

Logistics Performance and Economic Growth in MENA Region (Case Study: Egypt)

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Abstract:

The paper investigates the relationship between logistics performance and economic growth on regional level including 23 countries in Middle East and North Africa MENA region, using indicators of logistics performance index by World Bank database from 2007 to 2018 due to data availability using panel model, regressing logistics performance indicators on Real GDP as proxy of economic growth. The results show that performance of logistics will increase economic growth. The paper further studied logistics in Egypt using structured interviews and questionnaires.

Keywords: Logistics, economic growth, MENA regions, Egypt, customs, performance, ports, railway, GDP, LPI.

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First: Introduction

Logistics include activities that manage flows of goods. Economic literature found that logistics raise economic growth through number of ways.

The investment in logistics increase aggregate demand of goods and services, as better logistics performance save cost and time.

Paper Importance: logistics role in economic growth didn't gain enough academic attention till now especially in the regional level. This paper is trying to fill this gap through examining the relationship between logistics performance and economic growth on regional level including 23 countries in MENA region, using indicators of logistics performance index by World Bank database from 2007 to 2018 due to data availability.

Research Methodology: the study adopts two methods first; using panel model including 23 countries in MENA region studying the impact of logistics performance indicators, on economic growth in the period from 2007 to 2018. Second: qualitative analysis studying logistics performance in Egypt to identify required modifications to upgrade the performance towards higher economic growth. Qualitative analysis will use structured interviews with Egyptian ports officials and logistics consultants, and questionnaire sent to logistics companies and experts.

The rest of paper structured as follows: Second section presents definitions of logistics. Third section presents a review of theoretical literature to identify the relationship between logistics and its impact on economic growth. Fourth, section presenting the research methodology used with further discussion of results of the empirical analysis. Finally, the fifth

section presents Egypt case study. The paper will end by presenting conclusion and recommendation.

Second: Definitions of Logistics

Logistics as defined by the Council of Logistics Management “is that part of the supply chain process that plans, implements, and controls the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements”.

Flanders institute for logistics mentioned that “logistics encompasses four functional domains: purchase and procurement logistics, production logistics, distribution logistics and reverse logistics. Transport logistics is seen as the organization of flows of goods and information across these functions”.

Logistics and supply chain management handbook stated that “Logistics contributes to the creation of time, place, and even form utility through the management of processes that enable companies to get the right goods to the right place at the right time in the right condition and at the right cost”.

TNO Inro (2003) defined logistics within the context of studying logistics societal value “Three segments make up logistics; physical logistical processes, control and support. Physical logistical processes encompass transport modalities, transport (assistance) services, warehousing, handling, value-added logistics, storage and administrative settlement. Control concerns the forwarders, ship brokers, 3PL, 4PL, planning & control and management. Support covers ICT services, consulting/research, banks, insurance, accountants,

maintenance, (temporary) employment agencies and leasing companies”.

The Council of Supply Chain Management Professionals (CSCMP) has defined logistics as “that part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.” A second, more concise definition offered by CSCMP is “the management of inventory, at rest or in motion.” EC (2015) defined Logistics as “a set of services including the planning, organisation, management, execution and monitoring of a company’s entire material, goods and information flows (from purchasing, production and warehousing, to added value services, distribution and reverse logistics”. Vanoutrive et al. (2016) presented a simple definition that “logistics covers the activities that manage flows of goods”.

Jonsson and Mattsson (2005) “Logistics is defined as the planning, organization, and control of all activities in the material flow, from raw material until final consumption and reverse flows of the manufactured product, with the aim of satisfying the customer’s and other interest party’s needs and wishes i.e., to provide a good customer service, low cost, low tied-up capital and small environmental consequences”.

Shapiro and Heskett (1985) “ Logistics is defined as those activities that relate to receiving the right product or service in the right quantity, in the right quality, in the right place, at the right time, delivering to the right customer, and doing this at the right cost (The seven R’s)” .

Lumsden (1998) defined logistics as follow “Logistics systems encompass operative responsibilities, which include

administration, operation and purchase and constructive duties as well as detailed design”.

Third: Literature Review

Economic literature identified telecommunication, transport and public infrastructure as economic growth determinants. Logistics infrastructure cause economic growth as it saves transportation time and reduce trading cost, which raise demand of goods and services that open new distant markets in front of producers, and lower inventories as well as attracts foreign direct investment which stimulate domestic production and causes higher economic growth (Lean et. al, 2014).

In theoretical literature infrastructure role in economic growth has changed through economic history. Neoclassical growth model argued that technological progress, labour force and change in infrastructure temporary influence income only. Solow (1956) used aggregate approach in assuming technical changes as exogenous factor. Endogenous Growth Model shows possible impact of infrastructure on long run economic growth. Romer (1986), Barro (1990) and Lucas (1988) endogenize infrastructure in the aggregate production function. Large number of empirical literature stated a positive relationship between economic growth and infrastructure. Blum (1982) studying Germany found that roads and ports positively significant to productivity. Aschauer (1989) using neo classical function treated infrastructure investment as input. Krugman (1991) stated that improvement of transport and logistics which reduce cost of trade and transport has positive impact on industrial aggregation. Logistics zones attract investments and help in concentrating economic activities which increase

productivity as mentioned by Lu and Yang (2006), Ciccona and Hall (1996).

Alleman et al. (1994) studying South Africa found a positive impact of infrastructure on economic development. Mody & Wang (1997) studying indicators of economic growth during second half of 1980s found that telecommunication and transport facilitates economic growth. Moreno et. al (1997) studying Spain economy found that infrastructure is positively significant to economic growth among other variables. Groote et al. (1999) found positive impact of transportation infrastructure on economic growth in Netherlands. Banister and Berechman (2000) investigated the impact of transportation on economic growth; the study found that improved transportation reduces travel cost and time which increases trade volume through better transportation network that increase economic growth.

Roller & Waverman (2001) studying 21 OECD economies found positive impact of telecommunication infrastructure on aggregate output. Demurger (2001) studying Chinese economy from 1985 to 1998 identified telecommunication and transport infrastructure as accelerators of economic growth. Cheng & Peng (2006) investigated the relationship between economic growth and logistics industry using freight turnover. Liu et al. (2006) found that logistics causes economic growth, a positive relationship between regional economic growth and logistics industry. Yamaguchi (2007) studying Japan found positive significance of air transport on productivity. Fan & Chan-Kang (2008) found that development of roads and telecommunication positively contributes to economic growth. Lean et. al (2014) studying relationship between logistics and economic growth in

China found that land transport infrastructure causes economic growth.

Logistics industry promotes economic growth as it recognized as “third profit source” beside labour and raw materials. In 2009 China logistics industry contributed about 16.1% of services industry value added as mentioned by Chu (2012) investigating the relationship between economic growth and logistics investment in china from 1998 to 2007 which found positive significant impact of investment in logistics on china economic growth. The study also stated that logistics importance increased since 1980s due to increasing outsourcing of logistics services to professional logistics companies which increase its impact on economic growth.

Goh & Ling (2003) stated that logistics manage flow of raw materials to end customer which covers china’s sectors as telecommunication, transport, warehousing and customs as well as logistics zones.

Chen & Fleisher (1996, 1997), Madden & Savage (2000), Datta & Agarwal (2004) identified investment in telecommunication, transport; public infrastructure, trade, and R&D are economic growth engines.

Economic literature found that logistics can raise economic growth through number of ways. Roller and Weverman (2001) stated that investment in logistics increase aggregate demand of goods and services. Gunasekera et. al (2008) discussed the impact of logistics on saving cost and time through reduction of arrival time of shipments and passengers. Shirley and Winston (2004) showed the impact of investment in speed railway and highway on lowering inventories. Hong (2007) discussed the impact of better logistics services in attracting foreign direct

investment FDI, which is an important source of economic growth.

Although the importance of logistics sector on economic growth, it is not well examined, literature widely studied the impact of logistics sub sectors as transport and telecommunication on economic growth but studies covering the impact of logistics on economic growth are few which need further analysis. Most empirical studies uses infrastructure variables as electricity coverage, length of highway, paved roads or rail and number of internet and phone users but the efficiency and quality of that infrastructure not covered, which give misleading results of their role in economic growth. This paper is trying to fill this gap through examining the relationship between the efficiency of logistics services and infrastructure on economic growth on regional level including 23 countries in MENA region.

Fourth: Empirical Analysis

4.1 Panel Model Specification

This section investigates relationship between logistics performance and economic growth on regional level including 23 countries in MENA region, using indicators of logistics performance index by World Bank database from 2007 to 2018. The model is regressing logistics performance indicators on Real GDP as proxy of economic growth, in addition to import and export as control variables to identify the significance and direction of relationship. The model specified as follows:

$$RGDP_{it} = a_0 + a_1 imp_{it} + a_2 exp_{it} + a_3 ship_{it} + a_4 customs_{it} + a_5 infra_{it} + a_6 log_{it} + a_7 shipment_{it} + a_8 track_{it} + \varepsilon_{it} \quad (1)$$

- RGDP: Real Gross Domestic Product
- Imp: Imports of goods and services as percentage of GDP

- Exp: Exports of goods and services as percentage of GDP
- Ship: Frequency with which shipments reach consignee within scheduled or expected time
- Customs: Efficiency of customs clearance process
- Infra: Quality of trade and transport related infrastructure
- Log: Competence and quality of logistics services
- Track: Ability to track and trace consignments
- Shipment: Ease of arranging competitively priced shipments
- a_0 intercept parameter
- a_1, \dots, a_n : are the coefficients of the independent variables
- ε stochastic error term

The pooled ordinary least square (OLS), panel random and fixed effect methods are employed then Hausman test carried which found that the fixed effects model best fits the data.

Data retrieved from World Bank - logistics performance Indicators database last updated December 2018.

4.2 Panel Model Results

From the below table it can be deduced that using the fixed effect model, the R_2 coefficient of determination shows that about 41 percent of the total variations in economic growth are explained by all the independent variables in the model.

As shown from the results in table (1) all explanatory variables used are positively significant to RGDP which goes with literature except quality of trade and transport related infrastructure was insignificant, and imports was negative significant which goes with literature. From the above table one percent increase in frequency with which shipments reach consignee within scheduled or expected time will lead on average to 43 percent increase in real GDP.

Table (1): Panel Model Regression Results

Variables	Coefficient	p> t
Imp	-0.828433	0.000
Exp	0.501778	0.004
ship	43.99961	0.055
customs	54.99961	0.016
infra	15.03248	0.462
log	54.7741	0.022
shipment	68.7323	0.011
track	48.58958	0.033
Constant	2.625651	0.910
R. Squared	0.4077	

Source: Author's computation using Stata 14

One percent increase in competence and quality of logistics services will lead to on average to 54 percent increase in real GDP. One percent increase in efficiency of customs clearance process will lead to on average to 54 percent increase in real GDP. One percent increase in ability to track and trace consignments will lead to on average to 48 percent increase in real GDP. One percent increase in ease of arranging competitively priced shipments will lead to on average to 68 percent increase in real GDP.

Fifth: Logistics Performance in Egypt

This section study Egypt logistics performance and suggest ways of improvement using structured interviews and questionnaire. Egypt according to World Bank logistics performance index in 2018 stands 67th out of 150 economies covered in the index. Egypt experienced improvement of 30 ranks from 2007 to 2018 and stands 9th in comparison to the

studied MENA countries. Further improvement could be in customs operations which recorded lowest score in the index followed by tracking and tracing, which affect negatively overall logistics performance.

Table (2): Logistics Performance Indicator- MENA Region by Rank (2018)

Country	2018	Country	2018
United Arab Emirates	11	Djibouti	90
Qatar	30	Tunisia	105
Oman	43	Morocco	109
Turkey	47	Algeria	117
Saudi Arabia	55	Sudan	121
Bahrain	59	Mauritania	135
Kuwait	63	Syrian Arab Republic	138
Iran, Islamic Rep.	64	Yemen, Rep.	140
Egypt, Arab Rep.	67	Somalia	144
Lebanon	79	Iraq	147
Jordan	84	Libya	154

Source: Collected by researcher from Logistics performance indicators

5.1 Information System Technologies in Egyptian ports

Evaluating available logistics technologies in Egyptian ports according to the KPIs mentioned in the project of European Regional Development Fund (2015). The analysis found that Egyptian ports experience technological development and covers almost 70% of the KPIs as shown from table (3).

Table 3: Technologies Available at Egyptian Ports

Technology	Availability
Wireless and wireline communication	available for port staff
Radio Frequency Identification RFID	Not all ports
Optical character recognition OCR	NO
Global Navigation Satellite System GNSS	NO
Terminal operation systems TOS	Yes (EDI)
Port Community System PCS	Yes (EDI)
Business To Business B2B systems	Yes
Business To Government B2G systems	Yes
Government To Government G2G systems	Yes
Government To Business G2B systems	Yes

Source: Collected by researcher from structured interviews with ports officials

The required further improvement as follows:

- Applying Global Navigation Satellite System GNSS to allow integral tracking and tracing and vessel notifications.
- Establishing strong relationship between customs and other public and private organizations to apply successful port and terminal operation systems.
- Wireless communication should be available for ports' customers to facilitate flexible, faster operations and higher port operations efficiency.
- Radio Frequency Identification should be implemented for processes automation, improvement of operational productivity.
- Optical character recognition for automated identification and locating of assets.

5.2 Recommended Improvements of Logistics in Egypt

Further analysis carried to identify required improvements and its expected impacts on economic growth. The analysis carried through structured interviews with three main ports officials and questionnaire emailed to random sample of 200 logistics and transportation companies and structured interviews with experts in logistics which considered as pilot test for the questionnaire. Almost 33% of the emailed companies have responded. The questionnaire combined of four sections the results as below.

5.2.1 Factors Hindering Gateway Projects and trade flows

The first section of the questionnaire studied the factors that hindering trade flows in Egypt and the results from questionnaire found that almost 83% of the responders chosen that the most hindering factors to gateway projects and trade flows are cumbersome customs procedures, incompetitiveness of ports facilities followed by institutional bottlenecks and political interference.

Results from structured interviews found that the main hindering factors are institutional bottlenecks, political inference, cumbersome customs procedures, bribery and corruption, numerous trade regulations and requirements, low level of competence among trade officials, human resources and physical cargo inspection.

5.2.2 Required Improvement and Investment

The second section of the questionnaire studied the required improvements in logistics services in Egypt and the results from questionnaire found that almost 85% of the responders stated that the most factors require improvement and investment are improvement of railway, training of human resources, training of officials and stakeholders, modernization of cargo clearance

information system, automation of customs clearance procedures, institutional reforms, time reduction and improvement of ports facilities.

Results from structured interviews found that the most improvement required are roads and railways, training of officials and stakeholders, institutional reforms, automation of customs clearance procedures and modernization of cargo clearance information system.

5.2.3 Required Improvement of logistics Information Systems

The third section of the questionnaire studies the required improvements in logistics information systems and the results from questionnaires results found that almost 95% of the responders stated that the most systems need improvement are vessel notifications, entry and exit customs declaration, transit documents, and integral track and trace followed by shipping instructions, export and import documents, pre- load information, load confirmation, and discharge documentation. From structured interviews the systems needs modernization and improvement is entry and exit customs declaration, export, import and discharge documentation.

5.2.4 Expected Impacts of upgraded logistics Information system

The fourth section of the questionnaire studies the expected impact of upgrading logistics information system in Egypt and the results from questionnaires found that almost 91% of the respondents companies as well as interviews expect that if the previous improvements taken place this will improve logistics performance which will increase the rate of cargo clearance, make customs clearance procedures less cumbersome, increase

volume of trade, that will lead to higher economic growth which goes with literature.

Conclusions and Recommendation

Empirical analysis using the fixed effect model which best fitted the data found that about 41 percent of the total variations in GDP as proxy of economic growth are explained by all the independent variables in the model. All explanatory variables used are positively significant to GDP which goes with literature except quality of trade and transport related infrastructure was insignificant.

Studying logistics performance in Egypt the analysis found that improvements in logistics performance can stimulate economic growth, which requires the following:

- Coordination between public and private community members to invest in upgrading logistics.
- Upgrade personnel language and technical skills as well as understanding of new technologies
- Real time monitoring and control operations
- Coordination between transport modes
- Advanced and reliable information
- Fast exchange of data for decision making
- Well established information technology infrastructure
- Updating business processes within the ports
- Upgrading ports equipment, infrastructure and facilities
- Strengthening institutional support

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