Fourth Industrial Revolution and Seaports Impact on Economic Growth (MENA Region)

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Abstract

The paper is analytical trying to analyze the relationship between fourth industrial revolution technologies at seaports and economic growth, through theoretical and empirical analysis studying first the nature of relationship between economic growth and technology theoretically using economic growth model, then testing causality between economic growth and logistics performance index (LPI) as proxy of fourth industrial revolution at seaports, the test results found that LPI directly cause economic growth. Then the paper studied the relationship between seaports and economic growth theoretically studying seaports infrastructure and ports activity using different economic models, then studied empirically using panel model including 22 countries in Middle East and North Africa (MENA) region, analysis period is 21st century the up rise of innovation at seaports the data collected starting from year 2007 the start of calculating LPI by world bank and till 2019 due to data availability. Explanatory variables (Exports, containers volume as proxy of seaport activity and ports infrastructure) are found to be positively significant to economic growth. Seaports recommended to apply Fourth industrial revolution innovations to improve its performance, which will further positively affect economic growth.

Keywords: industrial revolution, economic growth, MENA, infrastructure, seaports, LPI, empirical analysis, panel model, causality.

First: Introduction

Seaports are "adaptive entities", adapting to continuous changes in trade volume and patterns, adaptive to evolution in ships sizes and technologies as well as advancement of equipment at terminals as cargo loading and unloading machines. Industrial revolutions had a significant impact on seaports because of mass production and increasing volume of goods traded. The automation of seaports increases aggregate demand of goods and services, as better ports performance saves cost and time.

Paper Importance: seaport role in economic growth did not gain enough academic attention especially at MENA region. The current paper is trying to enrich the literature through studying relationship between seaport and economic growth on regional level trying to answer two main questions. First; if seaports technology has impact on economic growth, second; if seaports infrastructure and activity have impact on economic growth.

Research Methodology: the paper is using analytical approach studying the direction and significance of economic impact of fourth industrial revolution technologies at seaports, studying first technology and economic growth using economic growth models, and empirically using Granger – causality test to identify if (LPI) as proxy of fourth industrial revolution at seaports granger cause economic growth. The paper will then study the relationship between seaports and economic growth theoretically studying seaports infrastructure and ports activity using different economic models, then empirically using panel model including 22 countries in MENA region, during 21st century period of innovation at seaports the data collected starting from year 2007 as it is the start of calculating quality of

port infrastructure by world bank, ends in 2019 due to data availability.

The rest of paper will include five more section, the Second section, covers theoretical analysis studying the relationship between economic growth and fourth industrial revolution technologies at sea ports, to identify importance of applying fourth industrial revolution technologies at seaports which will further be covered at third section. Fourth section, presents research methodology used and definition of variables. Fifth section, discusses results of empirical analysis. Sixth section, will present the main requirements for Introducing 4th industrial revolution at seaports. The paper will end by presenting conclusion and recommendations.

Second: Theoretical Background

This section will try to theoretically analyze the relationship between fourth industrial revolution technologies at seaports and economic growth, through studying first the impact of technology on economic growth, then study importance of seaports to economic growth to identify importance of applying fourth industrial revolution technologies at seaports which will be further studied at third section.

Solow (1956) growth model stated that main factor of total factor productivity TFP is technology, "Nearly everyone takes it for granted that the rate of growth of TFP is the same everywhere. The only thing that justifies this remarkable presumption is the fairly mechanical though that knowledge of new technology diffuses rapidly around the world. Maybe so, but productivity performance depends on many other influences besides the content of the latest engineering textbook" (Solow, 2007).

Based on Solow (2013) "technological change generally increases productivity, it is a tenet held in economics since the 19th century, although it disrupts the careers of individuals and the particular firms, it produces opportunities for the creation of

new unrelated jobs. Technological change has an effect on productivity and structural unemployment and has been subjected to different and contradicting views in particular with respect to the role that full computerized automation can have on jobs."

Due to the importance of technology on productivity and economic growth fourth Industrial revolution innovations and technologies has to be studied further.

The world witnessed three industrial revolutions resulting in higher productivity before the current fourth 4th industrial revolution (IR). The First one started at end of eighteenth century, used steam power to invent steam engine, transforming from agriculture activities to manufacturing, using coal energy. Then at 20th century mass production added huge economic impacts to industry due to usage of electrical energy which called second 2nd industrial revolution. Third 3rd industrial revolution started in 1960s using electronics and Information technology, which facilitated automation of production and sophisticated technology. Gradually approaching full automation and digitization reaching the Fourth Industrial Revolution 4th IR with 21st century led to more automated devices and less human, the era of automation and data exchange technologies, creates "smart technology" (Olaniyi, 2016).

Schwab (2015) stressed that "a fusion of technologies that is blurring the lines between physical, digital, and biological spheres. Fusion is more than complementary technology, because it creates new markets and new growth opportunities for each participant in the innovation. It blends incremental improvements from several (often previously separated) fields to create a product". Schwab also mentioned that "Technological innovation lead to a supply-side miracle, with long-term gains in efficiency and productivity. Transportation and communication costs will drop, logistics and global supply chains will become more effective, and the cost of trade will diminish, all of which will open new markets and drive economic growth" (Schwab,

2015). Jee (2017) stated that 4th IR will raise levels of income by allowing new ideas, and improving life quality all over the world (Jee, 2017).

Neoclassical growth model argued that technological progress, labor force and change in infrastructure influence income. Solow (1956) used aggregate approach assuming technical changes as exogenous factor. Endogenous Growth Model shows possible infrastructure impact on economic growth. As Romer (1986), then Lucas (1988), and later Barro (1990) endogenize infrastructure in the aggregate production function.

Through economic history economists studied the role of seaports on economic growth. Adam Smith (1776) stated "As by means of water-carriage, a more extensive market is opened to every sort of industry than what land-carriage alone can afford it, so it is upon the sea-coast and along the banks of navigable rivers that industry of every kind naturally begins to subdivide and improve itself". Alfred Weber (1929) discussed that in locations of "break-in-bulk", firms search for locations of possible multimodal transportation where usage of two or more transportation modes is possible.

R. Goss (1990) discussed the importance of seaport in driving economic development due to facilitation of higher trade which raise market competition faced by firms at local markets that will lead to better quality and lower prices of products for consumers. Gripaios-Gripaios (1995) studied the impact of income generated by ports which affect gross domestic product (GDP) through multiplier effect (Ferarri et al., 2012).

Li-zhuo (2012) discussed the importance of upgrading seaports which will reflect in reduction of production costs and higher efficiency of production sector, which shows the positive economic impact of infrastructure investment, this will facilitate increasing national income with multiple amounts according to multiplier effect, due to increase of demand on production factors, as production inputs, machines and technologies (wildenboer,2015).

Economic theory always states the economic importance of seaport as it expands market opportunities for firms and raise competition (Rodrigue, 2013). Well-developed automated seaports will lower trade costs which consider very important for economic growth as high costs of trade would be an obstacle for countries to increase its foreign trade and take advantage of economic specialization (Merk, 2013). Seaports facilitate access to global markets, increase competitiveness of regional firms according to reduction of trade costs (import and export), attraction of new maritime and logistics industries as shipbuilding. Higher traffic of Import and export generates better levels of added value due to its direct link to regional economic networks (Brox, 2014). Higher foreign trade is translated to higher GDP growth rate.

Adam Smith mentioned in "wealth of nations" that countries need to increase their exports to finance imports and raise GDP as nation's main economic strength factor. Exports increase will cause higher economic productivity which increase GDP levels improving country's balance of payment. Marshall (1890) stated that the main cause of nation's economic progress is international trade (Kovač et al., 2012).

McKinnon (1964) discussed exports impacts on economic performance due to economies of scale which improve productivity and enhance production technologies and efficiency as specialization upon comparative advantage led to better resources allocation. Wagner (2007) discussed the importance of raising exports in increasing competition which improve productivity. Seaport development considered a catalyst to economic activity and employment creation (UNCTAD, 2013). At aggregate level, seaports raise competitiveness and stimulate higher economic benefits.

Empirical literature of transport and ports infrastructure, as well as containers as proxy of ports activity shows importance of seaports to economic growth.

Maritime Transport Review 2013 by United Nations Conference on Trade and Development (UNCTAD) stated that

"For a long time, containerized trade flows could be predicted by looking at the performance of world GDP with the multiplier effect of the container volume growth ranging between three to four times the GDP growth rates".

Large number of empirical literatures stated a direct relationship between infrastructure and economic growth. Blum (1982) studying Germany found that roads and ports positively significant to productivity. Aschauer (1989) using neo classical function treated infrastructure investment as input (Cockburn et al., 2013). Krugman (1991) stated that improvement of transport, and logistics reduce cost of trade and transport which has positive impact on industrial aggregation. Logistics zones attract investments and help in concentrating economic activities which increase productivity as mentioned by Lu & Yang (2006), and Ciccona & Hall (1996).

Alleman et al. (1994) studying South Africa stated the existence of direct relationship between economic development and infrastructure. Mody and Wang (1997) studying economic growth determinants at the period from 1985 till 1990 found that telecommunication and transport facilitates economic growth. Moreno et al. (1997) studying Spain economy stated that there is positive significance of infrastructure on economic growth among other variables. Chen and Fleisher (1996, 1997), Datta and Agarwal (2004) identified investment in telecommunication, transport; public infrastructure, trade, research and development as economic growth engines. Groote et al. (1999) studying Netherlands stated a positive impact of infrastructure of transportation on economic growth.

Banister and Berechman (2000) studied the effect of transportation on economic growth; the study found that travel cost and time will be reduced when transportation is improved, which increases volume of trade through better transportation network that increase economic growth.

Demurger (2001) studying Chinese economy from 1985 to 1998 identified telecommunication and transport infrastructure as accelerators of economic growth. According to Francou

(2002), improvement of port infrastructure and operations positively affect GDP as it reduces costs. Port efficiency led to higher competitiveness of ports and exports, lower prices of imports lead to positive impact on balance of payment and higher growth rate (Begum, 2003).

Yamaguchi (2007) studying Japan found positive significance of air transport on productivity. Gunasekera et al. (2008) discussed the impact of logistics on saving cost and time through reduction of arrival time of shipments and passengers.

Upgrading seaports affects ports activity which has positive impact on economic growth as mentioned by Lakshmanan (2011) transport infrastructure has positive impact on freight which led to growth of trade. Number of empirical studies found positive impact of seaport activity on economic growth as; Yochum and Agarwal (1987) studying ports of United States of America, Ferrari et al. (2010), and Bottasso et al. (2013, 2014), studying European ports, Shan et al. (2018), studying ports in China (Munim & Schramm, 2018).

Lean et al. (2014) studying China stated a positive significant effect of land transport infrastructure on 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 stimulates domestic production and causes higher economic growth.

Theoretical and empirical literature found positive impact of technology on GDP growth, and economic impact of seaports development and activity which shows the importance of applying fourth industrial revolution technologies at seaports to facilitate higher economic growth.

Third: Fourth Industrial Revolution at Seaports

Taylor defined Seaports as “places to which ships resort to load and discharge cargoes...a point of transfer between sea and land” (Talyor, 1974). Martin Stopford (1997) defined it as “a

geographical area where ships are brought alongside land to load and discharge cargo, usually a sheltered deep-water area such as a bay or river mouth" (Stopford, 1997).

Alderton (1999) stated that seaports are "areas where there are facilities for berthing or anchoring ships and where there is equipment for the transfer of goods from ship to shore or ship to ship". Also stated that "Port means an area which ships are loaded with and/or discharged of cargo and includes the usual places where ships wait for their turn or are ordered or obliged to wait for their turn no matter the distance from the sea" (Alderton, 1999).

As defined by Szwankowski (2000) "For years seaports have been perceived as areas, situated at the interface between land and sea with economic facilities properly prepared with regard to technical-technological and organizational handling of foreign trade, carried out by sea, designed to serve maritime and land transport engaged in their carriage" (Kotowaska, 2017).

Montwiłł (2011) stated that "Seaports are important economic spaces, which provide a wide range of services and serve a wide range of customers including shippers, forwarders, transport companies and logistics operators. One of their main tasks is to facilitate the domestic and international trade of goods, often on a large scale" (Montwiłł, 2014).

Starting from 1990s port activities have changed deeply; based on UNCTAD, ports before 1960s, were just an interface connecting land with sea, with no joint activities with firms which called first 1st generation. Then ports developed to play a role as center of trade and transport services through adding new functions which called second 2nd generation ports "adding value" to shipped goods. Ports became a part of the logistic chain adding new value-added services at the third 3rd generation in 1980s due to modern economy of globalization, (UNCTAD, 1992). Fourth 4th generation ports consider new aspects in logistics management and integration using advanced information and communication methods and technologies to add innovative value-added services, automation of ports'

activities, connection with other ports and different modes of transport and integration whether vertically or horizontally (European Union, 2013).

Flynn et al. (2011) defined fifth generation ports as "customer centric and community focused ports, with service deliverables related to port user's multi- faceted business requirements while also taking care of community stakeholder requirements" (Lee & Cullinane, 2016).

According to McKinsey report and remarks of T. Notteboom and J. Rodrigue, sixth 6th generation ports container terminal should be fully automated due to the significant volume of loading and unloading operations that should be handled in a short time using information technology IT progress acquired during last 50 years as the Internet of Things, or big data analysis, that form a basis for maintaining the rate of IT development over the coming years (Kaliszewski, 2018).

Responding to 4th IR ports focusing on developing technological innovation as automation of terminals and automation of seaports logistics services to raise competitiveness at the following ports:

- Netherlands Rotterdam Port started to apply terminal automation in 1993, applying fully automation of pier cranes, and up to date APM terminal, and Rotterdam World Gateway in 2015.
- United States of America (USA) fully automation of Long Beach Container Terminal (LBCT) April, 2016
- China full operation automation of terminal at QQCTN of Qingdao Port May 2017
- Singapore fully automation for TUAS's 65 berths (partially in 2020 and targeted to be completely in 2040)
- Germany Hamburg Smart port integrates 4 infrastructure systems include ports, railways, customs clearance, and roads. Also introduced smart services as MOVABLE BRIDGES with automated traffic systems such as Smart ROAD Solution, smart lighting scheme, structural and environmental sensors.

Shipping industry as well, applying innovations to stay competitive through minimizing operation time and cost as Maersk with Ericsson applied REAL TIME end-to-end container tracking system for containers and vessels using single GSM antenna and floating DSM. CMA-CGM with Traxens applied REAL-TIME container monitoring system. Hapag–Lyod's with XVELA applied REAL-TIME information sharing system for transportation and supply chain (Shin et al., 2018).

Theoretical and empirical literature as studied found that technological innovation raise efficiency which facilitates larger economic gains due to higher productivity. Applying automation in transportation will drop costs, and raise efficiency of seaports and logistics which increase trade and drive economic growth. Further study will be carried at MENA region using empirical analysis at the following sections.

Fourth: Methodology Description

4.1 Definitions of Variables

- **RGDP**: Real Gross Domestic Product used as an indicator of economic growth.
- **Quality of Port Infrastructure**: empirical literature stated a positive economic impact of seaports infrastructure as it saves transportation time and reduce trading cost, which raise demand of goods and services that facilitate higher international trade, which causes higher economic growth. The variable will be used to show the importance of upgrading ports infrastructure to economic growth.
- **Container's volume**: the variable will be used as proxy for port activity to examine the importance of ports activity on economic growth based on literature stated positive impact of port activity on economic growth which required further study at MENA countries.
- **Export**: used as control variable as proxy for trade as shown from economic literature better developed seaports facilitate trade which induce higher economic growth. Based on literature as Adam Smith (1776) stated that main

principal countries need to increase their exports to raise revenues to finance imports and increase GDP as nation's main economic strength factor.

- **Logistics Performance Index (LPI)**: World Bank calculates LPI to measure the efficiency of logistics services at countries. It includes six main indicators then aggregated into one index (LPI). The index used as proxy for fourth industrial revolution technologies.

4.2 Granger Causality

Granger (1969) created a methodology to study the causal relationship in time series data. Dumitrescu and Hurlin (2012) developed Dumitrescu and Hurlin test (DH) to test Granger causality in panel data sets. One concern in carrying the test is choosing the number of lags to be used in the estimations. Based on Akaike, Bayesian and Hannan-Quinn an extension of DH test has been added to facilitate this task (Lopez & Weber, 2017), it will be used in the current paper using Stata 14, to determine causality for significant effects of past vales of x on y present value tested as in Granger (1969) the lag assumed to be identical for all individuals and the panel must be balanced.

The causality will be tested between logistics performance index as proxy of 4th industrial revolution and economic growth.

4.3 Panel Model Specification

This section investigates relationship between seaports and economic growth using three independent variables quality of port infrastructure as proxy of 4th Industrial revolution showing the importance of upgrading ports infrastructure. Second variable is container port traffic (TEU: 20-foot equivalent units) as proxy of port activity, in addition to export as control variable. Panel model designed based on studied theoretical literature.

Data covers 22 countries in MENA region, during the 21st century as it's the flourishing era of 4th industrial revolution technologies at seaports. The data collected starting from year 2007 as it is the start of quality of port infrastructure variable by World Bank till 2019 due to data availability.

The model is regressing exports, container port traffic and port infrastructure variables on Real Gross Domestic Product as proxy of economic growth, to identify significance and direction of relationship. The model specified as follows:

$$(1)\quad RGDP_{it} = a_{\circ} + a_1\,Export + a_2\,portinfra + a_3\,container + \varepsilon_{it}$$

RGDP: Real Gross Domestic Product
Export: Exports
portinfra: Quality of Port Infrastructure
Container: Container port traffic (TEU: 20-foot equivalent units)

$a_{\circ}$ intercept parameter

$a_{1,\ldots,}a_n$: are coefficients of independent variables

ε: stochastic error term

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 database last updated February 2021.

Fifth: Empirical Results and Discussions

5.1 Results of Granger Causality

Causality test between Real GDP and Logistics performance index LPI used as proxy of fourth industrial revolution to shows the importance of applying automated upgraded logistics services on economic growth. Causality test carried according to the following steps

First the data was balanced as the test require that all data must be balanced

Second running the test to check the following hypothesis

- H0: Lpi doesn't granger-cause RGDP
- H1: Lpi does granger -cause RGDP for at least one panel var (id)
- Third: carrying DH lag test for choosing the optimal lag to use it in estimation which found to be 1 year lag with significance.

The results accepted the alternative hypothesis that LPI does granger -cause economic growth. The causality impact found to be high significant starting from one year lag which goes with literature that 4th industrial revolution innovations upgrading logistics services will have positive direct effect on economic growth.

That goes with Solow (1956) growth model used aggregate approach assuming technical changes as exogenous factor, stated that technology is a main factor of total factor productivity growth, justified by diffusion of new technology around the world (Solow, 2007).

5.2 Panel Model Results

Table 1. Panel Model Regression Results

Variables	Coefficient	p>ItI
Export	1.1	0.000
Portinfra	3.03	0.006
Container	13957.14	0.000
Constant	-1.11	0.812
R. Squared	0.5357	

Source: Author's computation using Stata 14

Using STATA model results found to be as shown in table 1, it can be deduced that using the fixed effect model, the R^2 coefficient of determination shows that 53 percent of the total variations in economic growth are explained by independent variables of the model. As shown from results in table (1) all explanatory variables used are positively significant to RGDP which goes with literature. This shows the economic importance of ports activities as increasing container traffic at seaports has positive significant impact on RGDP. The model shows the importance of 4th industrial revolution innovations on economic growth as raising the efficiency of ports infrastructure has positive significant relationship with economic growth which

requires further study of the requirements of applying 4th IR automation in seaports.

Exports positive significance goes with theory as Adam Smith mentioned in "wealth of nations" that countries need to increase their exports to finance imports and raise GDP, also Marshall (1890) stated that the main cause of nation's economic progress is international trade. McKinnon (1964) also stated that exports improve productivity and enhance production technologies and efficiency as specialization led to better resources allocation. Wagner (2007) stated the importance of raising exports in increasing competition which improve productivity.

Seaport infrastructure positive significance goes with Neoclassical growth model argued that technological progress, labor force and change in infrastructure influence income. Endogenous Growth Model shows possible infrastructure impact on economic growth, as Romer (1986), then Lucas (1988), and Barro (1990).

Container's volumes proxy for seaport activity has positive impact on economic growth which goes with literature as number of studies found positive impact of seaport activity on economic growth as; Yochum & Agarwal (1987), Ferrari et al. (2010), Bottasso et al. (2013, 2014), and Shan et al. (2018) (Munim & Schramm, 2018).

Sixth: Requirements of 4th Industrial Revolution at Seaports

Due to the importance of seaports on economic growth as shown from the carried theoretical and empirical analysis which shows positive significant impact of seaports infrastructure and activity on economic growth in MENA. This shows importance of upgrading seaports and applying latest automation techniques.

As stated by Schwab (2015) **"**the response to it (4th IR) must be integrated and comprehensive, involving all stakeholders of

the global polity, from the public and private sectors to academic and civil society." In order to introduce 4th IR at ports, the most urgent is to improve the investment of terminal companies improving profitability enhancement, Secure trade volume, generalize port automation followed by more advancement technology, applying Real-time information analysis for best safety and unloading practices, as well as, Real-time information sharing of port facilities as improvement of conditions of cargo and terminal yard among port stakeholders as: shippers, freight service providers, drivers, and forwarders which are necessary for visibility and safety of freight.

Enhancement of carry - in - carryout efficiency as it is important for solving port congestion problems or port traffic. Automation should cover quality control management, efficiency of energy usage of port handling or discharging facilities and equipment, usage of renewable energy as solar power in port operation.

Development, education and training for personnel for using the new system, as field labor consider very important to facilitate applying automation and minimization of risk at work place by proper human resources adjustment.

Digitization and standardization should take place as digital cargo management, standardization of freight, labeling unification and standardization of cargo and logistics services, expansion of automatic warehouses for standardized cargoes.

Automation and integration of documents as unification of Bill of Lading (B/L) for aviation sector with customized B/L for maritime sector, which facilitate integration between the two modes of transportation, automation of customs clearance responding to dynamic changes of international trade environment (Schwab, 2015).

Conclusion and Recommendations

The paper studied the relationship between fourth industrial revolution technologies at seaports and economic growth, through theoretical and empirical analysis studying first relationship between technology and growth using Robert Solow economic growth model, and testing causality between growth and logistics performance index (LPI) as proxy of fourth industrial revolution at seaports. The results found that LPI does granger -cause economic growth, which means that 4th industrial revolution innovations will have positive direct effect on economic growth. That goes with Solow (1956) growth model, stated that technology is a main factor of total factor productivity growth.

The paper after brief discussion of definition of 4th IR studied the relationship between seaports and economic growth theoretically studying seaports infrastructure and ports activity using different economic model. Economic Literature shows the importance of upgrading seaports to economic growth through facilitating higher international trade according to reduction of trading costs and better access to local markets.

The paper moved from theoretical analysis to empirical analysis testing the significance of seaports infrastructure, port activity using containers as proxy and exports as control variable to examine their impact on economic growth using panel model including 22 countries in (MENA) region, for the period starting from year 2007 as it is the start year of calculating data of seaport infrastructure by world bank till 2019 due to data availability. The three independent variables found to be positive significant which goes with economic literature. Exports positive significance goes with theory as Adam Smith mentioned in "wealth of nations" that countries need to increase their exports to finance imports and raise GDP as nation's main economic strength factor. Also as stated by Marshall (1890), McKinnon (1964), and Wagner (2007) stated the importance of

raising exports in increasing competition which improve productivity.

Seaport infrastructure positive significance goes with Neoclassical growth model argued that technological progress, labor force and change in infrastructure influence income. Endogenous Growth Model shows possible infrastructure impact on economic growth as; Romer (1986), Lucas (1988), and Barro (1990).

Containers volumes as proxy for seaport activity has positive impact on economic growth which goes with literature as; Yochum and Agarwal (1987), Ferrari et al. (2010), Bottasso et al. (2013, 2014); Shan et al. (2018).

Due to economic significance of seaports on economic growth as shows from theoretical and empirical analysis it shows the importance of developing seaports and applying fourth industrial revolution technologies at MENA countries which required discussion of the main requirements to apply those technologies at seaports which covered at last section of the paper which consider important recommendation for MENA countries in upgrading seaports, as applying Real-time information analysis for best safety and unloading practices, Real-Time information sharing on port facility, improving carry-in - carryout efficiency for solving port congestion problems, automation at quality control management, and efficiency of energy usage at ports.

Development, education and training for personnel for using the new system, to minimize risk at work place by proper human resources, digitization and standardization at cargo management, freight, cargo and logistics services, automation and integration of documents as unification of Bill of Lading (B/L) for aviation and maritime sector, automation of customs clearance responding to dynamic changes of international trade environment.

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