The Moderator Effect of Global Competitiveness Index on Dimensions of Logistics Performance Index

Murat Çemberci Mustafa Emre Civelek Neslihan Canbolat

World Conference on Technology, Innovation and Entrepreneurship 2015

Abstract

- The most important assessment tool that demonstrates the comparative situation of countries is the Logistics Performance Index (LPI) created by the World Bank.
- This index which has been prepared as a questionnaire consists of six dimensions.
- These dimensions are as follows:

- Customs: The efficiency of customs and customs clearance processes

- Infrastructure: The quality of trade and transport related to infrastructure.

- International Transportation: The capability of arranging competitively priced shipments.

- Logistics Competence: The competence and quality of logistics Services.

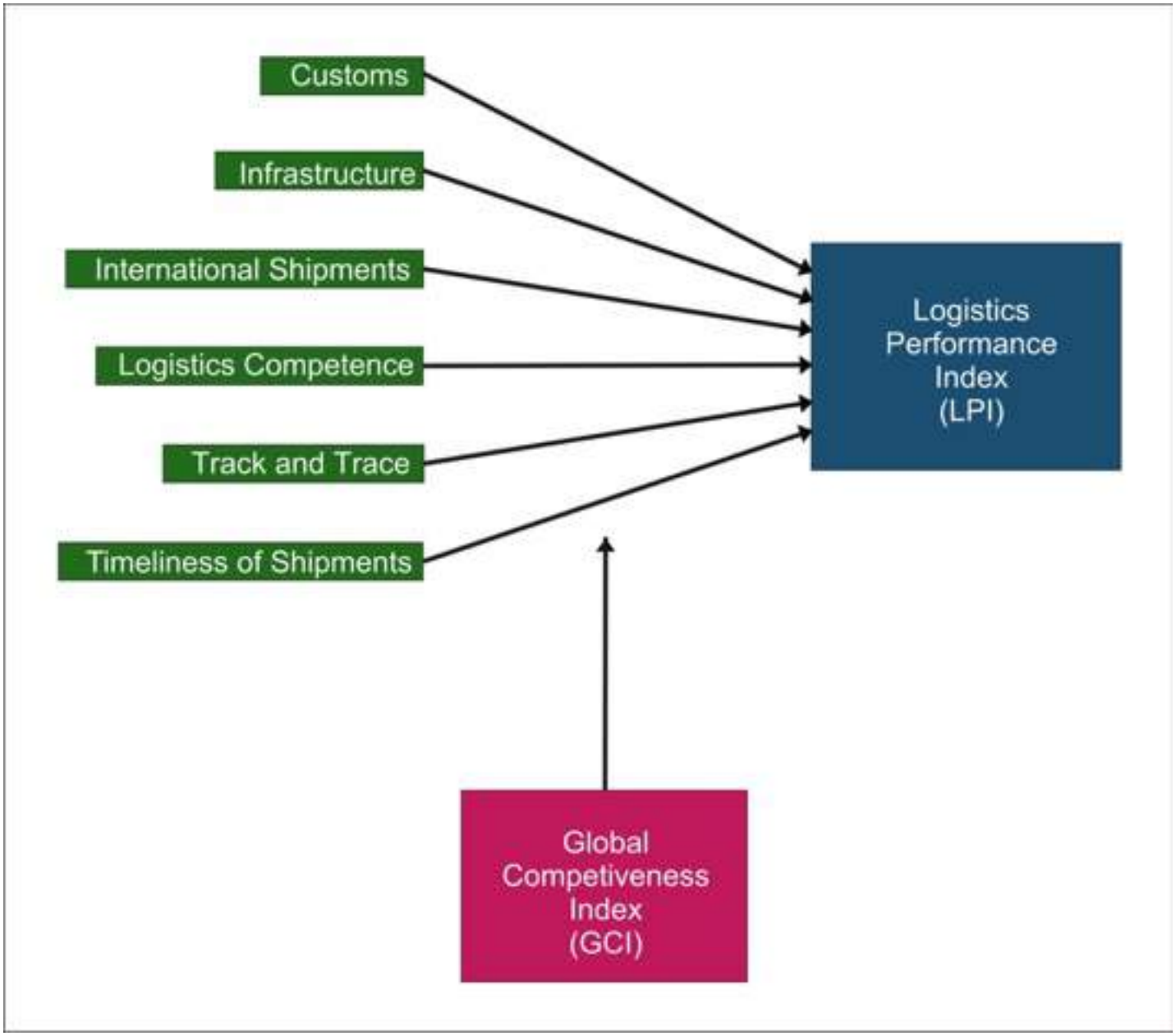
- Tracking and Tracing: The ability to track and trace your consignments.

- Timeliness: Carrying out the transports at scheduled time.

Abstract

- In this research, the moderating effect of the Global Competitiveness Index (GCI) on each dimensions of the LPI was measured.
- The Global Competitiveness Index (GCI) is prepared annually by the World Economic Forum (WEF) in order to rank countries according to their competitive strength.
- The moderating effect was measured by means of hierarchical regression method.
- This research has important contribution to existing literature.

Initial Research Model



Hypothesis

Effect of 'Customs' on the LPI?

- The first hypothesis is related to the Customs dimension. Customs dimension means the efficiency of customs and customs clearance processes. In this context, the following hypothesis was proposed:
- **H1.** Global Competiveness Index has moderator effect on the influence of **Customs** on Logistics Performance Index.

Effect of 'Infrastructure' on the LPI?

- The second hypothesis is related to the Infrastructure dimension. Infrastructure dimension means the quality of infrastructure related to trade and transport. In this context, the following hypothesis was proposed:
- **H2.** Global Competiveness Index has moderator effect on the influence of **Infrastructure** on Logistics Performance Index.

Effect of 'International Shipments' on the LPI?

- The third hypothesis is related to the International Shipments dimension. International Shipments dimension means the Capability of Arranging Competitively Priced Shipments. In this context, the following hypothesis was proposed:
- **H3.** Global Competiveness Index has moderator effect on the influence of **International Shipments** on Logistics Performance Index.

Hypothesis

Effect of 'Competence ' on the LPI?

- The fourth hypothesis is related to the Competence dimension. Competence dimension means the Competence and quality of Logistics Services. In this context, the following hypothesis was proposed:
- **H4.** Global Competiveness Index has moderator effect on the influence of **Logistics Competence** on Logistics Performance Index.

Effect of 'Track and Trace ' on the LPI?

- The fifth hypothesis is related to the Track and Trace dimension. Track and Trace dimension means the Ability to Track and Trace Your Consignments. In this context, the following hypothesis was proposed:
- **H5.** Global Competiveness Index has moderator effect on the influence of **Track and Trace** on Logistics Performance Index.

Effect of 'Timeliness of Shipments' on the LPI?

- The sixth hypothesis is related to the Timeliness of Shipments dimension. Timeliness of Shipments dimension means the Carrying Out The Transports at Scheduled Time. In this context, the following hypothesis was proposed:
- **H6.** Global Competiveness Index has moderator effect on the influence of **Timeliness of Shipments** on Logistics Performance Index.

Research Design

•The research data sample consists of 134 countries.

•LPI measurements are ranked by asking questions to employees and managers of various logistics companies of each country and determining the replies according to the scores.

•GCI consists of 12 dimensions. The World Economic Forum makes use of two kinds of data in this study. These are

•the international digital indicators and the Manager's Opinion Questionnaire and

•the international digital indicators consist of data such as public debt, budget deficit and life expectancy, which are obtained from international corporations such as the IMF, UNESCO and the World Health Organization (WHO).

•The Manager's Opinion Questionnaire, on the other hand, uses qualitative data

Hierarchical Regression Analysis Results

H_1: Global Competiveness Index has moderator effect on the influence of Customs on Logistics Performance Index.

The model summaries of hierarchical regression analysis are as follows:

MODEL 1: $LPI = \beta_0 + \beta_1.C + \varepsilon$
MODEL 2: $LPE = \beta_0 + \beta_1.C + \beta_2.GCI + \beta_3.C'.GCI' + \varepsilon$

Model	R	R^2	Adjusted R^2	Standard Error of the Estimate
1	,948[a]	,898	,897	,16952
2	,956[b]	,913	,911	,15752

As shown in the table above, the difference between R2 value of Model 1 and R2 value of Model 2 was found to be 0,015. This value of increase is **relatively low.**

Hierarchical Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		β	Std. Error	β		
1	Constant	,612	,072		8,556	,000
	Customs	,848	,025	,948	34,096	,000
2	Constant	,341	,091		3,747	,000
	Customs	,677	,044	,757	15,487	,000
	GCI	,000	,014	,000	,008	,000
	Multiplication Variable	,250	,052	,227	4,775	,994

As shown in the table above, Multiplication Variable **is not statistically significant** in % 5 significance levels. Considering R2 change, Global Competiveness Index **does not have moderator** effect on the influence of Customs on Logistics Performance Index.

Hierarchical Regression Analysis Results

H2: Global Competiveness Index has moderator effect on the influence of Infrastructure on Logistics Performance Index.

The model summaries of hierarchical regression analysis are as follows:

MODEL 1: $LPI = \beta_0 + \beta_1.I + \varepsilon$

MODEL 2: $LPI = \beta_0 + \beta_1.I + \beta_2.GCI + \beta_3.I'.GCI' + \varepsilon$

Model	R	R^2	Adjusted R^2	Standard Error of the Estimate
1	,970[a]	,941	,941	,12877
2	,971[b]	,943	,942	,12727

As shown in the table above, the difference between R2 value of Model 1 and R2 value of Model 2 was found to be 0,002. This value of increase is **relatively low.**

Hierarchical Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Standardized Coefficients
		β	Std. Error	β		
1	Constant	,715	,051		14,021	,000
	Infrastructure	,793	,017	,970	45,949	,000
2	Constant	,603	,075		8,015	,000
	Infrastructure	,763	,037	,933	20,667	,000
	GCI	,072	,047	,065	1,525	,130
	Multiplication Variable	-,019	,012	-,038	-1,574	,118

As shown in the table above, Multiplication Variable **is not statistically significant** in % 5 significance levels. Considering R2 change, Global Competiveness Index **does not have moderator** effect on the influence of Infrastructure on Logistics Performance Index.

Hierarchical Regression Analysis Results

H3: Global Competiveness Index has moderator effect on the influence of International Shipments on Logistics Performance Index.

The model summaries of hierarchical regression analysis are as follows:

MODEL 1: $LPI = \beta_0 + \beta_1.IN + \varepsilon$

MODEL 2: $LPI = \beta_0 + \beta_1.IN + \beta_2.GCI + \beta_3.IN'.GCI' + \varepsilon$

Model	R	R^2	Adjusted R^2	Standard Error of the Estimate
1	,924[a]	,892	,852	,20342
2	,975[b]	,963	,911	,15779

As shown in the table above, the difference between R2 value of Model 1 and R2 value of Model 2 was found to be 0,071. This value of increase is **higher than 0,05**.

Hierarchical Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		β	Std. Error	β		
1	Constant	-,230	,118		-1,946	,054
	International Shipments	1,089	,039	,924	27,695	,000
2	Constant	-,382	,095		-4,008	,000
	International Shipments	,762	,049	,646	15,426	,000
	GCI	,358	,047	,326	7,653	,000
	Multiplication Variable	,059	,014	,110	4,102	,000

As shown in the table above, Multiplication Variable **is statistically significant** in % 5 significancel levels. Considering R2 change, Global Competiveness Index **has moderator** effect on the influence of International Shipments on Logistics Performance Index.

Hierarchical Regression Analysis Results

H4: Global Competiveness Index has moderator effect on the influence of Logistics Competence on Logistics Performance Index.

The model summaries of hierarchical regression analysis are as follows:

MODEL 1: $LPI = \beta_0 + \beta_1.L + \varepsilon$

MODEL 2: $LPI = \beta_0 + \beta_1.L + \beta_2.GCI + \beta_3.L'.GCI' + \varepsilon$

Model	R	R^2	Adjusted R^2	Standard Error of the Estimate
1	,977[a]	,954	,954	,11376
2	,979[b]	,959	,958	,10838

As shown in the table above, the difference between R2 value of Model 1 and R2 value of Model 2 was found to be **0,05**.

Hierarchical Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		β	Std. Error	β		
1	Constant	,274	,053		5,166	,000
	Logistics Competence	,920	,018	,977	52,367	,000
2	Constant	,182	,061		2,976	,003
	Logistics Competence	,813	,032	,863	25,221	,000
	GCI	,131	,037	,119	3,555	,001
	Multiplication Variable	,015	,010	,030	1,555	,122

As shown in the table above, Multiplication Variable **is not statistically significant** in % 5 significance levels. Considering R2 change, Global Competiveness Index **does not have moderator** effect on the influence of Logistics Competence on Logistics Performance Index.

Hierarchical Regression Analysis Results

H5: Global Competiveness Index has moderator effect on the influence of Track and Trace on Logistics Performance Index.

The model summaries of hierarchical regression analysis are as follows:

MODEL 1: $LPI = \beta_0 + \beta_1.T + \varepsilon$

MODEL 2: $LPI = \beta_0 + \beta_1.T + \beta_2.GCI + \beta_3.T'.GCI' + \varepsilon$

Model	R	R^2	Adjusted R^2	Standard Error of the Estimate
1	,946[a]	,903	,901	,15656
2	,979[b]	,955	,955	,12477

As shown in the table above, the difference between R2 value of Model 1 and R2 value of Model 2 was found to be 0,052. This value of increase is **higher than 0,05**.

Hierarchical Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		β	Std. Error	β		
1	Constant	,284	,074		3,823	,000
	Track and Trace	,904	,024	,956	37,226	,000
2	Constant	,014	,071		,200	,841
	Track and Trace	,681	,032	,720	21,354	,000
	GCI	,307	,037	,279	8,299	,000
	Multiplication Variable	,024	,012	,045	2,033	,044

As shown in the table above, Multiplication Variable **is statistically significant** in % 5 significance levels. Considering R2 change, Global Competiveness Index **has moderator** effect on the influence of Track and Trace on Logistics Performance Index.

Hierarchical Regression Analysis Results

H6: Global Competiveness Index has moderator effect on the influence of Timeliness of Shipments on Logistics Performance Index.

The model summaries of hierarchical regression analysis are as follows:

MODEL 1: $LPI = \beta_0 + \beta_1.TM + \varepsilon$

MODEL 2: $LPI = \beta_0 + \beta_1.TM + \beta_2.GCI + \beta_3.TM'.GCI' + \varepsilon$

Model	R	R^2	Adjusted R^2	Standard Error of the Estimate
1	,930[a]	,864	,863	,19566
2	,958[b]	,917	,915	,15388

As shown in the table above, the difference between R2 value of Model 1 and R2 value of Model 2 was found to be 0,054. This value of increase is **higher than 0,05**.

Hierarchical Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		β	Std. Error	β		
1	Constant	,025	,104		,244	,808
	Timeliness of Shipments	,883	,030	,930	28,978	,000
2	Constant	-,190	,092		-2,072	,040
	Timeliness of Shipments	,611	,039	,643	15,849	,000
	GCI	,365	,045	,332	8,124	,000
	Multiplication Variable	,043	,016	,076	2,783	,006

As shown in the table above, Multiplication Variable **is statistically significant** in % 5 significance levels. Considering R2 change, Global Competiveness Index **has moderator** effect on the influence of Timeliness of Shipments on Logistics Performance Index.

Conclusion

As a result of this study GCI has the moderator effect on the following dimensions of LPI :

- **International Transportation,**
- **Tracking and Tracing**
- **Timeliness.**
- **Customs**
- **Infrastructure.**
- **Logistics Competence.**

According to the result of this research, if a country' s target is to be in the top level the GCI index, it needs to make improvements in these dimensions of the LPI mentioned above.