EMPLOYMENT ANALYSIS IN THE LOGISTICS SECTOR OF THE REPUBLIC OF CROATIA

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Abstract

The logistics sector includes transport and storage activities. It is vital for Croatian economy and represents a significant source of employment. Croatian logistics sector employs more than 70 thousand people in 4 582 companies. This study will analyze and evaluate employment trends in the logistics sector of the Republic of Croatia as a whole, and then its most important parts, with special emphasis on logistic companies dealing with storage and accompanying transport activities. Statistical analysis of the collected secondary data for the period from 2000 to 2015 was made for the purpose of researching the employment trend in the logistics sector, and is based on methods of descriptive statistics, regression and correlation analysis.

Key words: employment, logistics sector, logistics companies, Republic of Croatia

1. INTRODUCTION

The logistics sector, with its two core subsectors - transport and storage activities - represents a significant source of employment. However, in spite of a favourable geo-political position and comparative advantages of Croatian logistics system, employment in the logistics sector of the Republic of Croatia shows a continuous tendency of decline (Pupavac & Drašković, 2015). The problem of decline in employment and possible ways of solving it are among fundamental problems and challenges faced by managers of macro- and micro- logistics systems. Loss of positions in the macro-logistics system of the Republic of Croatia appears as a result of the increasing capital intensity of this economic sector and of the great financial crisis, of which adverse effects are still felt. Low economic growth rates in the post-crisis period are not conducive to faster recovery and employment growth in the logistics sector, due to derivation of demand in logistics (Pupavac & Zelenika, 2004). A significant part of this study is the structure of employment in the logistics sector and factors that directly and significantly influence employment in the logistics sector of the Republic of Croatia.

In accordance with the identified problem and subject of research, the main hypothesis has been set as follows: total employment in the logistics sector, and employment in its two subsectors (transport and storage activities), are directly and

essentially dependent on the growth of gross domestic product, the growth of international trade and growth of the volume of transport (in tons of goods carried). The aim of the research is to explore the role and importance of each of these factors in order to contribute to the possibilities of increasing employment within the logistics sector of the Republic of Croatia.

In scientific literature, it is often the logistics sector (Rodrigue, 2017: Pupavac, 2009, Zelenika & Pupavac, 2008, Božić, Rakić & Aćimović, 2001) or some part of it (Pupavac, 2017, Malić, Badanjak, Rajsman, 2005) that is deemed important for employment in general terms, but there is no concrete applied research that would be of practical relevance for decision-makers in macro- and micro- systems. To fulfill the purpose of the research, and to prove the hypothesis set up in various combinations, several scientific methods were applied, mostly the classification method, the method of descriptive statistics and the statistical method of regression and correlation analysis.

Research results in this study are organized in five logically related parts. After introduction, the logistics sector is analyzed in the second part, followed by analysis of the structure of employment in the logistics sector of the Republic of Croatia, with a further elaboration on problems of research at the end. The third part encompasses secondary data that was used as the subject of analysis, and the presentation of scientific methodology used. After the results of the research and discussion in the fourth part of the study, the conclusion is reached in the fifth.

2. THEORETICAL BACKGROUND AND RESERCH PROBLEM

Logistics is a set of services including the planning, organisation, management, execution and monitoring of a company's entire material, goods and information flows (from purchasing, production and warehousing, to added value services, distribution and reverse logistics). The logistics sector is included within divisions 49 to 53. From "Division" 49 Land transport and transport via pipelines: 49.2 – Freight rail transport 49.4 – Freight transport by road and removal services 49.5 – Transport via pipeline From "Division" 50 Water transport: 50.2 – Sea and coastal freight water transport 50.4 – Inland freight water transport From "Division" 51 Air transport: 51.2 – Freight air transport and space transport From "Division" 52 Warehousing and support activities for transportation: 52.1 – Warehousing and storage 52.2 – Support activities for transportation From "Division" 53 Postal and courier activities: 53.2 – Other postal and courier activities.

The structure of employment in the logistics sector of the Republic of Croatia is shown in figure 1.

Figure 1. Employment Structure in the Logistic Sector of the Republic of Croatia, 2015
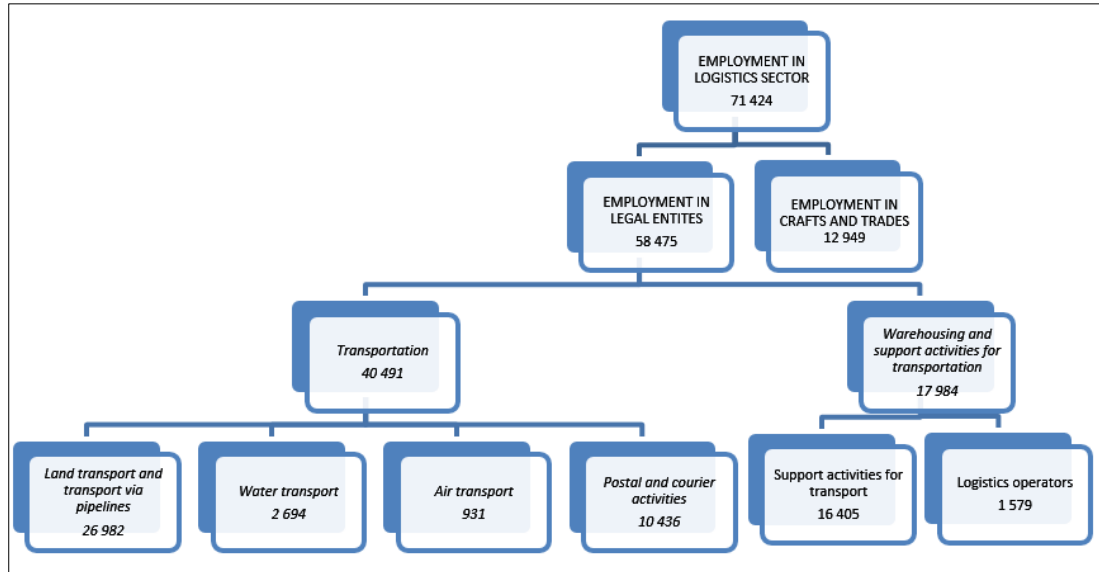
The logistics sub-sector of storage activities in the Republic of Croatia covers 30.75% of total employment in the logistics sector. The sub-sector of storage activities in EU-28 employs 25.74% of the total employment in the logistics sector. The top three logistic operators in Croatia, with regards to the number of employees (Ricardo, Intereuropa and Ralu Logistics) cover more than half the share of the number of employees among logistic operators (see Table 1).

Table 1. Ten leading logistic operators in Croatia, 2015

Logistics operators	number of employees	Revenues (mil.HRK)	Net profit (mil.HRK)	Export (mil.HRK)	Investments (mil. HRK)
Ricardo d.o.o.	295	209,1	16,8	14,4	44,5
Intereuropa d.o.o.	283	161,8	-5,6	27,7	6,8
Ralu Logistika d.o.o.	233	145,9	-7,2	89,8	133,6
Zagrebšped d.o.o.	203	69,7	7,7	12,4	0,3
Lagermax AED Croatia d.o.o.	197	189,4	-3,9	44,6	5,7
Kuehne & Nagel d.o.o.	103	153,7	-3,1	23,1	0,4
Primacošped d.o.o.	98	58,6	1,3	13,9	8,9
Gebruder Weiss d.o.o.	90	108,1	1,7	0	0
Cargo-Partner d.o.o.	53	84,5	1,7	18	0,2
DSV Hrvatska d.o.o.	24	57,6	-0,1	14,9	0

Source: Prepared by author from Kovačić, B. (2016). Logistics – Leaders of the Sector: Ten leading logistic companies, available at www.jatrgovac.com, accessed on 10/01/2018.

Based on data shown in Table 1, a brief descriptive analysis of the top 10 Croatian logistics operators was conducted (see Table 2).

Table 2. Descriptive statistics for 10 leading logistic operators in the Republic of Croatia

	number of employees	Revenues (mil.HRK)	Net profit (mil.HRK)	Export (mil.HRK)	Investments (mil. HRK)
Mean	**157,90**	**123,84**	**0,93**	**25,88**	**20,04**
Standard Error	30,51	17,56	2,23	8,00	13,32
Median	150,00	127,00	0,60	16,45	3,05
Standard Deviation	96,49	55,53	7,06	25,29	42,13
Sample Variance	9310,54	3084,12	49,82	639,63	1774,60
Kurtosis	-1,51	-1,52	2,04	4,92	7,27
Skewness	0,13	0,16	1,31	2,09	2,66
Range	271,00	151,50	24,00	89,80	133,60
Minimum	24,00	57,60	-7,20	0,00	0,00
Maximum	295,00	209,10	16,80	89,80	133,60
Sum	**1579,00**	**1238,40**	**9,30**	**258,80**	**200,40**

Source: Author's calculations

Based on data in Table 2, the average Croatian logistic operator employs 158 employees, their average annual revenue is HRK 123,84 million, with HRK 0.93 million in profits, exports worth HRK 25.88 million and investments in fixed assets HRK 20.04 million.

The Republic of Croatia has entered a vicious circle of unemployment and dislocation (Jurčić, 2017, 673). The trend of emigration is increasing, which turns human capital into scarce resource and limiting factor of domestic production growth. The number of employed persons in the Republic of Croatia in 2015 has decreased by about 200,000 compared to 2008 (Pupavac, 2017). In the same period, there was also a negative relation of immigration with respect to emigration. The average number of emigrants in 2015 and 2016 has exceeded 30,000.

Negative economic trends had a negative effect on Croatian logistics sector. Reduced volume of transport operations measured by static and dynamic indicators, as a result of economic crisis, negatively affected employment trends in the logistics sector as well. The average number of employees in the logistics sector in 2014 decreased by 12.25% compared to 2008. In comparison, the total employment decreased by 13.7% in the same period, and the real gross domestic product by 12.02% (Pupavac & Baković, 2017).

In 2014, European logistics market was worth 960 billion euros, and German logistics market made up the highest share, with a market size of €235 billion. Croatia, with a share of €2,2 billion, is doing better than only two EU-28 countries: Cyprus

(0,7 bn) and Malta (0,3 bn). The logistics sector is a significant contributor to GDP and employment in Europe, both directly by creating jobs and adding value, but also by enabling other economic sectors to perform efficiently.

3. DATA AND RESEARCH METHODOLOGY

Data abouth employment in logistics sector (ELS), employment in transport sector (ETS) and number of employed in the warehousing sector (EWS) are from the Croatian Bureau of Statistics while the data abouth GDP in constant prices are the results of author calculations (cf. table 3).

Table 3. Movement of GDP, employment in logistics sector and logistics subsectors from 2000 to 2015.

Year	ELS	ETS	EWS	GDP
2000.	67018	42147	24871	234589,65
2001.	66258	42350	23908	243585,96
2002.	64985	40780	24205	256841,78
2003.	65459	41371	24088	269575,02
2004.	65656	40679	24977	281031,02
2005.	65868	41275	24593	292859,83
2006.	67415	64989	2426	306739,80
2007.	67844	43075	24769	323522,76
2008.	**68490**	**43541**	**24949**	**331155,41**
2009.	65517	42715	22802	308305,68
2010.	62610	40974	21636	301214,65
2011.	62347	41052	21295	301214,65
2012.	62575	41690	20885	295190,36
2013.	60581	42176	18405	292238,45
2014.	57690	41123	16567	290777,26
2015.	58475	40491	17984	295430,00

Source: Statistical Yearbook of the Republic of Croatia 2015, (online data at www.dzs.hr , PC-Axis) (access: 5/09/2017)

Considering the lack of correlation between employment trends in Croatian logistics sector and GDP (r = -0,019, p <0,05), the weak positive correlation between employment trends in the logistics sub-sector of transport and GDP (r = 0.22, p <0.05), and a weak negative correlation between employment trends in the logistics sub-sector of storage activities and GDP (-0.24; p <0.05), data collection was also extended to data on international exchange trends and carried goods measured in tons (cf. table 4). This data was collected for a shorter period of time from 2006 to 2015.

Table 4. Movement of GDP, employment in logistics sector and logistics subsectors, international trade and goods carried from 2006 to 2015.

Year	ELS	ETS	EWS	GDP Constant price in HRK	IT Mil.€	Goods 000 t
2006.	67415	43169	24246	306739,80	25357	164730
2007.	67844	43075	24769	323522,76	27887	173661
2008.	68490	43541	24949	331155,41	30402	171616
2009.	65517	42715	22802	308305,68	22749	150455
2010.	62610	40974	21636	301214,65	24042	134985
2011.	62347	41052	21295	301214,65	25863	129746
2012.	62575	41690	20885	295190,36	25842	114979
2013.	60581	42176	18405	292238,45	26116	116348
2014.	57690	41123	16567	290777,26	27498	109168
2015.	58475	40491	17984	295430,00	30011	112613

Source: Statistical Yearbook of the Republic of Croatia 2015., (online data at www.dzs.hr , PC-Axis) (access: 5/09/2017)

In order to make an objective forecast the number of employees in logistics sector in Croatia, a theoretical model should be defined first. This study investigates the dependance of the number of employees in logistics sector (ELS) and in logistics subsectors (ETS & EWS) as the dependent variables and gross domestic product (GDP), international trade (IT) and goods carried (G) as the independent variables. Accordingly, a models to estimate the number of employees in logistics sector and logistics subsectors can be written as a function

$$ELS, ETS, EWS = f(GDP, IT, G) \tag{1}$$

Where:

ELS, ETS, EWS – number of employees in logistics sector and logistics subsectors,

GDP – gross domestic product,

IT – international trade,

G – goods carried,

t – time (t=0,1,...)

Variables ELS, ETS, EWS are a dependent variables, while GDP, IT and G are independent or explanatory variables.

Supposing that the number of employees in logistics sector and logistics subsectors depends on the GDP, international trade, and goods, its linear form would be as following:

$$ELS, ETS, EWS = b_0 + b_1 GDP + b_2 I + b_3 G \tag{2}$$

$b_i - (i=0,1,2,3) = $ model parameters

4. RESEARCH RESULTS AND DISCUSION

Based on data given in Table 4, correlation analysis was conducted (cf. Table 5). It shows a strong and positve interdependence between the number of employed in the logistics sector, and GDP (r=0,87; p<0,05) and Goods caried (r=0,95; p<0,05), between the number of employed in the logistics subsector transport and GDP (r=0,76; p<0,05) and Goods carried (r=0,84; p<0,05), and between the number of employed in the logistics subsector warehousing and GDP (r=0,8; p<0,056) and Goods caried (r=0,94; p<0,05).

Table 5. Interdependence of the number of employed in the logistics sector and logistics subsectors, GDP, international trade and goods

Correlations (Os_2018) Marked correlations are significant at p < ,05000 N=10 (Casewise deletion of missing data)							
	Means	Std.Dev.	ELS	ETS	EWS	GDP	IT	Goods
ELS	63354,4	3850,81	1,000000	0,875812	0,984211	0,878541	-0,062202	0,957370
ETS	42000,6	1081,81	0,875812	1,000000	0,776554	0,763774	0,024347	0,840419
EWS	21353,8	2949,92	0,984211	0,776554	1,000000	0,866747	-0,090126	0,941542
GDP	304578,9	13420,53	0,878541	0,763774	0,866747	1,000000	0,304029	0,919375
IT	26576,7	2422,53	-0,062202	0,024347	-0,090126	0,304029	1,000000	0,039153
Goods	137830,1	25435,87	0,957370	0,840419	0,941542	0,919375	0,039153	1,000000

Source: Author's calculations

Since there was a strong and positive interdependence between the number of employed in the logistics sector and logistics subsectors and GDP and goods caried, regression analysis was also conducted using data from Table 5. While evaluating the value of the parameters of the function, which has a form (2), we could not find conclusive regression models. After many trial and errors procedures, simplier models has been developed for the forecast the number of employees in the logistics sectors and logistics subsectors of the Republic of Croatia.

$$\text{ELS, ETS, EWS} = f(G) \tag{3}$$

Regression analysis between the number of employed in the logistisc sector, logistics subsectors and goods caried (G) has resulted with the following models of linear regression:

$$\textbf{ELS = 43 377,45 + 0,14G} \ (\text{R=0,95; F(1,8)=87,87; p<0,01}) \tag{4}$$

$$\textbf{ETS = 37 074 + 0,04G} \ (\text{R=0,84; F(1,8)=19,23; p<0,01}) \tag{5}$$

$$\textbf{EWS = 6 303,407 + 0,109G} \ (\text{R=0,94; F(1,82)=62,485; p<0,01}) \tag{6}$$

It may be right to assume that Croatian economy will show a positive growth trend in the forthcoming period, ie that the capacity utilization of the logistics system will increase. If we are to assume that the transport of goods in the future would reach pre-recession values and increase at an average annual rate of 6%, and apply the mathematical model (4), the conclusion would be that employment in the logistics

system of the Republic of Croatia could reach 2008 employment heights as soon as 2024 (cf. table 6).

Table 6. Estimates for employment in the logistics sector of the Republic of Croatia 2024

Predicting Values for (Os_2018) variable: ELS			
	b-Weight	**Value**	**b-Weight - * Value**
Goods	0,144939	179488,0	26014,80
Intercept			43377,45
Predicted			69392,25
-95,0%CL			67675,78
+95,0%CL			71108,73

Source: Author's calculations

There is a 95% reliability that the number of employees in Croatian logistics system in 2024 would move within the range of 67 676 - 71 109 employees.

Estimates for employment in two basic logistics subsectors were calculated using mathematical models (5) and (6). Estimates for employment in the logistics subsector of transport is given in Table 7, and for employment in subsector of storage in Table 8.

Table 7. Estimates for employment in the logistics transport subsector in 2024

Predicting Values for (Os_2018) variable: ETS			
	b-Weight	**Value**	**b-Weight - * Value**
Goods	0,035744	179488,0	6415,56
Intercept			37074,05
Predicted			43489,61
-95,0%CL			42584,93
+95,0%CL			44394,28

Source: Author's calculations

There is a 95% reliability that the number of employees in Croatian logistics subsector of transport in 2024 would move within the range of 42 585 - 44 394 employees.

Table 8. Estimates for employment in the logistics storage subsector in 2024

Predicting Values for (Os_2018) variable: EWS			
	b-Weight	**Value**	**b-Weight - * Value**
Goods	0,109195	179488,0	19599,24
Intercept			6303,41
Predicted			25902,65
-95,0%CL			24369,09
+95,0%CL			27436,21

Source: Author's calculations

There is a 95% reliability that the number of employees in Croatian logistics

subsector of storage activities in 2024 would be within the range of 24 369 - 27 436 employees.

5. CONCLUSION

There are more than 70,000 people directly employed in the logistics sector of the Republic of Croatia. Legal entities employ 58,475 people, and trades 12,949. That goes to show the importance of the logistics sector for self-employment, ie the openness of this sector for numerous entrepreneurial initiatives. Logistic operators within the logistics subsystem employ only 1 579 people, so there is certainly space for more employment, given that some of the leading logistic operators have doubled the number of employees over the past five years, while others show slight growth or stable number of employees. The only two analyzed logistic operators with a negative employment trend are Intereuropa and Zagrebšped.

Considering that no statistically strong link between employment trends in the logistics sector and gross domestic product has been established in the period from 2000 to 2015, data collection has also been extended to trends of international trade and carried goods. Based on data collected for the period from 2006 to 2015, the application of statistical correlation analysis established the existence of a statistically strong and positive link between the employment trends in the logistics sector on the one hand and the gross domestic product trends and goods carried on the other. Subsequently, the method of regression analysis was used for developing conclusive mathematical models for estimating the total number of employees in the logistics sector, ie its main subsectors. Assuming that freight transport will reach pre-recession values in the forthcoming period and increase at an average annual rate of 6%, the employment in the logistics sector of the Republic of Croatia could reach 2008 trends by 2024. The main disadvantage of this study is the fact that the subject of research relates only to employment within the traditional logistics sector. The main limitations of this study stems from the fact that employment in logistics sector is seen as a dependent variable of only one independent variable, goods carried. In the future researches in the model for estimate the numbers of employees in logisticsc sector should be included the greater number of variables.

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