# EMPLOYMENT IN TRANSPORTATION: LOOKING BACKWARD AND LOOKING FORWARD

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### Abstract

The basic objective of this research is to analyze the employment trend in transportation over the past thirty years and to determine the possible contribution of transportation as an economic activity in solution of the unemployment problem in Croatia. The methods of correlation and regression analyses are used to prove the hypothesis concerning the limitations of transport sector in new job creation. The applied scientific methodology has the task to prove that transport sector in Croatia is becoming more capital intensive than labor intensive economic activity. Accordingly, the trend of decreasing employment in the transport sector will continue in the next period. Data analysis and numerical calculations are performed using Statistica software.

Keywords: transport, employment, correlation and regression analyses

JEL Classification: E24, J2, J21

## 1. INTRODUCTION

The Global Financial Crisis indicates the end of industrial civilization with an increasingly visible and ubiquitous consequence - increasing unemployment. Thus, the increase of domestic production, competitiveness, employment and export, as well as the growth of the real individual income become the basic elements of economic policy. Industrial policy should employ all idle productive resources and all the unused capacities to ensure the smooth transition to the new industry. 'Industry' here comprises all activities from agriculture and metal and financial industry to transport. In national economies oriented towards service section growth, there is a growth with low or stagnant number of transport involved employees.

In periods of economic crisis transport reacts with greater sensitivity to market events in a way of transport companies quickly reducing labor costs in order to maximize profits or minimize losses, because that is the easiest way to make cuts in the short term. The reduction of salaries and/or downsizing them seems as an efficient solution so as to maintain market position of transport companies. When taken into account the fact that the transport is a capital, not labour intensive activity, it is hardly likely that the transport industry would increase their absolute and relative share in total employment. Accordingly, the purpose of this paper is to evaluate the effects of the transport industry and solving the unemployment problem in the new economy. To achieve the intended goal, numerous scientific methods were used in various combinations, including statistical methods of regression and correlation analysis.

### 2. THEORETICAL FRAMEWORK AND PROBLEM

Transportation is a significant source of employment, namely since the operation of vehicles such as trucks or buses is labor intensive. It employs between 3% and 8% of the total labor force of developed countries (cf. graph 1).



Graph 1. Transportation employment in developed countries

Source: http://people.hofstra.edu [access June 12, 2014]

In the European Union, transportation employed more than 10 million people, or 4,5% of the EU workforce (cf. table 1).

<b>Fable 1.</b> Employment	nt by mode of tran	sport, 2009. (in 000)
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	Total	Road freight transport	Road passenger transport (**)	Railways	Pipelines	Inland water transport	Sea transport	Air transport	Warehousing and support activities	Postal and courier activities
EU27	10580,3	2951,8	2110,5	712,4	22,9	41,1	179,7	379,5	2379,3	1803,1
EU15	8508,4	2274,4	1689,9	437,1	10,2	33,8	163,2	349,3	2010,0	1540,4
EU12	2071,8	677,4	420,6	275,3	12,7	7,3	16,4	30,2	369,3	262,7

Source: Eurostat

Of the ten million people employed in the transport sector, almost half are in road freight and passenger transport (see graph 2).

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### Graph 2. Employment in the transport sector in the EU 27 in 2009

Source: Prepared by Authors according to EC, 2012

There is approximately 76,000 people employed within Croatian transport industry (of which 13 371 people are in crafts and trades and liberal professions) or 5.4% of total employment. From 1977 to 2012, the share of employees in the Croatian transport sector in total employment decreased by 3.4 index points, ie the share went from 8.8% to only 5.4%. Activities of land transport and pipeline transport account for 41.5% in the total employment of the transport sector, of storage business and related activities with 32.8%, while there is 18.8% in postal and courier activities. The least is employed in air and water transport. Air transport has a 5% share, while water transport only has 2%, where people are employed in transport and storage activities[6].

Negative economic trends and the reduction in real income and purchasing power had a negative effect on the Croatian transport sector. Decrease in passenger transportation in all forms of transport is a continuation of the negative trend started in 2009. In 2012, there is 36.3% less passengers carried compared to 2008.

In addition to passengers, in 2012 there was also a decrease in the amount of goods carried (33%) compared to 2008. The amount of transported goods has decreased in all types of transportation. The biggest drop of 40.9% was registered in road transport, the most important mode of transport in goods transportation, but also the most important when it comes to employment.

Reducing the volume of passenger and cargo transportation has had a negative impact on employment trends. The average number of employees in transport and storage in 2013 has been reduced by 11,5% since 2008. In comparison, overall employment in the same period decreased by 9,5%. This means that in times of employment decline, the number of transport employees falls faster [3]. This trend resulted in reduction of the share of transport involved employees in total employment of the country, from 5.47 percent in 2008 to 5.35 percent in 2013. The highest decline in employment (cf. Table 2) has been recorded in storage and transport supporting activities (26,3%) and in air transport (20%).

	2008	2009	2010	2011	2012	2013
	-X	-X	-X	-X	-X	-X
Land and pipeline transport	26701	26353	25335	25185	25536	26656
Water transport	2851	3045	2991	2955	2956	2785
Air transport	1337	1346	1322	1320	1154	1069
Storage and transport supporting activities	24949	22802	21636	21295	20885	18405
Postal and courier activities	12652	11971	11327	11592	12044	11666
Total transport	68490	65517	62611	62347	62575	60581

### Table 2. The number of employed as legal entities

Source: Croatian National Bureau of Statistics

## 3. RESEARCH RESULTS AND DISCUSSION

The period from 1977 to 1987 is marked by a constant increase in transport related employment. After that, there has been a sharp decline in the number of transport employed (cf. graph 3).



Graph 3: Employment trends in Croatian transport system from 1977 to 2012

Source: Prepared by authors according to DZS, SLJH from various issues

In 1987, the transport system had a record 128,400 workers. The period after 1987 was characterized by a continuous decline in the number of employees (cf. Figure 1). It was only in 1997 that an increase in the number of employees in the Croatian transport system rised by 7.32% compared to the previous year. The following period was characterized by a continuation of the negative trend, and it is expected that this trend will continue despite significant investment in the development of the transport system [5]. The traffic is an intense capital activity that does not contribute much in new work force employment in the new economy. The sector's capital intensity is obvious in data on actual gross investments. Gross investments made in transport and storage sector in 2011 accounted for 6.1% of the total gross investments in Croatia, which is more than the share of the transport sector in GVA, but also more than the share in total employment. The fact that traffic is a capital intensive sector is clearly illustrated by the information that, for example, the Port of Rijeka in the mid eighties of the last century had 7,000 people employed, and in early 2015 only 768. In the transition period, the Port of Rijeka had a record in transport in 2008 with about 6 million carried cargo, which was last achieved in 1987 when they had seven times more workers. We could say with certainty that the era when the percentages of gross domestic product and transport employment were in direct functional dependence is long gone. This is also confirmed by the calculated coefficient of correlation between gross domestic product and the number of employees in the Croatian transport system for the period from 1983 to 2012 of only r = 0.21.

In the following, this research will explore the interdependence of the number of employees in the Croatian transportation system and dynamic natural indicators of transport activity in order to examine the possibility of stopping or at least slowing down the observed downward trend in transport related employment. Research results are based on the data on the number of employees in the Croatian transport system, the number of passenger kilometers and the number of net-tonne kilometers for the period from 1990 to 2012. Based on statistical data from Table 3 Pearson's correlation coefficient was calculated to determine if there is a connection between dynamic indicators of transport activity and the number of employees in the transport system. (cf. table 3).

**Table 3.** Correlation of natural indicators of transport activity and the numberof employees in the Croatian transport system

	Correlations (Transport.sta)					
	Marked correlations are significant at p < ,05000					
	N=23 (Casewise deletion of missing data)					
Variable	Means	Std.Dev.	tkm	pkm	ΒZ	
tkm	166889,0	23976,71	1,000000	-0,037403	0,450634	
pkm	6585,4	1228,18	-0,037403	1,000000	0,374239	
ΒZ	85389,5	11267,91	0,450634	0,374239	1,000000	

Data from Table 3 shows the statistically weak positive correlation between the movement of transport activity indicators and the number of employees in the Croatian transport system. Linear relationship between the number of passenger kilometers and the number of employees is lower (r = 0.37; p < 0.05) than the linear relationship between the number of realized tonne-kilometers and the number of employees (r = 0.45; p < 0.5). The results suggest that the number of employees in the Croatian transport system does not depend significantly on natural indicators of work. This means that the number of employees in the transport system is still above the required number of employees, or that the trend of reducing the number of employees in the transport sector will continue, regardless of the increase in transport activity natural indicators. To determine the appropriate regression model for prediction of the number of employees in the Croatian transport system up to 2025, a scatterplot was made based on logarithmic values of the variables (number of employees-NE and time-T).





Based on the diagram of dissipation a two-dimensional non-linear mathematical regression model form  $y_i = ax_i^b e_i$  was selected. The model is linearized by logarithmic transformation and in the concrete example the equation is:

 $\log y = 5,317 - 0,3081 \log x \ uz \ R = 0,916, F(1,24) = 126 \ p < 0,01.$  (1)

Graph 5 shows the comparison between the actual values and model predicted values of number of employees. A satisfactory suitability of model values and the actual values is fairly obvious.

Chart 5. The comparison between the results of the econometric model and the actual data for the number of employees in Croatian traffic system



Based on the given model (1), an estimate of number of employees in Croatian traffic system by 2025 was made (cf. Table 6).

Table 4. Estimate the total number of employees in traffic system by 2025

Year	Number of employees
NE <sub>2012</sub>	76085
NE <sub>2017</sub>	73512
NE <sub>2019</sub>	72017
NE <sub>2021</sub>	70643
NE <sub>2023</sub>	69373
NE <sub>2025</sub>	68196

## 4. CONCLUSION

Over the last three decades in Croatia there was more than 52,000 jobs lost in the transport sector. This negative trend is strengthened further by the economic crisis. But despite this, transport is still a significant source of employment. In the Philippines, about 76 000 people were employed within the transport system, or 5.4% of the total workforce. Further investment in the transport sector cannot and will not contribute to solving the unemployment problem in Croatia. In this paper a weak correlation between natural indicators of trans-

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port activity and the number of employees in transport was proven, as well as a limitation of the transport sector in the creation of new jobs. The main reason for this lies in the fact that the traffic is more capital and less labor intensive activity. The presented model could serve as a basis for calculating an estimated number of employees in the transport sector. Estimated number of employees in the Croatian transport sector has an slightly decrease of 10,4% by 2025.

### LITERATURE

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