CROATIAN COMPETITIVENESS WITHIN EUROPEAN LOGISTICS SPACE

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Scientific paper

Abstract

World trade between countries is operated within a network of increasingly global logistics operators. But the ease with which traders can use this network to connect with international markets, by large depends on country-specific factors such as trade procedures, transport and telecommunications infrastructure, and the domestic market for support services. The Logistics Performance Index (LPI) and its component indicators provide a unique global point of reference to better understand these key dimensions of logistics performance. The first worldwide LPI was developed by the World Bank to provide a better assessment about how respective countries rank in the managerial and physical effectiveness of their logistics. At the global level in 2010 Croatia ranks 74th, behind developed EU countries, but also behind EU Balkan countries Bulgaria, Romania and Greece. The initial hypothesis of this study is that improving LPI to acceptable levels (LPI > 3.5) would significantly improve trade expansion, ability to attract foreign direct investments, and economic growth. Research results are based on primary and secondary research methods. Findings of this study should provide a realistic way to improve national competitiveness in European and global logistics market.

Keywords: Logistics Performance Index, competitiveness, logistics market

1. INTRODUCTION

Logistics encompasses an array of essential activities — from transport, warehousing, cargo consolidation, and border clearance to in-country distribution and payment systems — involving a variety of public and private agents. A competitive network of global logistics is the backbone of international trade. Unfortunately, many

developing countries have not yet benefited from the productivity gains of logistics modernization and internationalization implemented over the last 20 years by advanced economies.

Improving logistics performance has become an important development policy objective in recent years because logistics have a major impact on economic activity. Data on 2007 and 2012 LPIs indicates that, for countries at the same level of per capita income, those with the best logistics performance experience additional growth: 1 increase in gross domestic product and 2 increase in trade (www.worldbank.org, 2012). These findings are especially relevant today, as developing countries need to invest in better trade logistics to boost recovery from the current economic crisis and emerge in a stronger and more competitive position. When observing competitiveness on a global level, it is clear that Croatia cannot be considered competitive. Croatia is one of lowest ranging competitive countries in the European Union (*The Global Competitiveness Report* 2012–20013). Accordingly, this research will explore the interdependence between Logistics Performance Index (LPI) and Global Competitiveness Index (GCI). To achieve the intended goal, statistical methods of regression and correlation analysis were used.

2. THEORETICAL BACKGROUND AND RESERCH PROBLEM

Logistics is a business process that involves the management and movement of goods and services from the point of origin to the point of consumption. It is a core part of SCM and includes various services such as freight forwarding, multimodal transport by means of air, sea, road and rail. It also provides customs brokerage, warehousing and storage, tracking, and tracing of freight goods services. The logistics industry is more important to the European economy and its citizens than it seems to be to the general public. The share of the logistics industry in Europe is close to 14% of GDP (Freight Transport Logistics Action Plan" – 2007). In 2006 the total turnover of the logistics sector grew to €800- €900 billion. Approximately 40% of the total turnover is accumulated by logistics service corporations, while the other 60% is made by internal activities of companies from other economic sectors (Zelenika, R.& Pupavac, D., 2008). In addition to this, there is a significant shift towards the outsourcing of logistics activities. The development and provision of advanced logistics services varies from country to country. In developing countries, the market for these services is usually small, which can be a major deterrent for companies wishing to establish a market presence. About half of the logistics industry is concentrated in only three countries: Germany, the United Kingdom and France (cf. figure 1).

Figure 1. European logistics location and clusters

Source: Rebitzer, W.D. The European Logistics Market, www.clt.org.me [accessed on the 12/06/2008]

Core economies benefit more from the effects of European integration than peripheral economies. Germany in particular is continuing to position itself as a logistics platform in the heart of Europe. Here an evident issue is imposed: how can peripheral economies, such as Croatian, reap greater benefits from the integration of the European logistics market? The answer to this could be found by exploring the factors which determine the efficiency of transport and logistics system of a particular country.

The first worldwide Logistics Performance Index (LPI) was developed to provide a better assessment of countries' ranking in managerial and physical effectiveness of their logistics. On a global level, a gradual convergence of the LPI is observed. Mostly, it is the outcome of diffusion of transport infrastructures and services, a process favored by the growing presence of global freight carriers, such as maritime shipping companies, global terminal operators, air freight and even third party logistics providers. The LPI is a composite index based on proxy measures for transport and information infrastructure, supply chain management (SCM) and trade facilitation capabilities, which are calculated based on a world survey of international freight forwarders and express carriers. The LPI is based on six underlying factors of logistics performance [4]: (1) efficiency of the clearance process by customs and other border agencies; (2) quality of transport and information technology infrastructure for logistics; (3) ease and affordability of arranging international shipments; (4) competence and quality of logistics services; (5) ability to track and trace international shipments; and (6) timeliness of shipments in reaching destination. LPI values range from 1 (worst) to 5 (best) and show that building the capacity to connect firms, suppliers and consumers is key in a world where predictability and reliability are

becoming even more important than costs. A value of less than 3.0 reflects an array of problems within a nation's freight distribution system causing undue delays and additional costs. For instance, a difference of one point in the LPI is related to two to four additional days of port - hinterland access and a 25% higher physical inspection rate at customs (people.hofstra.edu). High-income OECD countries lead in logistics performances, but developing countries are showing gradual and continuous improvements. They benefit from economies of scale and scope, innovation and technological change in logistics services. On average, the LPI is a good proxy for involvement of each country in global value chains and the friction of freight flows and there is a significant concordance with the location of the world largest container ports. According to the LPI, Germany and Singapore, major global transport and logistics hubs, rank first (Connecting to Compete 2010). At the other extreme are low-income countries, particularly those landlocked in Africa and Central Asia. All developed countries turned out to be top performers. There are also significant differences among developing countries with similar incomes. China, for instance, ranks 27th, while countries in higher income groups, such as several oil producers, tend to perform below what would be expected from their income levels. Developing countries with higher trade performances performed better than those with similar incomes.

The logistics market in Croatia and throughout the Southern and Eastern Europe remains underdeveloped. Croatia currently suffers from high unemployment that has driven down salaries which are now among the lowest in Europe. 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 strategic location of Croatia, EU membership and being a maritime entry route for cargo from the Far East to the North Adriatic Ports, creates opportunities for development in this sector. The development of the railway network to strengthen the existing high quality motorway network could help Croatia become both an entry and exit point for goods coming in and out of the EU. The government is focusing on improving the rail network to enable the Port of Rijeka and the neighbouring ports in Koper, Venice and Trieste to be more competitive to the established ports in northern Europe, such as Le Havre and Hamburg. There is €3 billion of planned investments in the Rijeka rail route, 85% of which could be drawn from EU fundings (www.aik-invest.hr).

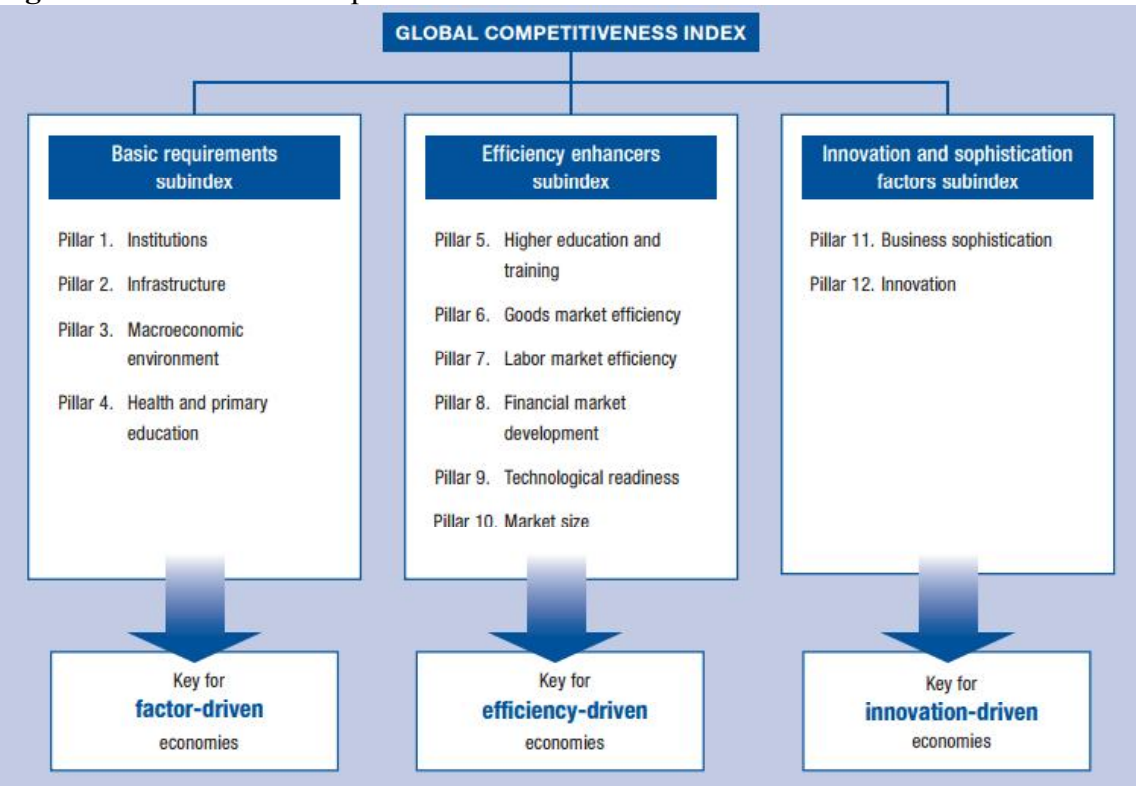
3. DATA AND RESEARCH METHODOLOGY

Data is obtained from the Logistics Performance Index surveys conducted by the World Bank in partnership with academic and international institutions and private companies and individuals engaged in international logistics. Round of surveys in 2009 covered more than 5,000 country assessments by nearly 1,000 international

freight forwarders. Respondents evaluate eight markets on six core dimensions on a scale from 1 (worst) to 5 (best). The markets are chosen based on the most important export and import markets of the respondent's country, random selection, and, for landlocked countries, neighboring countries that connect them with international markets. Scores for the six areas are averaged across all respondents and aggregated to a single score using principal components analysis.

Second source of data is *The Global Competitiveness Report* 2012–20013. The GCI includes an average of many different components, each measuring a different aspect of competitiveness. These components are grouped into 12 pillars of competitiveness (see Figure 2).

Figure 2. The Global Competitiveness Index framework



Source: *The Global Competitiveness Report* 2014–20015, [accessed on the 19/05/2015]

Croatia, and another 20 states are in transition from stage 2 to stage 3, from efficiency-driven economies to innovation-driven economies. The importance of pillar 2 is described as follows (*The Global Competitiveness Report* 2014–20015): Extensive and efficient infrastructure is critical for ensuring the effective functioning of the economy, as it is an important factor in determining the location of economic activity and the kinds of activities or sectors that can develop in a particular instance. Well-developed infrastructure reduces the effect of distance between regions, integrating the national market and connecting it at low cost to markets in other countries and regions. In addition, the quality and extensiveness of infrastructure networks significantly impact economic growth and reduce income inequalities and poverty in a variety of ways. A well-developed transport and communications infrastructure network is a prerequisite for the access of less-developed communities

to core economic activities and services. Effective modes of transport—including quality roads, railroads, ports, and air transport—enable entrepreneurs to get their goods and services to market in a secure and timely manner and facilitate the movement of workers to the most suitable jobs. Economies also depend on electricity supplies that are free of interruptions and shortages so that businesses and factories can work unimpeded. Finally, a solid and extensive telecommunications network allows for a rapid and free flow of information, which increases overall economic efficiency by helping to ensure that businesses can communicate and decisions are made by economic actors taking into account all available relevant information.

This study applied scientific methods common in laboratory work (analysis, synthesis, description, explanation, comparison, induction, deduction), and the main findings are based on statistical methods of regression and correlation analysis. The numerical calculations are performed using *Statistica* software.

4. RESEARCH RESULTS

International trade operates through a network of increasingly global logistics operators who deal with a number of functions in the international supply chains: maritime shipping, air freight, land transport, warehousing, and third party logistics. Globalization has made the demand for logistics services more sophisticated, pushing for integration and diversification of services to help operate uninterrupted supply chains. Countries eager to improve trade logistics may need to reform and modernize border management institutions, change transport regulation policy, and, in some cases, invest significantly in trade-related infrastructure. The key issue — highlighted by the 2007 LPI — is that a trade supply chain is as strong as its weakest link. Determining where the weakest links are and addressing them through targeted development interventions has therefore become a major element of the trade facilitation and logistics agenda. Until recently, policy-makers and private sector stakeholders have not had the data they needed to identify trade constraints or create constituencies for reform. The LPI fills that gap.

Singapore receive the highest ratings in the 2007 and 2012 LPI with scores over 4.13, while Somalia ranks last with a score of 1.34 (see Table 1)

Table 1. LPI ranking and scores selected states, 2007-2012

Economy	**Rank**		**Score**			**% of highest performer**		
	2010	**2012**	**2007**	**2010**	**2012**	**2007**	**2010**	**2012**
Germany	1	4	4,1	4,11	4,03	97,62	100	97,58
Singapore	2	1	4,2	4,09	4,13	100	99,2	100
Sweden	3	12	4,1	4,08	3,85	97,62	98,8	93,22
Netherlands	4	5	4,2	4,07	4,02	100	98,5	97,34

United Kingdom	8	10	4	3,95	3,9	95,24	94,9	94,43
Finland	12	3	3,8	3,89	4,05	90,48	92,6	98,06
France	17	12	3,8	3,84	3,85	90,48	91,3	93,22
Italy	22	22	3,6	3,64	3,67	85,71	84,9	88,86
Spain	25	19	3,5	3,63	3,7	83,33	84,3	89,59
Hungary	52	39	3,1	2,99	3,17	73,81	63,8	76,76
Greece	54	69	3,4	2,96	2,83	80,95	62,8	68,52
Slovenia	57	34	3,1	2,87	3,29	73,81	60,2	79,66
Romania	59	53	2,9	2,84	3	69,05	59,1	72,64
Bulgaria	63	36	2,9	2,83	3,21	69,05	58,8	77,72
Macedonia, FYR	73	100	2,4	2,77	2,56	57,14	56,9	61,99
Croatia	74	42	2,71	2,77	3,16	64,52	56,8	76,51
Serbia	83	75	2,3	2,69	2,8	54,76	54,1	67,8
Bosnia and Herzegovina	87	55	2,5	2,66	2,99	59,52	53,4	72,4
Albania	119	78	2,1	2,46	2,77	50	46,8	67,07
Montenegro	121	121	2,4	2,43	2,45	57,14	45,9	59,32
Somalia	155	162	2,2	1,34	1,34	52,38	10,9	32,45

Source: Author prepared according to: Connecting to Compete 2007,2010, 2012, www.worldbank.org [accessed on the 19/05/2015]

Data from Table 1 show that Croatia ranked 74th in 2010 and apart from the EU countries ranking better than Croatia, Balkan countries with EU membership ranked better as well (Bulgaria, Romania and Greece). In just two years, Croatian progress is evident and significant – it is listed as 42nd, with the LPI above 3. To find out what were the improvements and which should be made in the future for an even better standing, it is necessary to explore the factors which form the LPI (see Table 2).

Table 2. Factors of logistics perfomance for Croatia 2007-2012.

Factors of logistics performance	**2007**	**2010**	**2012**	**2012/2007**
Efficiency of customs clearance process	2,36	2,62	3,06	+0,7
Quality of trade and transport-related infrastructure	2,5	2,36	3,35	+0,85
Ease of arranging competitively priced shipments	2,69	2,97	2,95	+0,26
Competence and quality of logistics services	2,83	2,53	2,92	+0,09
Frequency with which shipments reach consignee within scheduled or expected time	3,45	3,22	3,54	+0,09

Ability to track and trace consignments	2,46	2,82	3,2	+0,74
LPI: Overall	2,71	2,77	3,16	+0,45

Source: Prepared by the author according to http://www.worldbank.org/lpi [access May 19, 2015]

Data from Table 2 show that the greatest improvements were made in the quality of trade and transport-related infrastructure (+0.85), ability to track and trace consignments (+0.74) and efficiency of customs clearance process (+0.7). Unfortunately, this positive trend was broken, so that in 2014 Croatia was ranked as 55th (LPI=3.05), again behind Slovenia, Greece, Romania and Bulgaria [2014]. The afore mentioned confirms that stagnation in a competitive environment actually means a quick loss of competitiveness. In the following, this research will explore the interdependence of GCI and LPI in order to examine positive or negative correlation. Research results are based on the data from table 3.

Table 3. GCI and LPI score of chosen countries

Country	**Score GCI**	**Score LPI**
Germany	5,48	4,03
Singapore	5,67	4,13
Sweden	5,53	3,85
Netherlands	5,50	4,02
United Kingdom	5,45	3,90
Finland	5,55	4,05
France	5,11	3,85
Italy	4,46	3,67
Spain	4,60	3,70
Hungary	4,30	3,17
Greece	3,86	2,83
Slovenia	4,34	3,29
Romania	4,07	3,00
Bulgaria	4,27	3,21
Macedonia, FYR	4,04	2,56
Croatia	4,04	3,16
Serbia	3,87	2,80
Bosnia and Herzegovina	3,93	2,99
Albania	3,91	2,77

Montenegro	4,14	2,45
Somalia	2,50	1,34

Source: Prepared by the author according to *The Global Competitiveness Report* 2012–20013 & Connecting to Compete from 2012.

Data from Table 4 shows the statistically strong and positive correlation between the GCI and LPI.

Table 4. Correlations of GCI and LPI

	Correlations (Spreadsheet1) Marked correlations are significant at p < ,05(N=21 (Casewise deletion of missing data)			
Variable	Means	Std.Dev.	GCI	LPI
GCI	4,505714	0,809750	1,000000	0,943159
LPI	3,274762	0,694461	0,943159	1,000000

Source: Author's calculations

Data in Table 4 confirm the statistically firm correlation between the GCI and LPI (r=0,943). After conducting correlation analysis, a one-dimensional model of linear regression was chosen in the following form:

$$Y = a + bX + u \qquad (1)$$

Where:
X – independent variable,
Y – dependent variable,
u – deviation from the functional relation,
a, b – parameters.

The LPI was selected as an independent variable, while the parameters were evaluated based on statistical data from Table 3. In assessing the value of parameters in function (1) the method of regression analysis was applied, while the numerical computation was performed by *Statistica* software (cf. Table 5).

Table 5. Results of regression analysis

	Regression Summary for Dependent Variable: GCI (LPI.sta R= ,94315947 R2= ,88954979 Adjusted R2= ,88373662 F(1,19)=153,02 p<,00000 Std.Error of estimate: ,27610					
N=21	Beta	Std.Err. of Beta	B	Std.Err. of B	t(19)	p-level
Intercept			0,904341	0,297301	3,041845	0,006705
LPI	0,943159	0,076244	1,099736	0,088902	12,37026	0,000000

Source: Author's calculations

Regression analysis of the correlation between GCI and the LPI gives the following model of simple linear regression:

$$\mathbf{AP = 0{,}904341 + 1{,}099736\ LPI} \quad (2)$$

Results of regression analysis (cf. Table 4) indicate that there is a statistically significant correlation between GCI and the LPI ($R=0{,}943$; $F(1,19)=153{,}02$; $p<0{,}01$). Correlation between the GCI and the LPI is positive, indicating that the increase in GCI is linked with an increase in LPI. An increase in LPI of 1 leads to an increase in GCI of about 1,0997 in the first year ($B=1{,}099$; $SE=0{,}0889$; $p<0{,}01$). An increase in GCI with 88,37 % of variance can be explained by LPI. If Croatia would raise its LPI in the long term for one index point (from 3,05 to 4,05), it would be ranked among the most competitive countries in the world with the GCI of 5,36. In the short term, it is definitely possible to raise the LPI for 0,5 index points, which would result with the GCI of 4,8 which would put Croatia on a very good 34th place. This would mean a shift of 45 places compared to 2014.

5. CONCLUSION

Increased freight flows have been a fundamental component of contemporary changes in economic systems on a global, regional and local scale. These changes are not merely quantitative with more freight in circulation, but also structural and operational. The application of logistics enables a greater efficiency of movement with an appropriate choice of modes, terminals, routes and scheduling. Countries eager to improve trade logistics may need to reform and modernize border management institutions, change transport regulation policy, and, in some cases, invest significantly in trade-related infrastructure. Logistics advancement will provide the competitive advantage leading to customer service excellence and profits increase.

The perception of individual countries in the setting and management of supply chains can be assessed, as is done by application of the Logistic Performance Index. The LPI is a **composite index** based on proxy measures for transport and information infrastructure, supply chain management (SCM) and trade facilitation capabilities, which are calculated based on a world survey of international freight forwarders and express carriers. LPI values range from 1 (worst) to 5 (best). A value of less than 3.0 reflects an array of problems within a national freight distribution system. In 2012, Croatia raised its LPI above 3 thanks to improvements made in the quality of trade and transport-related infrastructure (+0,85), ability to track and trace consignments (+0,74) and efficiency of customs clearance process (+0,7). This success lasted until 2014, when Croatia dropped to a 55th place in the world ranking.

This study confirmed the statistically significant correlation between the GCI and the LPI. This correlation is strong and positive, suggesting that an increase in LPI leads to an increase in GCI. Accordingly, it can be concluded that if Croatia improves its competitiveness in the European logistics market, it would directly and significantly contribute to an improvement of its competitiveness in the global market.

With the LPI above 3,5, Croatia would be among the highly competitive national economies of the world.

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