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Enhancing Exports through Managing Logistics Performance: Evidence from Middle East and African Countries

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Abstract

Logistics activities and its cost affect daily businesses operations and eventually the country's economy. If countries are able to manage logistics performance efficiently it will be able to compete better internationally. The key objective of this study is to investigate the relationship between the logistics performance index and its components and exports focusing on Middle East and African countries using a regression model. Results of this study indicated that the logistics performance index positively enhance countries exports. In addition, logistics performance index components namely; customs, infrastructure, international shipments and timeliness have a significant impact individually, except for logistics quality, competence, tracking and tracing. The paper aims at supporting the economic policy maker to improve the economic decision in the field of logistics.

Keywords: Logistics Performance Indicator; Exports; Middle East And North Africa; Panel Data.

1. Introduction

The complexity of supply chain management and the highly competitive economy led companies to find the best technique to evaluate the efficiency and the effectiveness of supply chain logistics activities by using set a qualitative and quantitative methods to measure supply chain and logistics activities. Quality, timely, flexibility, reliability, and cost were the main dimensions to measure supply chain efficiencies (Beamon, 1999). However, logistics is not only a concern of the private sector, put also a public policy concern. The supply chain performance depends on the public procedures directed toward infrastructure , urban planning and other connectivity-related activities (Arvis et al., 2016).

The logistical costs represents a vital part of exports costs Anderson and Van Wincoop (2004) estimate the tax equivalent of "representative" trade costs of 170 percent for industrialized countries. This number breaks down to 21 percent transportation costs, 44 percent border-related trade barriers, and 55 percent retail and wholesale distribution Costs. Moreover, the time of shipping in addition to the uncertainty of shipping time add a significant costs to the exporters, each day saved in shipping time is worth 0.8 percent ad-valorem tariff for manufactured goods (Hummels & Schaur, 2012). Efficient logistical activities have a significant effect over exports costs and thus competitiveness.

The World Bank grasped the importance of logistics activities. In 2007, it started issuing the Logistegs Performance Index. An interactive tool with main purpose of evaluating the logistical services on country level. In its latest version in 2016, the report covered 160 countries. The index is based on international survey of logistics professionals (LPI-Report, 2016). The LPI won the attention of the logistets professionals quoting Huxiang Zhao President, International Federation of Freight Forwarders Associations (FIATA): "The LPI is unique as a tool of decision making since it expresses the perception of operators on the ground; this is often as important as hard statistical data" (Arvis et al., 2016).

The research contributes to the literature by investigating the relationship between exports and logistical performance utilizing the LPI issued by the World Bank with a focus on MENA region and African countries. We analyzed the relationship between the LPI six sub-indexes and the exports of these developing countries, with a main purpose to set development agenda priorities to the decision maker. The rest of the paper is organized as follows: section two provide a literature review; section two

2. Literature Review

Thinking about logistics should no longer be limited to firm level. More focus on national and global level has to take place (Burmaoglu & Sesen, 2011). Logistics has a significant effect over the national and global economies. As it represents a significant component of GDP. As it effects the distribution of goods and services, it has a direct effect over inflation , and productivity (Lambert & Stock, 1993). Improvement of logistical performance enhance the chances of economic growth and the improvement of trade. Evidences show that for countries with the same level of per capita income, countries with best logistics performance experience additional 1 percent gross domestic product growth and 2 percent additional growth in trade (Arvis, 2010).

The effect of the logistical activities on trade has drawn the attention of the researchers. Some researchers has focused on logistical activities in the frame of discussing trade facilitation. Marine shipping was analysed by (Fink, Mattoo, & Neagu, 2002), who studied the effect of marine transport cost on trade. They tried to explain the variation in the cost structure between countries. The study found a higher impact of the private anticompetitive practices than the restrictive trade policies. Clark, Dollar, and Micco (2004) colluded that improving port efficiency from the 25th to the 75th percentile reduces shipping costs by 12 percent.

Hummels and Schaur (2012) studied the relationship between trade facilitation and manufactured goods global trade in 2000-2001. The study considered four logistical areas of development. Namely, port efficiency, customs environment, regulatory environment, and service sector infrastructure. The study found that international trade are to gain from trade facilitation. Behar and Manners (2008) used the gravity equation to assess the relationship between exports and logistics. The study concluded that the efficiency of logistical activities in importing countries have important impact on bilateral exports. They added that exports on landlocked countries depends more on the quality of their neighboring countries logistical efficiency than their own. A more comprehensive study was conducted by Nordås and Piermartini (2004) who analysed the effect of the infrastructure quality , telecommunication , and customs clearance time and total bilateral trade. The study found that bilateral tariffs, quality of infrastructure , port efficiency, access to telecommunication have a significant impact on total bilateral trade and on trade in the automotive, clothing and textile sectors in particular.

Introduced by World Bank in 2007, the Logistics Performance Index has provided a comprehensive view of the logistical activities quality on country level. The index main objective is to provide a basis for trade logistics comparison between countries. The index depends on a worldwide survey of the global freight forwarders and express carrier who are the most active in international trade. In addition, to the Feedback from the survey the index is supplemented with data on the performance of key components of the logistics activities (Arvis, Mustra, Panzer, Ojala, & Naula, 2007).

Literature shows a growing interest in LPI. Hoekman and Nicita (2011) used LPI indicators of the efficiency of customs and measure access and affordably of international shipment. They study estimated that shall the low-income countries were to converge to a set of policies that would generate the average level indicator of the middle-income countries it would increase the exports and imports volume by 14,6% and 15.2% respectively.

Guner and Coskun (2012) illustrated the correlation between LPI scores and social and economic indicators by using a regression analysis. The results showed social predictors relates to logistics performance, the social predictors were risky behaviours, democracy, and human development. Empirical study by Hoekman and Nicita (2011) has reviewed the LPI components, along with different types of boarder and domestic trade restrictions. Utilizing gravity framework, the study found that the tariff and non-tariff measures effect over trade restrictiveness is still prominent. Erkan (2014) Researched the linking between the infrastructure-weighted indicators of the GCI and the LPI. The infrastructure dimensions of GCI were (Quality of Roads, Quality of Railroad Infrastructure, Quality of Port Infrastructure, and Quality of Air Transport Infrastructure, Value Chain Breadth, and Company Spending on R&D).

2.1 Logistics Performance Index (LPI)

The first LPI survey in 2007 highlighted supply chain gaps in developing economies, which considered a barrier to competitive in international markets (Arvis et al., 2007). In the 2010 survey, LPI showed the effect of efficiency of logistics performance on product variety, direct impact on economic growth (Arvis, 2010). In the 2012 and 2014 LPI surveys provided the role of logistics performance in developing countries' strategies and economic development. This study will use the data observed form 2007 until 2016. LPI is and its weighted dimensions can be valuable for countries to identify policy measures and for additional research into logistics performance (Arvis, Mustra, Ojala, Shepherd, & Saslavsky, 2012). Moreover, many of academics and researchers cleared that LPI is a tool to fix the logistics performance (LP). Although (LP) is defined based on the purpose of the study, Chow, Heaver, and Henriksson (1994) mentioned that the researchers have a difficulty to define LP because the objectives are totally different from firm to another, however the appearance of LPI made it easier to be defined. Arvis et al. (2007) Defined LPI as "a multidimensional assessment tool for measuring efficiency and reliability of supply chain structures in national and international trade capacities". The LPI is a measurement tool for international and domestic dimensions using quantitative standard to determine the position of logistics activities in the countries.

Arvis et al. (2016) Showed the six international dimensions of LPI Starting with customs processes which refer to the strength of border clearing agencies and processes with all services, this indicator uses the same measurements of international and domestics level. Then, the second one is the Logistics infrastructure which is responsible to the main communications for transportations and the information technology between the entities, Infrastructure competencies determine constraints or improvements in logistical activities resulting from different connected networks in a country, this factor also has been used in international and domestics levels. The third demission is Quality of logistics Services which measures the quality and efficiency of the country's logistics providers, this factor related to the facilities that logistics Service Providers present and also the capabilities to move from place to another on the international places international and domestics zones. The fourth component is timeliness which shipments reach buyers within expected delivery times. Timeliness the time between order placement and receipt. The fifth one is Tracking and Tracing which mean the ability to monitoring the shipments in in specific location and to inform the customer and company about the location of the shipments. The last component is International shipments which refer to all shipments that are transporting from country of originate to another.

The current literature shows that LPI used in many different positions whether as moderate variable or depended variable, Hoekman and Nicita (2011) reviewed different parameters of the world bank that related to trade barriers. The study derived the measurements that developing country can apply to have an effect on the trade.

Kim and Min (2011) Investigated how to achieve high logistics performance with taking into considerations the environmental quality by creating a new index called Green Logistics Performance Index (GLPI). In the study logistics performance was measured by the Environmental performance index (EPI). The results show that Asian and European countries with export-oriented economies scored high level in LPI more than GLPI, in contrast Nordic countries scored higher on the GLPI. Guner and Coskun (2012) illustrated the correlation between LPI scores and social and economic indicators by using a regression analysis. The results showed social predictors relates to logistics performance, the social predictors were risky behaviours, democracy, and human development.

Marti, Puertas, and García (2014) Used the gravity equation to examine the impact of LPI on socioeconomic strengths of emerging economies. The finding showed that social infrastructure in developing countries are related to their supply chain logistics capacity. Erkan (2014) Researched the linking between the infrastructure-weighted indicators of the GCI and the LPI. The infrastructure dimensions of GCI were (Quality of Roads, Quality of Railroad Infrastructure, Quality of Port Infrastructure, and Quality of Air Transport Infrastructure, Value Chain Breadth, and Company Spending on R&D).

To determine the relation between the overall LPI score and other indicators, a regression analysis is used a data from 113 countries indicated that only two (quality of port infrastructure and quality of quality of road infrastructure) of the six indicators have a significant relationship with the overall LPI. Vaillancourt and Haavisto (2016) used regression analysis as well to measure the relation between logistics in a country and its impact of different types of disasters (epidemic, flood, and storm). The results showed that the impact is significant for all the components except for the quality of services component.

Çemberci, Civelek, and Canbolat (2015) used hierarchical regression analysis as well to analyse the effect of the logistics performance index on the relation between global competitiveness index and gross domestic product. They studied between the main three main variable of study and it showed a highly significant relation to each other. Uca, Ince, and Sumen (2016) also used hierarchical regression analysis to examine the effect of LPI the relation between the Corruption Perception Index (CPI) and Foreign Trade Volume (FTV).

The finding illustrated that logistics capacity of a country influences the relation between corruption and foreign trade volume. A similar study done by Ekici, Kabak, and Ülengin (2016) this study that used artificial neural network (ANN) to analyse if there a close connection between the Global Connectivity Index and the LPI. The study that has been done

in Turkey showed the most important GCI indicators per LPI component, produced by the ANN in table 1 which indicated in the left column the most important GCI indicators.

Table 1: Connected GCI Indicators		
LPI components	Linked GCI indicator	Most important GCI indicator
Customs	12	Reliability of policies services
Infrastructure	25	Fixed broadband internet subscription
Services	54	Extent of staff training
Tracking and tracing	10	Intellectual property protection
International shipments	23	Legal rights index
Timeliness	18	Fixed broadband internet subscriptions
Source: (Roekel, 2017)		

2.2 Exports

In the last decades, many economists believed that contribution in international trade and development in export performance could give a huge push for economic growth in the developing economies (Ahmed, 2005). The development and growth literature on the role of exports in increasing economic growth has been discussed by many academics and researchers.

Funke and Holly (1992) discussed which of the supply and demand factors has more significant to the export performance, the findings of this study suggest that supply side factors are much more important for explaining export performance than demand side factors. Another study in a developing country was Turkey in 1993, Togan investigated the changes in the structure of "export incentives". Another study in India Sharma (2000) examined exports determinant using annual data for 1970-98. The study used "simultaneous equation framework". The findings of study proposed that demand for Indian exports rise when its export price drops in relation to world prices. In 2007 Mahadevan (2007) stated 4 main points that could lead to achieve development strategy:

- Trade growth will improve productivity through increased economies of scale in the export sector, by increasing the utilization capacity.

- Exports affects productivity over providing better allocation of resources motivated by increasing in efficiency, which lead to reduction in cost, therefore achieving comparative advantage.

- Dealing with the international markets will enable countries to gain more knowledge and more efficient management techniques which effect the overall economic growth and productivity.

- Collecting capital and raw materials needed for the production, in addition to raising capital and foreign exchange, can be enhanced through exports growth, which can be a corner stone for economic growth

Form the discussion above it can be argued that exports can enhance economic growth, and logistics performance is directly linked to exports. Hence, countries can manage their logistics activities to enhance exports and eventually increase their economic growth.

3. Methodology

In spite of the attention that the logistics performance attracted by either academics or practitioners, there was a lack of intensive research about its impact on the economy, especially in the developing economies, the literature review concluded in the previous chapter indicated a lack of studies explaining the nature of the relationship between logistics performance and exports in emerging markets. The importance of this research arises from this point, as it aims to cover the gap by analyzing this relationship between logistics performance indicator and its components namely customs, infrastructure, international shipments, logistics quality and competence, tracking and tracing and finally, Timeliness and exports in MENA and African countries. Giving insights about this relationship will help increase the competeveness of a country. In addition it will help governments better understand the impact of their investments in logistics performance on economic growth.

3.1 Research Variables

This research aims to investigate the impact of logistics performance on exports. The variables under investigation are LPI (independent variable) as a proxy for logistics performance and exports of goods and services (dependent variable) (in US$) as a proxy for exports. These variables will be discussed below.

In 2004 the World Bank started LPI as a way to measure the logistics performance of countries around the world. The index is based on a survey carried out on companies that moves goods across countries, it is consists of six main components; customs, infrastructure, ease of arranging shipments, quality of logistics services, tracking and tracing and timeliness. LPI is considered to be the most proper way to measure countries logistics performance (D'Aleo & Sergi, 2017). LPI components where verified by theoretical and empirical research, in addition to the opinion of practitioners in the field of international freight forwarding. These components are under the umbrella of two main categories. First, areas for policy regulations (the main input of a supply chain) which includes customs, infrastructure, and quality of logistics services. Second, service delivery performance outcomes (time, cost, reliability) which includes timeliness, international shipments, and tracking and tracing (Arvis et al., 2016).

LPI score ranges between 1 (lowest) and 5 (highest) this is applied for the overall score and its six components namely; customs (efficiency of the clearance process), infrastructure (quality of trade and transport infrastructure), ease of arranging shipments (ease of arranging competitively priced shipments), quality of logistics services (competence and quality of logistics services), tracking and tracing (ability to track and trace consignments) and timeliness (timeliness of shipments in reaching their destination) (Ben & Shintaro, 2015).

The dependent variable in this research is exports, exporting activities is essential for firms' growth as it provides a way to decrease dependency on domestic market by entering new markets which help in diversifying its markets and hence decrease its risk and cost, in addition to increasing its overall efficiency. Exports are also important for economic growth, as exports enhances firms' growth it contributes to industries development which increases job opportunities and eventually decrease unemployment rate. Further, exports increases foreign exchange reserve held by central banks, which affect countries' imports (Filipe Lages & Montgomery, 2004).

3.2 Model and Hypothesis

To test the impact of LPI and its components on exports, seven testable hypothesis were derived.

H1 : LPI does not affect exports

H2 : Customs does not affect exports

H3 : Infrastructure does not affect exports

H4 : International shipments does not affect exports

H5 : Logistics quality and competence does not affect exports

H6 : Tracking and tracing does not affect exports

H7 : Timeliness does not affect exports

Econometric analysis can be used for the panel data to find the relationship between the variables. In this research secondary data is collected from the official World Bank data base.

3.3 Research Strategy

The research is trying to help government take corrective action regarding their investment in logistics performance in order to enhance exports, thus leading to a more stable economic growth. This will be achieved by analyzing the nature of the relationship between LPI and its components and exports. An applied research will be used as a strategy in order to investigate this relationship.

The research problem "explores the relation between exports and logistics performance which will help in influencing the trade in African and Mena countries", which was clearly identified in the introduction chapter, was divided into testable hypotheses. Seven testable hypotheses were derived to test the relationship LPI and its components and exports.

A quantitative research approach using an empirical analysis will be conducted through statistical techniques to test the hypotheses developed in the previous section by collecting quantifiable data (see next section) from official World Bank database about the variables under investigation which was identified earlier this chapter. Applied Research will be used as a research strategy, which is appropriate when the research is testing a theory or hypothesis. Following applied research requirements, a clear definition of the research problem must be provided, which is exploring the relation between exports and logistics performance which will help in influencing the trade in African and Mena countries, this relation will help in enhancing export and eventually economic growth through managing logistics performance. This

problem has been divided into seven testable hypotheses, which test mainly whether there is a relationship between logistics performance and exports, as well as the relationship between logistics performance components and exports. The, last step is to use statistical techniques to test the hypotheses using quantifiable data about LPI and exports. Hence this thesis falls under quantitative research.

3.4 Data Collection

According to world bank data base LPI was calculated for five years; 2007, 2010, 2012, 2014 and 2016. LPI score is available for 150 country in 2007, 155 in 2010 and 2012 and 160 in 2014 and 2016. For the purpose of this research only countries in Africa and MENA region is selected, however, any country that does not have an LPI score in any of the five years will be neglected, because there is no enough data to predict missing observations. 30 countries remained namely; Algeria, Angola, Benin, Burkina Faso, Cameroon, Chad, Egypt, Gabon, Ghana, Guinea, Guinea-Bissau, Jordan, Kenya, Kuwait, Lebanon, Liberia, Namibia, Niger, Oman, Qatar, Rwanda, Saudi, Arabia, Senegal, South Africa, Sudan, Tanzania, Togo, Tunisia and United Arab Emirates.

4. Results and Analysis

4.1 Unit Root Test

Data under investigation will be tested to determine whether or not the data are stationary on level.

H0: The variable has a unit root

LL (Levin, Lin and Chu) and Im, Pesaran and Shin W-stat tests will be carried out to accept or reject the null hypothesis table 4.1 shows the results of the test for all the variables, which indicate that the null hypothesis will be rejected for the variables under investigation. Variable does not contain unit root problem at level I(0)

Table 4.1. Unit Root Test Results				
	Levin, Lin and Chu		Im, Pesaran and Shin W-stat	
Variable	At level		At level	
Y	Statistic	-11.8538	Statistic	-2.06388
	Probability	0.0000	Probability	0.0195
X	Statistic	-26.5652	Statistic	-12.0310
	Probability	0.0000	Probability	0.0000
X1	Statistic	-10.6961	Statistic	-4.61948
	Probability	0.0000	Probability	0.0000
X2	Statistic	-11.5863	Statistic	-6.25312
	Probability	0.0000	Probability	0.0000
X3	Statistic	-13.4641	Statistic	-4.07631
	Probability	0.0000	Probability	0.0000
X4	Statistic	-12.4115	Statistic	-4.68488
	Probability	0.0000	Probability	0.0000
X5	Statistic	-12.3802	Statistic	-5.17494
	Probability	0.0000	Probability	0.0000

X6	Statistic	-15.6486	Statistic	-3.96845
	Probability	0.0000	Probability	0.0000

Note. Where Y is exports, X is over all LPI score, X1 is Customs, X2 is Infrastructure, X3 is International shipments, X4 is Logistics quality and competence, X5 is Tracking and tracing, X6 is Timeliness

4.2 Hausman Test

In this step Hausman test will be carried put to determine whether random effect or fixed effect is more appropriate for the data used in the research. Since most of the independent variables are highly correlated (see table 4.3) each variable will be tested separately, in addition to overall LPI.

H0: Random effect model is appropriate

The results in table 4.2 indicate that null hypothesis is rejected for the seven equation, which means fixed effect model is more appropriate.

Table 4.2 Hausman Test Results				
Variables		**Chi-Sq Statistic**	**Probability**	**Decision**
Y	Dependent	26.643632	0.0000	Fixed effect model
X	Independent			
Y	Dependent	16.766715	0.0000	Fixed effect model
X1	Independent			
Y	Dependent	32.835267	0.0000	Fixed effect model
X2	Independent			
Y	Dependent	19.752481	0.0000	Fixed effect model
X3	Independent			
Y	Dependent	27.283670	0.0000	Fixed effect model
X4	Independent			
Y	Dependent	28.455329	0.0000	Fixed effect model
X5	Independent			
Y	Dependent	32.823706	0.0000	Fixed effect model
X6	Independent			

Table 4.3. Correlation Matrix						
	X1	X2	X3	X4	X5	X6
X1	1.000000	0.876071	0.686035	0.806065	0.741277	0.680532
X2	0.876071	1.000000	0.745158	0.860029	0.782490	0.709283
X3	0.686035	0.745158	1.000000	0.738020	0.734920	0.643864
X4	0.806065	0.860029	0.738020	1.000000	0.859560	0.729233
X5	0.741277	0.782490	0.734920	0.859560	1.000000	0.753230
X6	0.680532	0.709283	0.643864	0.729233	0.753230	1.000000

4.3 Fixed Effect Model

After the confirmation that the fixed effect model is more appropriate, 7 models will be carried out to test the impact of LPI and its component on exports. Table 4.4 summarizes the coefficient and probabilities of each equation. From the results it can be concluded that LPI has a significant positive impact on exports. In addition, most of its components had a significant positive impact on exports. However, the two components X4 logistics quality and competence and X5 tracking and tracing, didn't have a significant impact on exports. The R-square value shows that LPI and its components namely; customs, infrastructure, international shipments, timeliness is responsible for approximately 97% of the variation in the exports. Table 4.5 summarizes the results of the research.

Table 4.4. Regression Model "Fixed Effect Model"		Coefficient	Probability	R-square
Y	Dependent	0.839478	0.0049	0.977907
X	Independent			
Y	Dependent	0.603152	0.0052	0.977886
X1	Independent			
Y	Dependent	0.606787	0.0057	0.977858
X2	Independent			
Y	Dependent	0.472918	0.0411	0.977199
X3	Independent			
Y	Dependent	0.443943	0.0569	0.977094
X4	Independent			
Y	Dependent	0.285920	0.1938	0.976717
X5	Independent			
Y	Dependent	0.484789	0.0454	0.977167
X6	Independent			

Table 4.5. Results Summary	
Null Hypothesis	**Result**
H1 : LPI does not affect exports	Accepted
H2 : Customs does not affect exports	Accepted
H3 : Infrastructure does not affect exports	Accepted
H4 : International shipments does not affect exports	Accepted
H5 : Logistics quality and competence does not affect exports	Rejected
H6 : Tracking and tracing does not affect exports	Rejected
H7 : Timeliness does not affect exports	Accepted

5. Conclusion

Logistics has a major effect on local and international trade which was the departing point to the main concept of the study which is investigating how can logistics performance enhance its exports and eventually its competiveness. Economic growth is affected greatly by the exports as it change the balance of payments of the country to the better, in addition it enhances domestic currency value. Logistics performance has to be measured and controlled as it was found that it enhances exports, which means the more the country control its logistics performance and more it can enhance its competitiveness through exports. Increase investment in the logistics sector will improve a country competitiveness growth (D'Aleo & Sergi, 2017), this research results could do the same for the region under investigation.

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