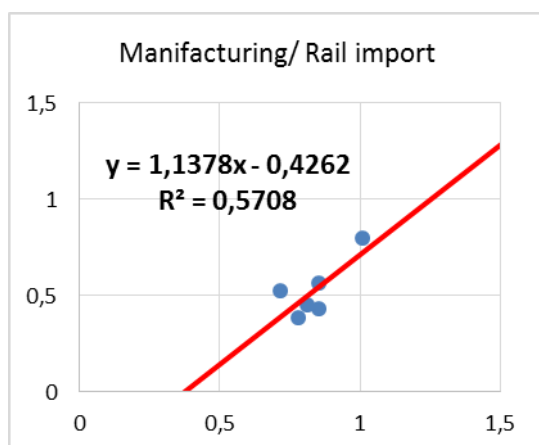


Figure 9

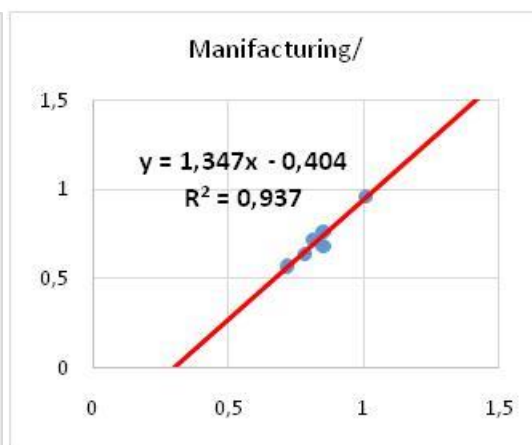


Figure 10

Despite the intensity of dependence and degree of determination, the functions' graphs illustrate the elasticity of the goods flows by modes of transport and per direction compared with the alterations in the total volume of industrial production as well as the distributed volumes by economic sectors.

4 CONCLUSION

The analysis results indicate that the major part of the basic functional additions between industry and flows of goods could be described punctually by means of linear functions. They could be used for the purposes of forecasting in determining the alteration trends in the goods' flows influenced by industrial development. A considerable part of the functional relations between industry and goods' flows could be authentically depicted through linear models and a necessity for exploring other functional models arises.

REFERENCES

- [1] Statistical data „Business statistics, Multi-domain statistics (<http://www.nsi.bg/en/content/6797/short-term-business-statistics>).
- [2] Trade and transport statistics (<http://ec.europa.eu/eurostat>).

Článok recenzovali dvaja nezávislí recenzenti.