

# **Trade Facilitation in the Arab Region**

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## **Abstract**

This paper aims to assess the progress of trade facilitation in the Arab region, and subsequently to test the effect of trade facilitation on bilateral trade flows within this region.

Our findings support the fact that the performance of Arab countries' logistics system in general is still weak and needs to be improved, as indicated by World Bank's Logistics Performance Index (LPI). Vast divergence and discrepancy among Arab countries can be observed because of differences in income levels and political and war conditions.

Our estimation results indicate the weak role of trade facilitation in improving trade flows between Arab countries. Despite the fact that overall LPI is significant from both the exporting and the importing countries, its amount is relatively small compared with what previous research found regarding the same measures in other regions.

For robustness purposes, another model based on small sample of more sophisticated data set is estimated. Its estimation results are in line with the original model, but provide evidence that trade facilitation measures for exporting countries play relatively stronger role in enhancing their exports compared with the role of the importer.

Indeed, there is great potential for trade expansion in the Arab region. Efforts should be made to develop transportation which is fundamental to enhance regional integration and trade cooperation. In fact, improving intra-Arab trade requires addressing the various structural issues impeding trade development, such as removing the remaining tariff barriers and full implementing of the commitments under the GAFTA.

## 1. Introduction

Although numerous attempts by Arab countries to engage into various practices of regional economic integration, intra-trade between them is still extremely inadequate and implausible compared with various developed and developing regional groupings. Given the mutual features for these countries such as the common religion, history, language and culture, intra-Arab trade is inadequate and ineffective compared with what it should have been. (Limam and Abdalla, 1998)

In fact, several elements may justify the vulnerability of Intra-Arab trade and the failure of former Arab regional agreements to motivate trade amongst Arab countries. The major economic elements include: homogeneity of production structures and traded goods, insufficient and poor market information, weak transportation infrastructure, overprotection, lack of products competitiveness, and inefficient marketing strategies. Additional factors include colonial relations or the moral obligation to deep-rooted partners, and the bureaucracy and trade-related procedures. On top of the above mentioned factors, intra-Arab trade is very sensitive to political atmosphere and relationships that connect Arab countries. (Limam and Abdalla, 1998)

In fact, trade facilitation has grabbed the interest of policymakers, and has gained in importance as the global trade system has expanded and tariffs have fallen. Overall, trade facilitation refers to “The ease of moving goods across borders. This includes efficiency of customs administration and other agencies, quality of physical infrastructure as well as telecommunications, and a competent logistics sector” (Felipe and Kumar, 2010).

This paper aims to assess the performance and progress of trade facilitation in Arab economies. Additionally, the relationship between bilateral trade flows and trade facilitation will be examined. Because of lack of applied studies in trade facilitation in Arab countries, this paper will provide policymakers, stakeholders, and those who are in a position to make decisions regarding trade agreements and negotiations with evidence -based on actual data and appropriate econometrics techniques- about the relative effectiveness of possible interventions in specific areas of trade facilitation.

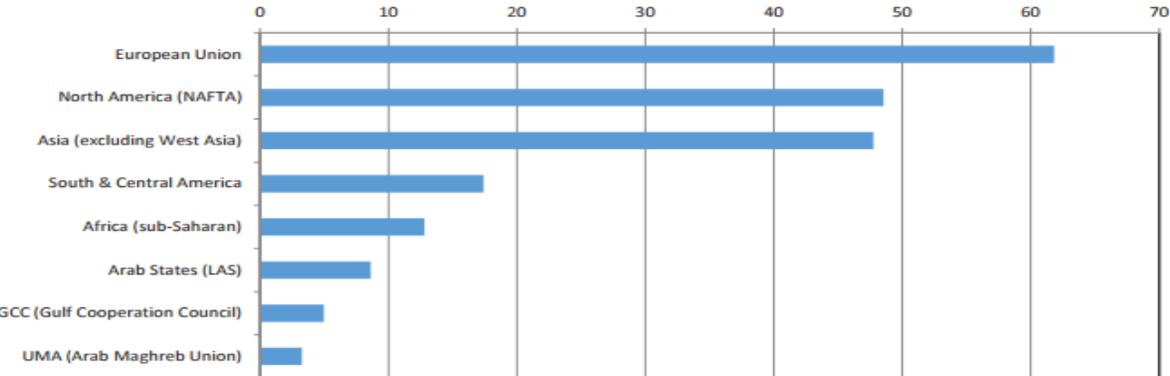
The rest of this paper is organized as follows. Section 2 analyzes various features of the Arab countries besides the economic challenges that they confront. Section 3 presents a

discussion of the state of logistics in the Arab countries. Literature review regarding previous work on the role of trade facilitation is provided in section 4. Section 5 discusses the estimation methodology and data. Section 6 presents the results. Section 7 tests the robustness of our analysis. Finally, Section 8 concludes and provides policy implications.

**2. Some facts about Arab Region<sup>1</sup>**

Trade in the Arab region is characterized as weak, with a very small per cent share of global trade except oil, with the weakest intra- regional trade in the world. Furthermore, sub-regional trade (such as Gulf Cooperation Council) is even weaker. In fact, the Arab region remains one of the least integrated regions of the world in terms of trade. Intra-regional exports only constitutes a small percent of the total exports of the Arab region compared to intra-regional exports in the European Union countries or in the North American Free Trade Agreement (NAFTA) zone, and also compared to other developing regions, Figures(1, 2 and 3).

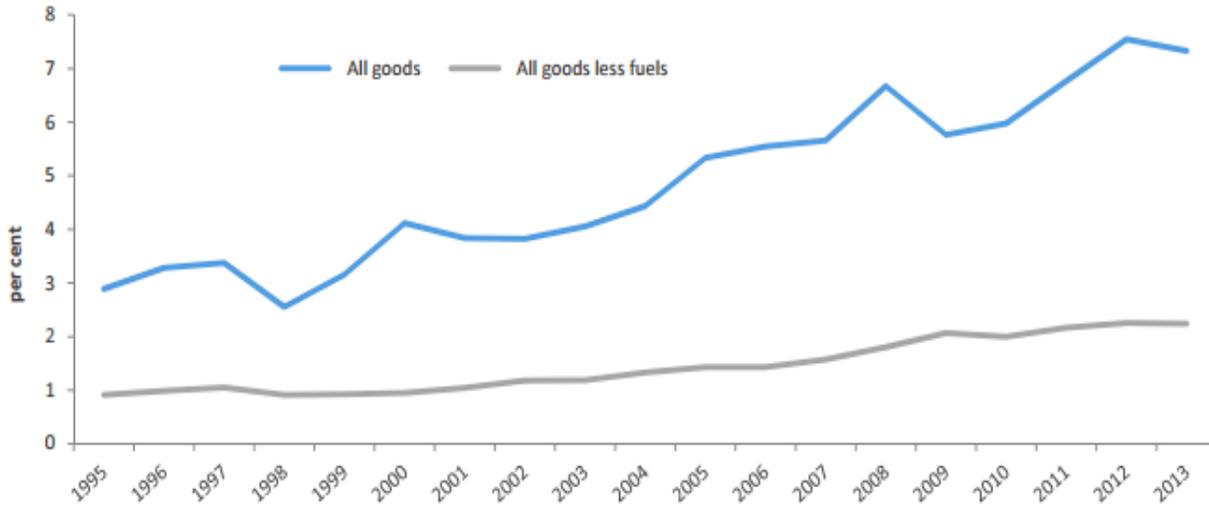
**Figure (1): Intra-Group Trade (%)in 2012**



Source: Hamwey, 2015.

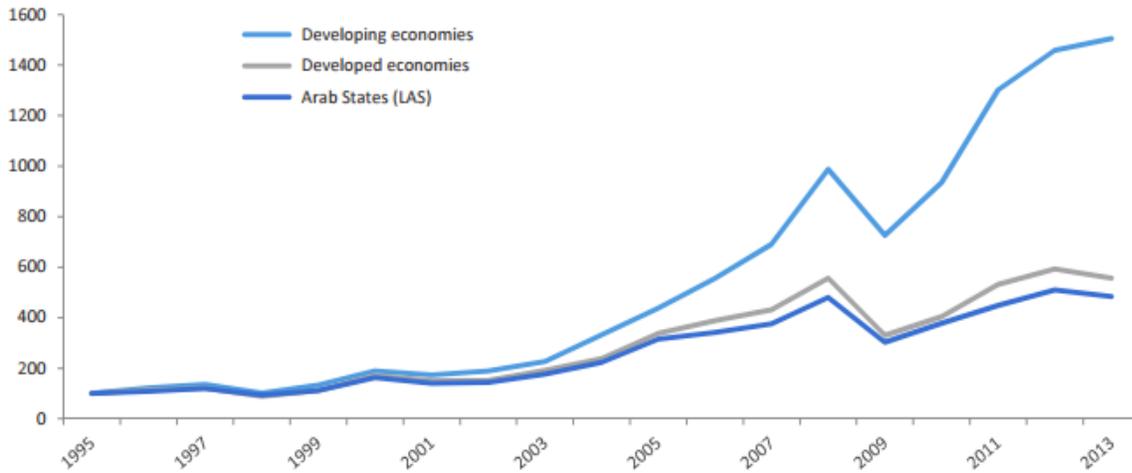
<sup>1</sup>ESCWA Booklet, 2013, and Hamwey, 2015.

**Figure(2):Arab Region Share of World Trade (1995-2013)**



Source: Hamwey, 2015.

**Figure(3): Relative Growth in LAS Exports by Destination (1995-2013)**



Source: Hamwey, 2015.

There are several reasons for the low level of intra-Arab trade. The most important causes include (Arab Booklet, 2013):

- High concentrations of exports, as most Arab countries are deeply reliant on a narrow range of export goods.
- High and complex non-tariff measures, where non-tariff measures still constitute an important barrier to the growth of intra-Arab trade despite the removal of tariff barriers on intra-Arab trade since 2005- in accordance with the provisions of the GAFTA. Besides, fees and taxes on export operations and financial measures associated with the pre-payment terms of imports and the allocation of foreign currency also constitute obstacles to intra-Arab trade. Additionally, most countries in the region still impose protectionist measures on trade-related services which constitute an obstacle to intra-Arab trade.
- Poor trade complementarity, since generally Arab countries produce goods that merely partly meet the demand in other Arab countries, while higher complementarity exists between Arab countries and partners outside the region-including the European Union, India, Turkey and the United States- than within the region.

### **3. State of Logistics in the Arab Countries**

Table (1) provides information about the development of the logistics performance Index (LPI) in the Arab countries. Evidently, trade facilitation in Arab Countries performs relatively low according to the latest available LPI index in 2014. Out of 160 countries, all but three countries in the region are ranked below the fifteenth position; including three of them are ranked above 150. The overall average rank for them is below the world's average. When analyzing individual countries, huge differences are observed among them. Their scores are ranged between 3.54 and 2.09, with ranks from 27<sup>th</sup> to 155<sup>th</sup>. Obviously, oil exporting Gulf countries achieve substantially higher scores and thus top ranks, while those Arab countries that are suffering from wars and unstable political conditions are ranked last. Comparing the scores and ranks with previous periods, clearly there is deterioration in all trade facilitation measures.

Starting from 2007, the average LPI for all Arab countries was higher than the world's average, except for the Logistics Services index which was little bit lower. Considerable improvement was achieved by the year 2010 when the LPI index grew by 2.5 % (based on the short list countries<sup>2</sup>), where all sub-indicators attained progress. Unfortunately, in 2012 average overall score for all Arab countries was lower than the World's average. However, based on the short list countries, the average LPI score was better than the world's average, but it registered a decline by 1.0% compared with its level on 2010. This negative trend continued in 2014 where the overall LPI score declined by 3.1% compared with its level in 2010. Clearly, all sub indicators witnessed scores below the World's average.

When looking at individual countries within the Arab region, massive differences can be observed. The United Arab Emirates is ranked the first in the region in all four periods, although its score declined from 3.73 in 2007 to 3.54 in 2014. Qatar's score improved significantly as it increased from 2.98 to 3.52 during the same period, to be ranked second in the region by 2014. According to Jordan, slight decline can be observed from 2.89 to 2.87 between the two periods, while it scored the lowest level in 2012 which amounted to 2.56. Yemen, Sudan, and Syria are ranked last between 151 and 155 in 2014, which reflects the war and unstable conditions experienced by those countries.

It is a fact; the performance of Arab countries' logistics system in general is still weak and needs to be improved as indicated by the World Bank's Logistics Performance Index (LPI). Vast divergence and discrepancy among Arab countries can be observed which is attributable to many reasons, of them are differences in income levels and unstable political and war conditions. Accordingly, while some Arab countries try to develop logistics activities to take advantage of opportunities, seeking to establish regional logistics platform, others not only are placed the lowest regarding the overall index, but are also at the bottom of the list as well in terms of various elements of LPI.

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<sup>2</sup> The short list Excludes Iraq, Morocco, and Libya because their data are not available for all periods, see table (1)

Table (1)

## The logistics performance Index

Country	2007													
	Overall LPI		Customs		Infrastructure		Ease of Shipment		Logistics Services		Ease of Tracking		Timelines	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank
Bahrain	3.15	36	3.40	22	3.40	27	3.33	27	2.75	59	3.00	47	3.00	84
Egypt	2.37	97	2.08	122	2.00	121	2.33	111	2.38	95	2.62	72	2.85	96
Jordan	2.89	52	2.62	54	2.62	56	3.08	39	3.00	41	2.85	57	3.17	68
Kuwait	2.99	44	2.50	59	2.83	46	2.60	76	3.00	47	3.33	32	3.75	32
Lebanon	2.37	98	2.17	107	2.14	102	2.50	88	2.40	93	2.33	101	2.67	115
Morocco	2.38	94	2.20	101	2.33	77	2.75	64	2.13	119	2.00	130	2.86	95
Oman	2.92	48	2.71	46	2.86	43	2.57	79	2.67	67	2.80	63	4.00	24
Qatar	2.98	46	2.44	67	2.63	55	3.00	46	3.00	43	3.17	38	3.67	38
Saudi Arabia	3.02	41	2.72	45	2.95	38	2.93	50	2.88	51	3.02	43	3.65	39
Sudan	2.71	64	2.36	79	2.36	73	2.67	68	2.83	55	2.92	51	3.17	67
Syria	2.09	135	2.17	108	1.91	131	2.00	138	1.80	145	2.00	137	2.67	118
Tunisia	2.76	60	2.83	39	2.83	44	2.86	55	2.43	88	2.83	60	2.80	105
United Arab Emirates	3.73	20	3.52	20	3.80	18	3.68	13	3.67	20	3.61	23	4.12	17
Yemen	2.29	112	2.18	105	2.08	111	2.20	123	2.22	111	2.30	104	2.78	108
<b>Average 2007 / Arab</b>	<b>2.76</b>		<b>2.564</b>		<b>2.62</b>		<b>2.7504</b>		<b>2.65</b>		<b>2.77</b>		<b>3.22</b>	

<b>Average 2007 / Arab*</b>	<b>2.79</b>		<b>2.59</b>		<b>2.65</b>		<b>2.7505</b>		<b>2.69</b>		<b>2.83</b>		<b>3.25</b>	
<b>Average 2007 / World</b>	<b>2.74</b>		<b>2.556</b>		<b>2.58</b>		<b>2.72</b>		<b>2.71</b>		<b>2.73</b>		<b>3.17</b>	
	<b>2010</b>													
Bahrain	3.37	32	3.05	37	3.36	30	3.05	54	3.36	30	3.63	26	3.85	39
Egypt, Arab Rep.	2.61	92	2.11	122	2.22	106	2.56	110	2.87	54	2.56	101	3.31	81
Iraq	2.11	148	2.07	130	1.73	147	2.20	144	2.10	140	1.96	150	2.49	148
Jordan	2.74	81	2.31	93	2.69	55	3.11	49	2.49	90	2.33	133	3.39	78
Kuwait	3.28	36	3.03	38	3.33	32	3.12	47	3.11	43	3.44	34	3.70	52
Lebanon	3.34	33	3.27	29	3.05	41	2.87	69	3.73	19	3.16	49	3.97	29
Libya	2.33	132	2.15	116	2.18	107	2.28	140	2.28	121	2.08	143	2.98	124
Oman	2.84	60	3.38	24	3.06	40	2.31	137	2.37	108	2.04	145	3.94	32
Qatar	2.95	55	2.25	99	2.75	51	2.92	63	2.57	81	3.09	57	4.09	22
Saudi Arabia	3.22	40	2.91	43	3.27	33	2.80	82	3.33	32	3.32	42	3.78	45
Sudan	2.21	146	2.02	139	1.78	144	2.11	151	2.15	135	2.02	148	3.09	108
Syrian Arab Republic	2.74	80	2.37	83	2.45	75	2.87	68	2.59	75	2.63	95	3.45	74
Tunisia	2.84	61	2.43	73	2.56	65	3.36	22	2.36	109	2.56	102	3.57	58
United Arab Emirates	3.63	24	3.49	21	3.81	17	3.48	14	3.53	27	3.58	28	3.94	33
Yemen, Rep.	2.58	101	2.46	69	2.35	88	2.24	142	2.35	110	2.63	94	3.48	68
<b>Average 2010 / Arab</b>	<b>2.85</b>		<b>2.62</b>		<b>2.71</b>		<b>2.75</b>		<b>2.75</b>		<b>2.735</b>		<b>3.53</b>	
<b>Average 2010 / Arab*</b>	<b>2.95</b>		<b>2.70</b>		<b>2.82</b>		<b>2.83</b>		<b>2.83</b>		<b>2.85</b>		<b>3.66</b>	
<b>Average 2010 / World</b>	<b>2.74</b>		<b>2.56</b>		<b>2.58</b>		<b>2.72</b>		<b>2.71</b>		<b>2.729</b>		<b>3.17</b>	

\* Excluding Iraq, Mrocco, and Libya because their data are not available for all periods.

Table (1 cont.....)

Table (1)

## The logistics performance Index

Co9untry	2012													
	Overall LPI		Custo ms		Infrastr ucture		Ease of Shipmen t		Logistics Services		Ease of Tracking		Time lines s	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Scor e	Rank
Bahrain	3.05	48	2.67	60	3.08	43	2.83	72	4.10	3	3.97	11	3.79	31
Egypt, Arab Rep.	2.98	57	2.60	69	3.07	45	3.00	51	3.34	31	3.17	46	3.40	63
Iraq	2.16	145	1.75	152	1.92	146	2.38	126	2.68	84	2.98	62	3.11	87
Jordan	2.56	102	2.27	115	2.48	91	2.88	63	2.80	66	3.07	55	3.14	82
Kuwait	2.83	70	2.73	53	2.82	61	2.68	90	2.65	90	2.58	96	3.42	59
Lebanon	2.58	96	2.21	124	2.41	102	2.71	85	2.73	78	2.69	84	3.36	65
Libya	2.28	137	2.08	135	1.75	152	2.63	99	2.75	74	2.83	70	2.73	132
Morocco	3.03	50	2.64	65	3.14	39	3.01	46	2.50	103	2.77	78	2.95	104
Oman	2.89	62	3.10	36	2.96	49	2.78	77	2.55	99	2.10	145	2.74	130
Qatar	3.32	33	3.12	34	3.23	34	2.88	64	2.46	108	2.42	119	2.84	117
Saudi Arabia	3.18	37	2.79	51	3.22	35	3.10	42	2.18	136	2.48	112	3.12	85
Sudan	2.10	148	2.14	131	2.01	140	1.93	150	2.16	139	2.10	146	2.80	119
Syria	2.60	92	2.33	104	2.54	84	2.62	100	2.00	149	2.00	147	2.59	141
Tunisia	3.17	41	3.13	33	2.88	54	2.88	65	2.21	131	2.26	136	2.31	152
Emirates	3.78	17	3.61	15	3.84	17	3.59	15	2.03	148	1.83	152	2.43	148

Yemen, Rep.	2.89	63	2.29	110	2.62	74	3.14	38	1.84	153	1.73	153	2.19	154
<b>Average 2012 / Arab</b>	<b>2.84</b>		<b>2.59</b>		<b>2.75</b>		<b>2.816</b>		<b>2.56</b>		<b>2.56</b>		<b>2.931</b>	
<b>Average 2012 / Arab*</b>	<b>2.92</b>		<b>2.69</b>		<b>2.86</b>		<b>2.85</b>		<b>2.54</b>		<b>2.49</b>		<b>2.932</b>	
<b>Average 2012 / World</b>	<b>2.87</b>		<b>2.66</b>		<b>2.76</b>		<b>2.824</b>		<b>2.82</b>		<b>2.88</b>		<b>3.26</b>	
	<b>2014</b>													
Bahrain	3.08	52	3.29	30	3.04	49	3.04	58	3.04	51	3.29	42	2.80	119
Egypt, Arab Rep.	2.97	62	2.85	57	2.86	60	2.87	77	2.99	58	3.23	43	2.99	99
Iraq	2.30	141	1.98	149	2.18	131	2.31	139	2.15	147	2.31	136	2.85	116
Jordan	2.87	68	2.60	78	2.59	76	2.96	65	2.94	60	2.67	96	3.46	58
Kuwait	3.01	56	2.69	68	3.16	43	2.76	89	2.96	59	3.16	50	3.39	60
Lebanon	2.73	85	2.29	124	2.53	89	2.53	118	2.89	67	3.22	44	2.89	108
Libya	2.50	118	2.41	104	2.29	119	2.29	140	2.29	131	2.85	78	2.85	114
Oman	3.00	59	2.63	74	2.88	57	3.41	31	2.84	73	2.84	80	3.29	67
Qatar	3.52	29	3.21	37	3.44	29	3.55	16	3.55	28	3.47	32	3.87	34
Saudi Arabia	3.15	49	2.86	56	3.34	34	2.93	70	3.11	48	3.15	54	3.55	47
Sudan	2.16	153	1.87	155	1.90	152	2.23	144	2.18	144	2.42	125	2.33	156
Syria	2.09	155	2.07	142	2.08	144	2.15	150	1.82	159	1.90	158	2.53	145
Tunisia	2.55	110	2.02	146	2.30	118	2.91	73	2.42	120	2.42	124	3.16	80
Emirates	3.54	27	3.42	25	3.70	21	3.20	43	3.50	31	3.57	24	3.92	32
Yemen, Rep.	2.18	151	1.63	159	1.87	153	2.35	134	2.21	141	2.21	144	2.78	124
<b>Average 2014 / Arab</b>	<b>2.78</b>		<b>2.52</b>		<b>2.68</b>		<b>2.77</b>		<b>2.73</b>		<b>2.85</b>		<b>3.11</b>	
<b>Average 2014 / Arab*</b>	<b>2.83</b>		<b>2.57</b>		<b>2.75</b>		<b>2.84</b>		<b>2.80</b>		<b>2.89</b>		<b>3.15</b>	
<b>Average 2014 / World</b>	<b>2.89</b>		<b>2.73</b>		<b>2.77</b>		<b>2.86</b>		<b>2.85</b>		<b>2.90</b>		<b>3.25</b>	

\* Excluding Iraq, Mrocco, and Libya because their data are not available for all periods.

#### **4. Literature Review**

(Liapis, 2015) provided evidence that many countries across the geographic and income spectrum improved their performance on several trade facilitation variables. The paper suggested that further enhancements to trade facilitation in many low and lower middle income countries are required to come up to better practices.

The OECD and the WTO (2013) additionally gave evidence that the removal of obstacles to trade, the reduction of customs delays and border procedures, and the reduction of transport costs are key priorities for future aid-for-trade initiatives in the agro-food sector.

Arvis et al. (2013) suggested that trade facilitation policy should pay special attention to improving transport and logistics performance, particularly in low income countries and in Sub-Saharan Africa where these could have highly significant impacts on trade costs.

Wilson et al. (2003), Fink et al. (2005), Hammar (2008), Felipe and Kumar (2010) Otsuki (2011) and Moïsé, (2013) examined the relationship among trade facilitation and trade flows in various countries. They provided evidence that applying trade facilitation measures will result in substantial benefits that outweigh their costs. Additionally, Hertel and Mirza (2009) used the World Bank's LPI to give thorough analysis for various trade facilitation dimensions.

With respect to the Arab region, several studies assessed the trade performance among Arab countries. (Al-Atrash and Yousef, 2000) estimated a gravity model to reveal if intra-Arab trade is too little. The findings of this paper indicated that intra-Arab trade and Arab trade with the rest of the world are lower than the gravity equation predictions. Consequently, substantial benefits may result from regional and multilateral – integration.

By applying a gravity model, (Elafif, 2008) analyzed the determinant of intra-Arab trade throughout the period of 1985-2005. This paper argued that expanding the possibility of intra-Arab trade needs harmonization of the economic policies and the trade practices between sub-regional unions of Arab countries specifically, or amongst all Arab countries in general.

(Abu Hatab, 2015) assessed the impact of Arab integration arrangements on intra-Arab Agrifood trade. The main results indicated that Arab regional integration efforts have been ineffective in promoting Agrifood trade flows among the Arab countries. Moreover, the results showed that actual intra-Arab Agrifood trade is consistently lower than the predicted values by the gravity model. Arab sub-regional trade agreements also have had a modest impact on intra-Arab Agrifood trade.

Overall, using several trade facilitation measures, previous studies revealed that trade facilitation is expected to enhance trade flows and to result in many benefits. (Figure (4) below shows a summary of major results from previous research in trade facilitation). In view of that, this study uses the latest available LPI for the year 2014 in addition to all available past periods: 2007, 2010, and 2012. It applies pooled data analysis to capture the effect of trade facilitation on trade volume over time and across Arab countries. To the knowledge of the researcher, there is lack of applied studies concerning trade facilitation in the Arab region.

**Figure (4): Summary of Major Results from Previous Research in Trade Facilitation**  
**Using Different Indicators**

Indicator	Study	Country set	Sector	Change in trade flows	Change in trade costs
Number of days to import	Liapis (2011)	214 countries and regions	-aggregate agri. -processed goods	10% reduction implies 22% increase in aggregate agri., but no effect in processed goods	
	Martinez-Zarzoso and Marquez-Ramos (2008)	13 exporters and 167 importers	- coffee, tea, cocoa, spices and manuf. thereof	10% reduction implies a 2.4% increase	
Number of days to export	Liapis (2011)	214 countries and regions	-aggregate agri. -processed goods	10% reduction implies increase of 9.8% for aggregate agri. And 17% for processed goods	
	Persson (2013)	Imports to 25 EU countries from 152 developing countries	-all agriculture, split by sectors	10% reduction implies increases in number of prod. traded between 0 and 5.6% depending on sector	
	Martinez-Zarzoso and Marquez-Ramos (2008) Djankov, Freund and Pham (2006, 2010)	13 exporters and 167 importers 146 countries	- coffee, tea, cocoa, spices and manuf. thereof -time sensitive fruits and vegetables	10% reductions implies a 3.3% increase in bilateral trade 10% decrease implies 3.5% increase in exports	
Number of documents	Liapis (2011)	214 countries and regions	-aggregate agri. -processed goods	non-significant	
	Martinez-Zarzoso and Marquez-Ramos (2008)	13 exporters and 167 importers	- coffee, tea, cocoa, spices and manuf. thereof	10% increase in number of doc. for imports implies a 1.1% increase	
	Freund and Rocha (2010) Weerahewa (2009)	Africa exports; 146 countries SAARC countries	- time sensitive agri. goods -aggregate agri.	non-significant 1 point increase in LPI is associated with an increase in value of agricultural exports by 25.01%	
Infrastructure quality index	Moisé et al. (2013b)	64 developing countries	-aggregate agri.	10% increase is associated with a 30% increase in exports	
Road density	Jongwanich (2009)	79 developing countries	-aggregate agri.	Non-significant	
	Jongwanich and Magtibay-Ramos (2009)	79 developing countries	-aggregate agri.	1% increase in the squared value increases share of processed goods by 0.01%	

Source: Liapis, Peter. Agricultural Specific Trade Facilitation Indicators: An Overview, OECD 2015

Figure (4cont....): Summary of Major Results from Previous Research in Trade Facilitation

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	Martinez-Zarzoso and Marquez-Ramos (2008) Djankov, Freund and Pham (2006, 2010)	13 exporters and 167 importers 146 countries	- coffee, tea, cocoa, spices and manuf. thereof -time sensitive fruits and vegetables	10% reductions implies a 3.3% increase in bilateral trade 10% decrease implies 3.5% increase in exports	
Number of documents	Liapis (2011)	214 countries and regions	-aggregate agri. -processed goods	non-significant	
	Martinez-Zarzoso and Marquez-Ramos (2008) Freund and Rocha (2010)	13 exporters and 167 importers Africa exports; 146 countries	- coffee, tea, cocoa, spices and manuf. thereof - time sensitive agri. goods	10% increase in number of doc. for imports implies a 1.1% increase non-significant	
	Weerahewa (2009)	SAARC countries	-aggregate agri.	1 point increase in LPI is associated with an increase in value of agricultural exports by 25.01%	
Infrastructure quality index	Moisé et al. (2013b)	64 developing countries	-aggregate agri.	10% increase is associated with a 30% increase in exports	
Road density	Jongwanich (2009)	79 developing countries	-aggregate agri.	Non-significant	
	Jongwanich and Magtibay-Ramos (2009)	79 developing countries	-aggregate agri.	1% increase in the squared value increases share of processed goods by 0.01%	

Source: Liapis, Peter. Agricultural Specific Trade Facilitation Indicators: An Overview, OECD 2015

## 5. Methodology

We estimated a modified gravity model equation to analyze the effect of trade facilitation measures and other factors on the flow of exports within the ARAB region. The modified model contains a number of variables that represent other factors that may influence trade in addition to income and distance. The estimation is performed as follows:

$$\text{Log}(X_{ij}) = \alpha + \beta_1 \log(\text{PCGDP}_i) + \beta_2 \log(\text{PCGDP}_j) + \beta_3 \log(D_{ji}) + \beta_4 \log(\text{POP}_i) + \beta_5 \log(\text{POP}_j) + \beta_6 (\text{Border}_{ji}) + \beta_7 (\text{LPI}_i) + \beta_8 (\text{LPI}_j) + u_{ij} \dots \dots \dots (3)$$

Where  $i$  is the exporting country, and  $j$  denotes the importing country.  $X_{ij}$  indicates the value of exports from  $i$  to  $j$ . The explanatory variables in the gravity model are defined as follows:

$\text{POP}_{i \text{ or } j}$ : population of the country as a measure for the size of the economy.

$\text{PCGDP}_{i \text{ or } j}$ : the per capita income based on purchasing power parity.

$D_{ji}$ : is the distance between country  $i$  and country  $j$  measured by the air routes using the straight – line or great -circle measure of distance.

$\text{Border}_{ji}$ : a dummy variable to identify if a country shares a border with the importing country. It is equal to 1 if countries  $i$  and  $j$  share a common border and 0 when they do not.

$\text{LPI}_{i \text{ or } j}$ : Logistics Performance Index.

$U_{ij}$ : is a log-normally disturbance error term.

### 6.1 Study Sample:

The dependent variable in our analysis is the natural log of total exports measured in current international prices (dollar value). Our trade data source is derived from the COMTRADE database and covers the Arab countries. Observations for all variables are taken in four periods (2007, 2010, 2012, and 2014), as LPI Index is available only for these periods.

The data source for PCGDP and POP is the World Economic Outlook published by the IMF. Bilateral distance is measured, in miles, as the great circle distance between two capital cities of the trading partners. Bilateral distance is from the data set developed by

<http://www.freemaptools.com/how-far-is-it-between.htm>

## **6. Estimation Results:**

### **6.1 Estimation Technique<sup>3</sup>**

Pooled data can be estimated using fixed effects (FEM) or random effects (REM) models. The choice between them depends upon the possible correlation among the cross-section specific error component  $e_i$  and the regressors  $X$ 's. If it is assumed that  $e_i$  and  $X$ 's are uncorrelated, (REM) may be appropriate, whereas if  $e_i$  and  $X$ 's are correlated, (FEM) may be suitable. Additionally, the choice between (FEM) or (REM) depends upon whether we have short panel or long panel. In our analysis, we have a short panel. That is, the number of cross-sectional subjects, 185 is greater than the number of time periods, 4. In this case, the estimates obtained by the two methods can differ significantly. Gujarati, (2009) explained that when  $N$  (number of cross-sections) is large and  $T$  (number of time periods) is small, (REM) estimators are more efficient than (FEM) estimators. So, our results are based on (REM) estimation. We estimated Equation (3) by applying the generalized least squares technique (GLS) with panel data for the period (2007 – 2014). GLS estimates are efficient and consistent, which eliminates serial correlation and heteroscedasticity.

### **6.2 Stationarity of the Variables**

Levin and Lin (1992, 1993) and Levin, Lin and Chu (LLC) (2002) thereafter provided some results on panel unit root tests. They developed a procedure using pooled  $t$ -statistic of the estimator to evaluate hypothesis that each individual time series contains a unit root against the alternative hypothesis that each time series is stationary.

To conduct the (LLC) panel unit root test, panels have to be balanced. All panels in this study are balanced, since each cross-sectional unit has the same number of time series observations, which enable conducting the (LLC) test. Table (2) below contains this test results for variables' levels. It is clearly shown that the null hypothesis of a unit root is rejected at extremely low probability of obtaining type I error for all cases. Thus all variables are trend stationary series.

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<sup>3</sup>Gujarati and Porter, (2009).

Table (2)  
Unit Root Test  
Levin, Lin & Chu t\*

	Statistic	Prob.**
INFL1	-27.0529	0.0000
INFL2	-40.9404	0.0000
LNINFRA_S1	-8.92671	0.0000
LNINFRA_S2	-17.3463	0.0000
LNCUS_S1	-5.85014	0.0000
LNCUS_S2	-44.386	0.0000
LNEXP1	-48.4313	0.0000
LNLOGSERV_S1	-13.5548	0.0000
LNPCGDP1	-51.7084	0.0000
LNLOGSERV_S2	-16.2406	0.0000
LNPCGDP2	-22.6619	0.0000
LNPOP1	-9.33882	0.0000
LNPOP2	-3.60771	0.0002
LNLPI_S1	-7.9834	0.0000
LNLPI_S2	-31.5491	0.0000
LNSHIP_S1	-9.85054	0.0000
LNSHIP_S2	-11.4627	0.0000
LNTIME_S1	-91.9953	0.0000
LNTIME_S2	-41.2811	0.0000
LNTRACK_S1	-13.8152	0.0000
LNTRACK_S2	-16.968	0.0000

### 7.3 Correlation Matrix:

As can be seen in table (3a), the basic Gravity model variables are not strongly correlated. To assure that there is no multicollinearity in the model, variance inflation factor test (VIF) is applied, where its value is found to be less than 4 for all possible scenarios. This provides sufficient evidence that no statistical problem will result from including the variables in the same model.

On the other hand, as table (3b) shows, the LPI sub-measures are extremely correlated. So any specification that involves all the six components of LPI will experience multicollinearity problem. Essentially, this will cause statistically insignificant estimators or may cause opposite

sign. To prevent this problem, we apply them separately in different regression models, keeping other main and control variables. Table (4) presents the summary statistics.

**Table (3. a): Correlation Matrix for the Basic Model**

	<b>LNDIST_FLY</b>	<b>LNLPI_R1</b>	<b>LNLPI_R2</b>	<b>LNPCGDP1</b>	<b>LNPCGDP2</b>	<b>LNPOP1</b>	<b>LNPOP2</b>	<b>INFL1</b>	<b>INFL2</b>	<b>BORDER</b>
<b>LNDIST_FLY</b>	<b>1</b>									
<b>LNLPI_R1</b>	<b>0.13</b>	<b>1</b>								
<b>LNLPI_R2</b>	<b>0.19</b>	<b>-0.07</b>	<b>1</b>							
<b>LNPCGDP1</b>	<b>-0.32</b>	<b>-0.61</b>	<b>0.06</b>	<b>1</b>						
<b>LNPCGDP2</b>	<b>-0.29</b>	<b>0.03</b>	<b>-0.68</b>	<b>-0.06</b>	<b>1</b>					
<b>LNPOP1</b>	<b>0.25</b>	<b>0.42</b>	<b>-0.04</b>	<b>-0.70</b>	<b>0.04</b>	<b>1</b>				
<b>LNPOP2</b>	<b>0.19</b>	<b>-0.01</b>	<b>0.41</b>	<b>0.05</b>	<b>-0.65</b>	<b>-0.07</b>	<b>1</b>			
<b>INFL1</b>	<b>-0.01</b>	<b>0.16</b>	<b>-0.03</b>	<b>-0.30</b>	<b>0.01</b>	<b>0.46</b>	<b>-0.06</b>	<b>1</b>		
<b>INFL2</b>	<b>0.09</b>	<b>-0.01</b>	<b>0.32</b>	<b>0.01</b>	<b>-0.36</b>	<b>-0.02</b>	<b>0.32</b>	<b>-0.03</b>	<b>1</b>	
<b>BORDER</b>	<b>-0.35</b>	<b>-0.04</b>	<b>-0.05</b>	<b>0.06</b>	<b>0.08</b>	<b>0.06</b>	<b>0.11</b>	<b>0.00</b>	<b>-0.01</b>	<b>1</b>

Table (3.b): Correlation Matrix between the LPI Sub-Measures

	CUS1	CUS2	INFR1	INFR2	LOGS1	LOGS2	LPI1	LPI2	SHIP1	SHIP2	TIME1	TIME2	TRACK1	TRACK2
LNCUS_S1	1													
LNCUS_S2	-0.08	1												
LNINFRA_S1	0.85	-0.06	1											
LNINFRA_S2	-0.06	0.91	-0.05	1										
LNLOGSERV_S1	0.43	-0.04	0.56	-0.03	1									
LNLOGSERV_S2	0.00	0.49	-0.03	0.57	-0.04	1								
LNLPI_S1	0.81	-0.06	0.93	-0.05	0.59	-0.02	1							
LNLPI_S2	-0.06	0.89	-0.05	0.96	-0.03	0.63	-0.05	1						
LNSHIP_S1	0.43	-0.06	0.64	-0.05	0.35	-0.04	0.70	0.06	1					
LNSHIP_S2	-0.05	0.67	-0.05	0.80	-0.03	0.53	-0.06	0.85	-0.07	1				
LNTIME_S1	0.22	0.02	0.39	-0.01	0.66	0.05	0.40	0.01	0.13	-0.02	1			
LNTIME_S2	0.00	0.40	-0.05	0.52	-0.04	0.76	-0.02	0.53	-0.10	0.38	0.17	1		
LNTRACK_S1	0.31	-0.04	0.49	-0.03	0.88	-0.04	0.52	0.04	0.33	-0.03	0.62	-0.03	1	
LNTRACK_S2	0.02	0.40	-0.02	0.50	-0.02	0.91	0.00	0.55	-0.01	0.47	0.05	0.72	-0.01	1

#### 7.4. Results

The estimation results are consistent with the literature as shown in table (4) below. All of our estimated coefficients are statistically significant with the expected signs in the economic theory. The size of the trading partners represented by population positively impacts trade flows. GDP per capita has positive and statistically significant impact on trade flows. The estimated coefficients are individually highly significant, for the p-values are so low. The F statistics is also very high, suggesting that collectively, all variables are statistically important. R-square is reasonable, providing plausible explanatory power.

Regarding our main variable LPI, the results showed that an enhancement in trade facilitation (LPI) of the exporting country by 1% increases trade flow by 0.70%. Trade facilitation of the exporter has a little higher effect on trade flows. Improving trade facilitation

(LPI) of the importing country by 1% increases imports by 0.66%. The results revealed that there are slight gains in trade from improving trade facilitation in Arab countries.

Additionally, we test the impact of the individual components of LPI. As mentioned previously, due to potential multicollinearity, we use separate models for each of the LPI measures. Estimation results are presented in table 4. Coefficients on other variables are qualitatively similar to the benchmark results reported when applying the overall LPI.

Customs efficiency of the exporter has impact on trade flows from both the importer and the exporter. Our results show that an improvement in customs efficiency of the exporting country by 1% improves trade flows by 0.69%, and improvement in customs efficiency of the importing country by 1% improves trade flows by 0.56%. According to infrastructure, it seems to have greater impact from the exporting country too, where enhancement in infrastructure of the exporting country by 1% improves trade flows by 0.82%, and improvement in infrastructure of the importing country by 1% increases trade flows by 0.60%.

Shipment efficiency matters only from importing country where enhancement in shipment efficiency of the importing country by 1% improves trade flows by 0.81%, while it is insignificant for exporting country. In contrast, logistics efficiency matters only from exporting country where improvement in logistics efficiency of the exporting country by 1% increases trade flows by 0.68%, while it is insignificant for the importing country. Finally, track and time efficiencies are insignificant from either the exporter or the importer. Clearly, various aspects of trade facilitation impact trade differently.

The above mentioned estimation results imply that trade facilitation has minor role in developing trade flows between Arab countries. Even though the overall LPI is significant from both the exporting and the importing countries, its magnitude is relatively small compared with what previous research find regarding the same measures in other regions.

**Table (4): Regression Results for the Gravity Model (all countries)**

Variable	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	Coefficient	Prob.												
C	4.645444	0.0263	4.468018	0.0319	5.812289	0.0063	4.390749	0.0268	4.272077	0.0343	3.817062	0.0581	3.615354	0.086
BORDER	0.634198	0.0224	0.600312	0.0311	0.632793	0.0214	0.658686	0.0126	0.631957	0.0191	0.590487	0.0278	0.596431	0.0359
LNDIST_FLY_	-1.152594	0.0000	-1.167179	0.0000	-1.177623	0.0000	-1.112239	0.0000	-1.154871	0.0000	-1.141896	0.0000	-1.133202	0.0000
LNPCGDP1	1.03636	0.0000	1.04636	0.0000	0.981047	0.0000	1.01994	0.0000	1.079752	0.0000	1.09161	0.0000	1.113424	0.0000
LNPCGDP2	0.622341	0.0000	0.652563	0.0000	0.58587	0.0000	0.680158	0.0000	0.639742	0.0000	0.733811	0.0000	0.722837	0.0000
LNPOP1	0.817591	0.0000	0.842987	0.0000	0.800979	0.0000	0.804875	0.0000	0.821744	0.0000	0.847352	0.0000	0.854394	0.0000
LNPOP2	0.710679	0.0000	0.735477	0.0000	0.693227	0.0000	0.721984	0.0000	0.724874	0.0000	0.749501	0.0000	0.752868	0.0000
LNLPI_S1	0.702158	0.0513												
LNLPI_S2	0.662204	0.0686												
LNCUS_S1			0.69421	0.0051										
LNCUS_S2			0.563282	0.0287										
LNINFRA_S1					0.817049	0.0041								
LNINFRA_S2					0.597891	0.0304								
LNLOGSERV_S1							0.683749	0.0061						
LNLOGSERV_S2							0.301173	0.1562						
LNSHIP_S1									0.328233	0.2676				
LNSHIP_S2									0.811476	0.0091				
LNTIME_S1											0.339346	0.1404		
LNTIME_S2											-0.025246	0.9129		
LNTRACK_S1													0.182099	0.4219
LNTRACK_S2													0.199296	0.2877
R-squared	0.473088		0.477013		0.480389		0.481686		0.476069		0.472144		0.463845	
Adjusted R-squared	0.463442		0.467439		0.470877		0.472198		0.466477		0.462481		0.45403	
S.E. of regression	0.580439		0.575792		0.578977		0.593994		0.585293		0.59278		0.577679	
F-statistic	49.04514		49.82313		50.50182		50.76488		49.63487		48.85974		47.2579	
Prob(F-statistic)	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	

**Table 5: Regression Results for the Gravity Model (reduced sample)**

Variable	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	Coefficient	Prob.												
C	5.361275	0.0248	6.912691	0.0043	7.550554	0.0019	5.08303	0.0338	5.556232	0.0201	5.102857	0.0373	5.368743	0.0264
BORDER	0.805263	0.0027	0.742916	0.0053	0.778478	0.0035	0.849716	0.0017	0.807857	0.0023	0.757455	0.0046	0.783218	0.0037
LNDIST_FLY_	-0.931617	0.0000	-0.956135	0.0000	-0.955554	0.0000	-0.926959	0.0000	-0.951707	0.0000	-0.956999	0.0000	-0.946651	0.0000
LNPCGDP1	0.508174	0.0065	0.439273	0.0249	0.434678	0.0226	0.663106	0.0003	0.643749	0.0004	0.70285	0.0001	0.687521	0.0002
LNPCGDP2	0.821177	0.0000	0.881219	0.0000	0.778108	0.0000	0.870742	0.0000	0.846603	0.0000	0.93444	0.0000	0.914758	0.0000
LNPOP1	0.698427	0.0000	0.697717	0.0000	0.686813	0.0000	0.703341	0.0000	0.702883	0.0000	0.726334	0.0000	0.715776	0.0000
LNPOP2	0.858098	0.0000	0.901884	0.0000	0.848454	0.0000	0.848451	0.0000	0.864198	0.0000	0.898031	0.0000	0.889287	0.0000
LNLPI_S1	2.039378	0.0004												
LNLPI_S2	0.776393	0.0476												
LNCUS_S1			1.143679	0.0009										
LNCUS_S2			0.470523	0.084										
LNINFRA_S1					1.315562	0.0004								
LNINFRA_S2					0.80302	0.0073								
LNLOGSERV_S1							0.908049	0.0024						
LNLOGSERV_S2							0.206849	0.3984						
LNSHIP_S1									0.528452	0.1351				
LNSHIP_S2									0.700368	0.0454				
LNTIME_S1											0.240964	0.4098		
LNTIME_S2											-0.096521	0.7042		
LNTRACK_S1													0.137949	0.5885
LNTRACK_S2													0.081198	0.7062
R-squared	0.62553		0.618926		0.631795		0.615534		0.614197		0.601294		0.602123	
Adjusted R-squared	0.610476		0.603606		0.616993		0.600078		0.598687		0.585266		0.586128	
S.E. of regression	0.477093		0.480186		0.473625		0.485512		0.493038		0.496001		0.497436	
F-statistic	41.55223		40.40097		42.68255		39.8251		39.60089		37.51434		37.64431	
Prob(F-statistic)	0.0000		0.0000		0.0000		0.0000		0.0000		0.0000		0.0000	

## 8. Robustness

To check the robustness of our findings, we present our estimations for only four countries of our sample. These countries are: Egypt, Oman, Bahrain, and Jordan. The choice of the countries is based on the availability of consistent data for these countries for all variables and for all years: 2007, 2010, 2012, and 2014, while all other countries have missing data for certain years and/ or for some variables.

Table (5) shows the results from the estimation. Our results are in line with the results found previously. Not only all of our estimated coefficients are statistically significant with the expected signs in the economic theory, but also the estimated models are preferable in terms of their explanatory power and the magnitudes of LPI parameters. The size of the trading partners represented by population positively impacts trade flows. GDP per capita has positive and statistically significant impact on trade flows. The estimated coefficients are individually highly significant, for the p-values are so low. The F-statistics is also very high, suggesting that collectively, all variables are statistically important. R- Square is reasonable, providing plausible explanatory power.

Concerning the LPI variable, the results showed that an improvement in trade facilitation (LPI) of the exporting country by 1% increases trade flows by 2.04%. Trade facilitation of the exporter has much higher impact on trade flows than of the importer. Imports will increase only by 0.78% when trade facilitation (LPI) of the importing country improves by 1%. For the four country sample, these results show that there are significant gains in trade from improving trade facilitation in the exporting country.

Furthermore, we test the impact of the individual components of LPI. As mentioned previously, due to potential multicollinearity, we use separate models for each of the LPI measures. Estimation results are presented in Table (5). Coefficients on other variables are qualitatively similar to the benchmark results reported when applying the overall LPI.

Customs efficiency of the exporter has a significant impact on trade flows from the exporter, while it is only significant at 8% for the importer. Evidently, an enhancement in customs efficiency of the exporting country by 1% will expand trade flows by 1.14%, while the enhancement in customs efficiency of the importing country by 1% increases trade flows only by

0.47%. According to infrastructure, it seems to have greater impact from the exporting country too, where enhancement in infrastructure of the exporting country by 1% improves trade flows by 1.32%, and improvement in infrastructure of the importing country by 1% increases trade flows by 0.80%.

Shipment efficiency matters only from importing country, where enhancement in shipment efficiency of the importing country by 1% improves trade flows by 0.70%, while it is insignificant for the exporting country. In contrast, logistics efficiency matters only for the exporting country where improvement in logistics efficiency of the exporting country by 1% increases trade flows by 0.91%, while it is insignificant for the importing country. Finally, track and time efficiencies are insignificant for either the exporter or the importer. Clearly, various aspects of trade facilitation impact trade differently. These impacts are strongly in line with what we found previously in the original model but with different magnitudes, confirming the importance of trade facilitation measures for the exporting country.

Indeed, these estimation results suggest that trade facilitation measures in exporting countries play relatively stronger role in enhancing their exports. Even though the overall LPI is significant from both the exporting and the importing countries, its magnitude is relatively much small for the importer compared with the exporter.

Evidently, in both samples the estimated coefficients are individually highly significant, for the p-values are so low (except for some LPI sub-measures). The F statistics is also very high, suggesting that collectively, all variables are statistically important.

## **10. Recommendations and policy implications**

Estimation results discussed above proposes that trade facilitation plays weak role in improving trade flows between Arab countries. Even though the overall LPI is significant from both the exporting and the importing countries, its magnitude is relatively small compared with what previous research indicated regarding the same measures in other regions.

For the small sample of more sophisticated data set, the estimation results suggest that trade facilitation measures in exporting countries play relatively stronger role in enhancing their

exports. Even though the overall LPI is significant from both the exporting and the importing countries, its magnitude is relatively much small for the importer compared with the exporter.

Indeed, Arab countries should benefit from their geography and stimulate investment in infrastructure, in addition to encouraging public-private partnerships. Efforts should be made to encourage member countries to fulfill the commitments they have entered into, and to encourage other non-members to do so. In fact, there is great potential for trade expansion in the region, as it plays a key role in connecting Europe, Asia and Africa. Thus, developing transport is fundamental to enhancing regional integration and trade cooperation. Additionally, improving intra-Arab trade requires addressing various structural issues impeding trade development, such as removing the remaining tariff barriers and full implementing of the commitments under the GAFTA. Finally, it is vital to enhancing productive capacities in the region and to developing the financial sector in order to enhance investment in the Arab region and to improve intra-Arab trade.