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The Effects of Logistics Performance on International Trade of Agricultural Products: Uzbekistan and CIS Countries

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Abstract

The main aim of the research is to analyze the effect of Uzbekistan-CIS countries LPI sub-index score gap on international trade of agricultural products between Uzbekistan and CIS countries in the period of 2010-2018. Based on above mentioned aim, research question listed below will be answered. What kind of correlation does it have between logistical development rate gap between Uzbekistan and CIS countries and international trade of agricultural products in 2010-2018?

Absolute difference in which LPI (Logistics Performance Index) sub-indices has the highest impact on the trade of agricultural products between Uzbekistan and CIS countries in the period of 2010-2018? In order to analyze the effects of logistics performance on international trade of agricultural products between Uzbekistan and CIS countries in the period of 2010-2018, gravity model of international trade was developed by adding 6 sub-indexes of LPI (The Logistics Performance Index). Empirical results showed that between countries' LPI sub-index score difference and bilateral trade volume has negative correlation. Partner countries showing bigger difference in LPI sub-index score represent lower trade volume.

Keywords: LPI, logistics, customs, pitted fruits, dried legumes, dried fruits

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1. Introduction

As Uzbekistan is located in the central part of the region and because of comfortable climatic condition, it has comparative advantages in producing agricultural products. According to production expenses, some fruits and vegetables are exported to foreign countries, whereas the other are imported from neighbour countries. Logistical development rate gap between Uzbekistan and CIS countries play the key role in trading agricultural goods. The aim of the research paper consists of analyzing the impact of Uzbekistan-CIS countries LPI sub-index score gap on mutual agricultural product trade in the period of 2010-2018.

2. Theoretical Background

Cambridge Dictionary(2020) defines a Logistics as the commercial activity of transporting goods. According to other source, logistics is the business of transporting and delivering goods.

World Bank (2020) defines the Logistics Performance Index is an interactive benchmarking tool created to help countries identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve their performance. Countries LPI score is identified by 6 sub-indexes as Customs, Infrastructure, International Shipments, Logistics Competence, Tracking&Tracing and Timeliness.

3. Research Method

There are quite a lot of factors and indicators that directly and indirectly affect to the volume of export. In our case, the formation of export volume of agricultural goods were analyzed by using gravity model of international trade. More precisely, the effect of gross domestic product, distance, availability of contiguousness and common language, the Logistics Performance Index on export volume was identified.

In order to get detail information about 5 variables and response, the table giving information about variables, unit of measurement and data sources was created by the author.

Table 1. Variables of regression model, unit of measurement and sources

Variable	Unit of measurement	Sources
Trade Volume	USD	UN COMTRADE and ITC statistics
Gross Domestic Product	USD	World Bank database
Distance	Kilometre	www.mapdevelopers.com
Contiguousness	Dummy variable	www.mapdevelopers.com
Common Language	Dummy variable	www.worldatlas.com
The Logistic Performance Index	Percent	The Logistic Performance Index (2010-2018)

According to the variables and response which is located above, we analyze the formation of trade volume of agricultural goods between Uzbekistan and CIS countries focusing on the effect of the Logistics Performance Index. When we talk about the trade volume of agricultural goods, it is mostly focused on the trade of fruits and vegetables between Uzbekistan and CIS countries.

The effects of logistics performance on bilateral trade of fruits and vegetables between Uzbekistan and CIS countries will be analyzed by gravity model. The gravity model of international trade in international economic relations is a model that, in its traditional form, predicts bilateral trade flows based on the economic sizes and distances between two countries. I am going to estimate gravity model with PPML method.

We are going to develop the following gravity model by adding 6 sub-index of LPI (The Logistics Performance Index) in order to estimate the effects of logistics performance on bilateral trade:

In our case, multiple linear regression is described as follow:

$$\text{Ln}(\text{Trade}_{ijt}) = \beta 0 + \beta 1\ \text{Ln}\ (\text{gdp}_{ijt}) + \beta 2\ \text{Ln}(\text{dist}_{ijt}) + \beta 3\ \text{Ln}\ (\text{lpisub}_{ijt}) + \beta 4\ \text{contig}_{ijt} + \beta 5\ \text{comlang}_{ijt} + \text{error}$$

Where, Trade_{ijt} is the value of bilateral trade in U.S. dollars between reporting country (Uzbekistan) i and partner country (CIS countries) j in year t (since LPI data is published

biennially, t represents years 2010, 2012, 2014, 2016 and 2018). gdpijt presents absolute difference of the GDP (in current US dollars) between country i and country j in year t. contigijt is a dummy variable with the value one if trading partners share land border, zero if not comlangijt is dummy variable with the value one if countries have common official primary language, zero if not. lpisubijt is calculated as absolute difference in one of the six LPI sub- indices between trading partners. lpisubijt of all 6 sub-index of LPI (The Logistics Performance Index) will be calculated for the period of 2010-2018 and their impact on bilateral trade between Uzbekistan and CIS countries for 2010-2018 will be analyzed separately. Finally, according to the results, sub-index with the highest and lowest impact on bilateral trade between Uzbekistan and CIS countries for 2010-2018 will be identified.

4. Analysis

Table 2. Empirical results representing the impact of LPI on international trade of pitted fruits between Uzbekistan and CIS countries.

	2010	2012	2014	2016	2018
Timeliness	-1.360818	-0.4329087	-0.5687839	-0.2507239	-0.2757004
Tracking &Tracing	-0.137793	-0.832041	-0.4962557	-0.4896195	-0.3904775
Logistics Competence	-0.9012287	-0.6390162	-0.4483769	-0.4234887	-0.0358856
International Shipments	-0.7100701	-1.001163	-1.782387	-1.423488	-0.3223993
Infrastructure	-0.5115132	-0.5724285	-0.2878197	-0.0849377	-0.0360248
Customs	-0.8220943	-1.062943	-1.116513	-1.178487	-0.5388665

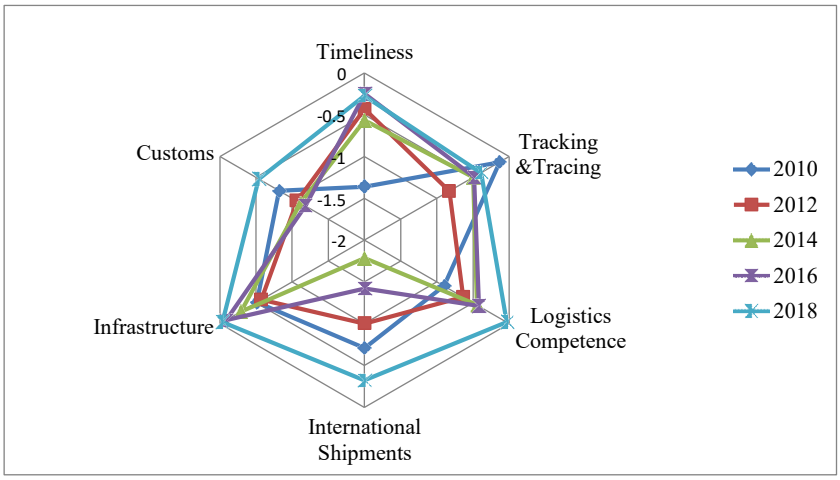

Figure 1. Empirical results representing the impact of LPI on international trade of pitted fruits between Uzbekistan and CIS countries.

According to the table and figure, it can be seen that between partner countries' LPI sub-index score difference and mutual trade volume of pitted fruits has negative correlation. Partner countries showing bigger difference in LPI sub-index score represent lower trade volume. Automatically, partner countries showing smaller difference in LPI sub-index score represent higher trade volume. In 2010, Timeliness had the highest negative effects on trade, while in 2012 and 2018, Customs was in the lead. International Shipments took the 1stplacein2014 and 2016, in terms of negative effect on trade volume of pitted fruits.

Table 3. Empirical results representing the impact of LPI on international trade of dried legumes

	2010	**2012**	**2014**	**2016**	**2018**
Timeliness	-0.568342	-0.5543418	-0.0486198	-0.0788463	-0.8480925
Tracking & Tracing	-0.1361056	-0.7482388	-0.4641275	-0.1655633	-0.0109791
Logistics Competence	-0.7720224	-0.9835863	-1.142747	-0.7278532	-0.0304859
International Shipments	-0.0788285	-0.1994448	-0.6285087	-0.5380298	-1.052916
Infrastructure	-0.9548472	-1.489362	-0.1669409	-1.61416	-0.3251675
Customs	-0.7592029	-0.5484832	-0.6445479	-1.637289	-0.9564046

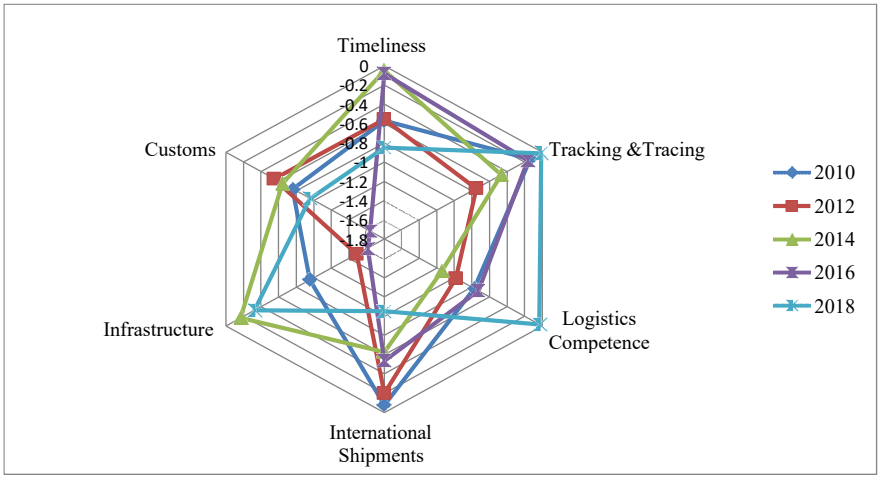

Figure 2. Empirical results representing the impact of LPI on international trade of dried legumes

The similar empirical results can be seen in the trade of dried legumes. However, unlike the previous results, in the trade of dried legumes, score difference of Infrastructure sub-index of LPI had the highest negative impact on trade in 2010 and 2012. In 2014, Logistics Competence took the lead before Customs, which was found the biggest barrier of trade in 2016 and 2018.

Table 4. Empirical results representing the impact of LPI on international trade of dried fruits between Uzbeistan and CIS countries.

	2010	**2012**	**2014**	**2016**	**2018**
Timeliness	-0.0292201	-0.0408357	-0.0453981	-0.109906	-0.1188687
Tracking &Tracing	-0.0390943	-0.8966628	-0.3232308	-0.2038059	-0.1683514
Logistics Competence	-0.5933422	-0.5247582	-0.5734589	-0.3747452	-0.029743
International Shipments	-0.0513814	-1.584617	-1.090853	-0.3902779	-0.0729276
Infrastructure	-0.5514264	-0.8237978	-1.184089	-0.7122197	-0.0478235
Customs	-0.1893697	-0.3720823	-0.3662864	-0.4202169	-0.1906595

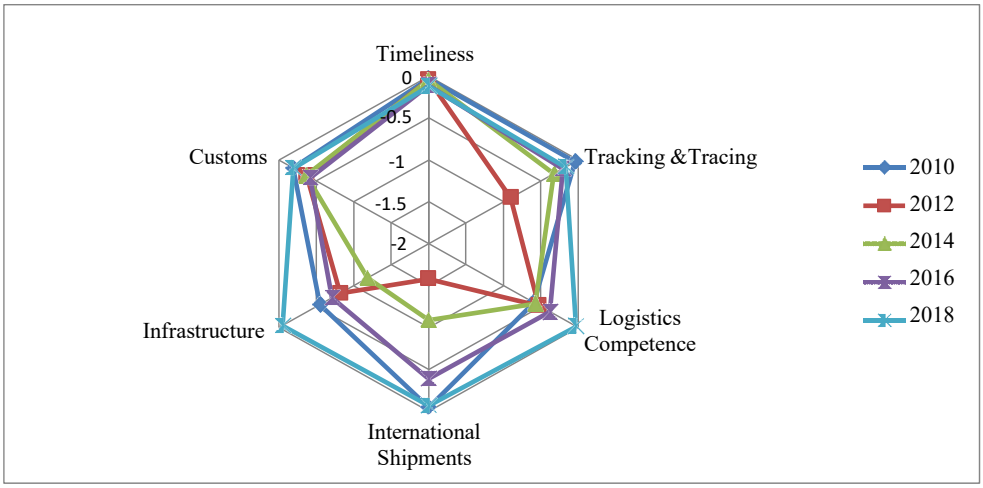

Figure 3. Empirical results representing the impact of LPI on international trade of dried fruits between Uzbeistan and CIS countries.

Differ from two cases which was analyzed above, empirical results representing the impact of LPI on international trade of dried fruits between Uzbekistan and CIS countries can be seen and understood easily. Like the trade of pitted fruits and dried legumes, partner countries representing bigger difference in LPI sub-index score represent lower trade volume. Obviously,

partner countries showing smaller difference in LPI sub-index score represent higher trade volume. In each analyzed years, different sub-index took the lead. In 2010, Logistics Competence were found the sub-index showing highest negative impact. In the next two years, International Shipment had the relatively bigger negative impact on trade volume. Infrastructure was the main trade barrier in 2014 and 2016. As for 2018, Customs showed relatively higher negative impact on bilateral trade of dried fruits.

5. Conclusion

The aim of the research was to investigate the impact of Uzbekistan-CIS countries LPI sub-index score gap on international trade of agricultural products between Uzbekistan and CIS countries in the period of 2010-2018. It was found that between partner countries' LPI sub-index score difference and mutual trade volume of pitted fruits, dried legumes and dried fruits has negative correlation.

Partner countries showing bigger difference in LPI sub-index score represent lower trade volume. Furthermore, partner countries showing smaller difference in LPI sub-index score represent higher trade volume.

In all cases, the coefficient of LPI sub-index showed relatively lower number in 2018. It means, year-by-year the negative impact of LPI on trade volume is becoming lower and lower.

Empirical results of the research support previously mentioned findings. However, the impact of each 6 sub-indexes of LPI is different according to the product and time period.

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