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MEASURING THE IMPACT OF PORT OPERATIONS ON ECONOMIC DEVELOPMENT OF DEVELOPING COUNTRIES

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ABSTRACT

The port system serves not only as an integral component of the transport system, but also as a major sub-system of the broader production and logistics systems. The main problems of the ports in developing countries is lack of infrastructure which lead to the low revenue generation by the government. This affects the economic development of many developing countries including UAE as port plays a very vital role in many countries by contributing to the national expenditure through revenue generation. This study was used six components for measuring the impacts of port performances on economic development that are; (i) Location and Hinterland; (ii) Hinterland Access; (iii) Draft and Accessibility; (iv) Presence of firms in the Port; (v) Port and terminal efficiency; (vi) Port charges. Therefore, this study intends to measure for the impact of port to the economic development in the developing countries. This brings to the hypothesis of this study that all the six components have significant impact to economic development of developing countries. In this case, a total number of 250 representing the population of Seaport staff at UAE ports. The rate of respondent is 72.8% of the sample. The analysis of data using appropriate statistical techniques statistical package for social sciences (SPSS) and smart PLS as the research is quantitative in nature. Results of analysis shows that Hinterland Access, Port and terminal efficiency and Port charges found not significant with economic development of developing countries. Results of this study will squarely help the policy makers of developing countries as regard to seaports and its impact on economic developments.

Keywords: Port; Characteristics; Developing Countries; Economic Development; Performance; Location and Hinterland; Hinterland Access; Draft and Accessibility; Presence of firms in the Port; Port and terminal efficiency and Port charges

INTRODUCTION

While ports are important to the modern global economy, their role in generating local economic development is less clear. A port provides local employment opportunities in two ways on-site at the port through the managing Ports Authority, and at private businesses that locate on or near the port to provide port-related services (Santos et al., 2018). Port-related job opportunities include those related to cargo processing, management of port operations and facilities, and jobs in inland transportation and distribution (Akhavan, 2017).

Investment in port infrastructure is typically done with state funding by a public ports authority that owns and manages port operations in the state. This raises questions of how much local economic benefit is realized by this public expenditure. Transportation developments since the 1960's have facilitated growth in global trade but reduced the likelihood that port-related jobs will be located in the community in which the port is located (Munim & Schramm, 2018).The main challenges faced by ports as regard to reducing employment emanate from containerization has reduced labour needs at port

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facilities by allowing cargo to move directly from ship to truck to rail without the need to break apart or repack loads (Lockwood, 2015). The expansive interstate highway system in the developing countries has reduced over-land transportation costs and widened the market that a port serves, encouraging port-related activity such as distribution and warehousing facilities and therefore jobs to locate further from the port where land and labour costs may be lower (Monios et al., 2018).However, in our days the aforementioned historical characteristics of the ports have changed radically and the importance of the ports themselves for the local societies stands ambiguous. On one hand the economic significance of the port stands under question, while on the other hand negative externalities burdening local societies seem out of proportion (Tiliakos, 2012). On other hand, negative externalities, such as traffic congestion and environmental pressures, manifest as a general problem of land consumption; this becomes aggravated through the continuous expansion and development, thus characterizing port facilities as land intensive, mainly due to containerized high traffic (Medda & Carbonaro, 2007)

Similarly, the main problems of the ports in developing countries is lack of infrastructure which lead to the low revenue generation by the government. This affects the economic development of many developing countries including UAE as port plays a very vital role in many countries by contributing to the national expenditure through revenue generation (Rahman & Siddiqui, 2019).

However, in UAE because of the rapid growth of Dubai Ports and desired closure of Jebel Ali Port will not have sufficient capacity for containers and other vessels in the future? Thus, further expansion of Jebel Ali Port is necessary (Padron et al., 2010). DP World wants a new masterplan of Jebel Ali Port by 2030, which should provide enough capacity and should allow for future development. Considering the nearby Palm Islands Project and Waterfront Project (Aoun, 2016).

Therefore, this study intends to formulate a measure for the impact of port to the economic development in the developing countries.

LITERATURE REVIEW

Ports play a vital role in the regional economy to provide the link between suppliers and customers. From an economic perspective, ports are increasingly related to the competitiveness of economies (Notteboom & de Langen, 2015). Developing ports is beneficial to the capital structure of the regional economy. As (Pardali et al., 2016) note, ports, being dynamic industrial and local clusters, are important for the creation of economic value. (Gravagnuolo et al., 2019)found that port impact studies focus on two areas: port economic impacts and port trade efficiency. Because of the port-city interface, ports are seen as economic catalysts for the regions they serve. The port services and activities generate aggregated benefits and socio-economic wealth for the geographical region through urban planning and environmental economics. Ports are thus seen as a driving force and engine in local and national economic development and policy makers consider ports as economic catalysts. Policy makers are interested in including ports in regional policy such as urban planning and expansion, safety, security and environmental sustainability (Deng & Hu, 2016). As ports are critical trade facilitators, they can generate additional economic benefits in such activities as land ownership (berths, terminals) and cargo handling.

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On the other hands, there are many ways to measure port efficiency and performance are very diverse (Ducruet, 2016). A commonly used gauge providing comprehensions into the functioning of ports and their capability to entice business is volumes handled by ports. As cargo flows are largely determined by changes in demand, port volumes help take the pulse of the world economy and inform about potential transport infrastructure needs and investment requirements. As such, port cargo throughput, including all cargo types, can serve as a leading economic indicator (Talley & Ng, 2016). This is known as the port throughput, and it measures the amount of cargo or number of vessels the port handles over time (United States Department of Transportation 2017) (Deng et al., 2013)completed a study in China and showed that there was a positive relationship between value-added operations at ports and economic activity. (Mlambo, 2021) completed a study in 10 West European countries and showed that port efficiency, as measured by port throughput, increased growth and employment opportunities. (Yuen et al., 2013)completed a study in China and showed that port efficiency increased growth in a country and also in its neigh boring countries. Poor efficiency in ports was also seen to be a significant contributor to poor economic performance in UAE (Shahbaz et al., 2014). (Cho, 2014) showed that port efficiency is a major determinant of freight costs; efficient ports are associated with lower freight rates. (Mlambo, 2021) concur and state that port efficiency and port infrastructure determine freight transport costs, and they also assist businesses in accessing global markets.

MEASURES OF ECONOMIC DEVELOPMENT

Unlike economic growth which may be measured as economic outcomes occurring over time and resulting from production and consumption activities in metro areas, economic development is more complicated. “It must be measured more broadly to account for the relevant qualitative and structural features of the local economy. Absent a consensus theory of economic development, the analyst cannot propose a definitive set of measures (Malizia, 1990)

Although the metro area or nodal region remains the appropriate unit of analysis, few measures are actually attributes of metro units. Most measures of economic development discussed below focus on establishments. The measures address the structure of industries, products, companies and occupations in the metro area. Clearly, shift-share analysis is a useful way to examine the influence of industrial structure on economic growth and to measure the growth potential of industry mix. The industry mix term is clearer than the residual effect which is often used as an indicator of competitive advantage. Productivity measures are more difficult to create. GDP per employee would be interesting if state estimates could be "stepped down" to the metro level. Value-added in manufacturing per production hour or wage dollar has reasonable face validity although differences in capital intensity introduce confounding effects. Regional scientists should collaborate and propose best available measures of industrial structure and productivity at the metro level as indicators of static efficiency (Coale & Hoover, 1958) Product cycle theory is widely used to explain regional growth from a structural perspective but poses difficult measurement problems due to ambiguities about the proper level of disaggregation. The simplest approach is to focus on manufacturing, where the hypotheses most easily apply, and examine the structure of establishments. With County Business Patterns (CBP) data,

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the analyst can develop overall and industry-specific employment size distributions for establishments by metro area. The U.S. Establishment and Enterprise Microdata (USEEM) file available from SBA can be used to generate complementary establishment measures, headquarters, branches, or subsidiaries among manufactures and other sectors across metro areas. The dominance of branches and, to a lesser extent, subsidiaries are evidence of standardized products and routine production. The preponderance of headquarters implies the presence of products in earlier stages of development. These CBP- and USEEM-based measures should be considered reasonable expressions of the product cycle hypothesis if they turn out to be correlated significantly with metro area income and significant wage levels. However, in an era of corporate restructuring, headquarters may be less significant than R & D facilities and expenditures as an indicator of new product development (Malizia, 1990). Recent work by (Sabatini, 2008) may shed additional light on the measurement of economic development. They pose five functional types of metro areas largely related to occupational structure. Cities are centres of entrepreneurship, central administration, R & D, precision production, or routine production. They point out that industry mix may change considerably without altering fundamentally the functional-occupational orientation of the area. (The same point may be made with respect to product cycle theory.) Using census information on occupational structure, the Thompson approach suggests several useful occupational measures that may be related to productivity and growth due to differences in comparative costs. Metro areas dominated by either routine or precision occupations which include labourers, operatives and technicians, may have lower relative costs and higher efficiency.

DEVELOPING COUNTRIES

A developing country, less developed country, less economically developed country, or underdeveloped country is a country with a less developed and a low relative to other countries. However, this definition is not universally agreed upon. “There is also no clear agreement on which countries fit this category. A nation's compared with other nations can also be a reference point. In general, the United Nations accepts any county's claim of itself being "developing" (Franko, 2018).”

The term "developing" describes a currently observed situation and not a changing dynamic or expected direction of progress. Since the late 1990s, developing countries tended to demonstrate higher growth rates than developed countries. Developing countries include, in decreasing order of economic growth or size of the capital market. Therefore, the least developed countries are the poorest of the developing countries.” Developing countries tend to have some characteristics in common. For example, with regards to health risks, they commonly have: low levels of access to safe high levels of high proportion of people with tropical and infectious diseases; high number of and generally poor. Often, there is also widespread low levels, inadequate access to services at all government levels and a lack of so-called are expected to impact developing countries more than wealthier countries, as most of them have a high (Waverman et al., 2005)

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RESEARCH METHODOLOGY

A total number of 250 questionnaires were administered across Ports in UAE. From this number, a total of 182 questionnaires representing 72.8 percent of the total questionnaires administered were retrieved. Out of this number, a total of 21 questionnaires were either partially filled or invalidated as a result of wrongful filling. Thus, therefore resulted in the total number of 161 valid questionnaires which were used for analyses. This is considered effective sample appropriate to give meaningful responses which can be relied upon and is considered sufficient sample size to meet the requirement of sample size for the chosen analytical tool.

ANALYSIS AND FINDINGS

The theoretical framework of this research contains seven main constructs. Construct validity shows the extent to which the respective indictors represent their underlying latent variables. In addition, to establish construct validity, the indicators in the measurement model have to meet up the requirement for convergent and discriminant validity. Convergent validity measures the extent to which indicators of the same concept are correlated while discriminant validity measures the degree of uniqueness of a construct in relation to other constructs (Van Rooy et al., 2005)
The relationship between all the constructs with their respective indicators was reflective. The recommended practice for assessing reflective measurement model is to assess the construct validity of the indicators of each construct in the model (Hair *et al*, 2014). For reflective models, however, the recommended practice for measurement model evaluation involves assessing the outer weights and collinearity issue in the model in order to establish construct validity (Hair Jr et al., 2014).

VALIDITY AND RELIABILITY

The recommendation for assessing convergent validity involves meeting the criteria for indicator reliability by examining the indicator loadings, composite reliability, and the average variance extracted (AVE) and comparing the values with the recommended thresholds as shown in Table 1. For a construct to achieve convergent validity, the literature recommended the values of 0.7 and above for both indicator loading and composite reliability and 0.5 and above for AVE (Hair Jr et al., 2014). On the other hand, discriminant validity is assessed by examining the cross-loadings, the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio of correlations(Henseler et al., 2015). Figure 4.1 shows the measurement model indicating the factor loadings of the various indicators on the respective latent constructs in the research model.

CONVERGENT VALIDITY

Table 1, shows the loadings of the respective indicators on their respective constructs of the research model. As shown in 1, all the loadings meet the recommended 0.7 threshold except for four items. The lowest loading is ranging from 0.435 to 0.622. The researcher retained those items on the recommendations of (Henseler et al., 2015), if the AVE is achieved then lowest items can be retained. While the highest loading is 0.912 which is associated with the Draft & Accessibility construct. This shows that the

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indicators of each construct were highly correlated with their respective construct thus indicative of convergent validity.

Table 1: Convergent Validity of Measurement Model

	Draft & Accessibility	Economic Activities & Development	Hinterland Access	Impact of Port ED	Location & Hinterland	Port & Terminal Efficiency	Port Charges	Presence of Firms In Port
DA1	0.912							
DA2	0.910							
DA3	0.889							
DA4	0.866							
EAD1		0.901						
EAD2		0.854						
EAD3		0.892						
EAD4		0.459						
EAD5		0.435						
HA1			0.942					
HA2			0.895					
HA3			0.912					
HA4			0.892					
IPED1				0.870				
IPED2				0.887				
IPED3				0.737				
IPED4				0.766				
LH1					0.919			
LH2					0.927			
LH3					0.920			
LH4					0.891			
LH5					0.911			
LH6					0.880			
PC1						0.837		
PC2						0.622		
PC3						0.867		
PC4						0.841		
PC5						0.519		
PC6						0.724		
PFP1							0.931	
PFP2							0.922	
PFP3							0.920	
PFP4							0.899	
PFP5							0.872	
PTE1								0.844
PTE2								0.889
PTE3								0.863
PTE4								0.929
PTE5								0.892
PTE6								0.787

STRUCTURAL MODEL EVALUATION

The two-staged of PLS-SEM evaluation process in the past research it found that all of the suggestions and recommendations criteria for measurement framework reliability and validity were satisfied with two staged of PLS-SEM. The staged two is presented in this section. According to (Henseler et al., 2015) reported that the five staged process which contents assessment of effect size, assessment of predictive relevance of the model, assessment of the level of R2, collinearity assessment and significance testing of the structural model relationship. In the Figure 1 below showed

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that structural model indicating the t-values of the respective path coefficients and factor loadings.

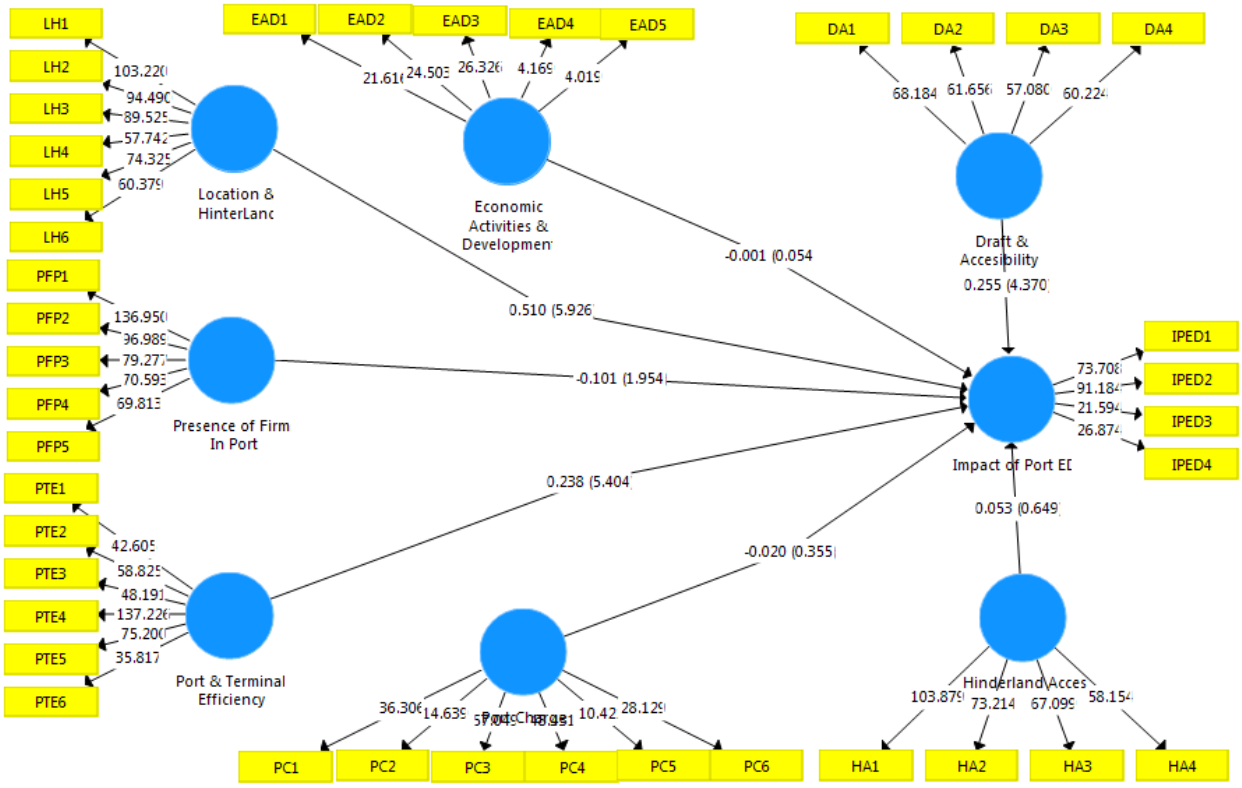

Figure 1: Structural Model

The hypotheses were tested via the PLS-SEM analysis the result of the test is shown in Table 2. As shown in the table, some of the hypotheses were accepted based on the 95 percent confidence interval. This study had developed seven main hypotheses. The findings show that four hypotheses were accepted and three hypotheses were not supported. The detail discussion about the previous literature and hypotheses acceptance or rejection are discussed in detail.

Table 2: Hypothesis testing

Hypotheses	Path	Beta	T- Statistics	P Values	Decision
H1	**LH -> IPED**	0.510	5.926	0.000	Supported
H2	**HA -> IPED**	0.053	0.649	0.517	Not Supported
H3	**DA -> IPED**	0.255	4.370	0.000	Supported
H4	**PFP -> IPED**	-0.101	1.954	0.051	Supported
H5	**PTE -> IPED**	0.238	5.404	0.000	Supported
H6	**PC -> IPED**	-0.020	0.355	0.723	Not Supported
H7	**EAD -> IPED**	-0.001	0.054	0.957	Not Supported

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DISCUSSION AND CONCLUSION

As revealed by the result, Location & Hinterland dimension positively significantly affect Development and Impact of Port ED (β=.510, t=5.926, p< .050). These findings are consistent with the findings from other studies conducted across the countries (Satta et al., 2017). A study by (Caldeirinha et al., 2009)showed that the distance between a port and the urban center has a positive relation with the port financial performance, but the location near the sea or the city does not have a significant relation with operational performance and port efficiency.
In respect of Hinterland Access, the result revealed that it has significantly negative effect on Impact of Port ED (β=-.0.053, t=0.649, p>0.05). However, the finding of this study contradicts many studies conducted in developed countries (Upadhaya et al., 2014). As discussed by (Nguyen et al., 2018), access to the hinterland is highly important for the competitiveness of a port and for the throughput volumes. The last years, ports have become parts of intermodal networks in complete transport chains.
The results also showed that Draft & Accessibility has a significant positive impact on the Impact of Port ED (β=.255, t=4.370, p< .050). These findings are consistent with other empirical findings that Draft & Accessibility can stimulate Impact of Port ED by pursuing new technological ways in the ports (Shen, 2015). In addition, the port infrastructure is necessary for explaining performance, but not sufficient. Other variables, such as maritime and inland accessibility, are always necessary to completely explain the link between the port infrastructure and port performance.
As revealed by the result, Presence of Firms in Port dimension positively significantly Impact of Port ED (β=0.101, t=1.954, p< .050). These findings are consistent with the findings from other studies conducted across the countries (Martínez Moya & Feo Valero, 2017). In seaport clusters, the core activity is cargo handling (all activities that concern loading and unloading the cargo), but other components of the cluster are transport, logistics, manufacturing and trade (Martínez Moya & Feo Valero, 2017)

In respect of Port & Terminal Efficiency the result revealed that it has significantly positively effect on Impact of Port ED (β=-0.238, t=5.404, p>0.05). However, the finding of this study are in lines with many studies conducted in developed countries (Nguyen et al., 2018). The research by Kang et al., (2017) showed that terminal efficiency has a statistically significant, positive influence on port performance, but port efficiency itself is also influenced by many factors such as the container mix, the vessel size and the crane efficiency. Port efficiency is also influenced by the work practices, consisting of the delays in commencing and the delays during stevedoring.

The result revealed that Port Charges does not have positive significant relationship with Impact of Port ED (β=-.020, t=0.355, p>.05). The result of this study is consistent with previous studies findings (De Oliveira, 2015).(Malchow & Kanafani, 2004) also did not take into account the port charges in their research, because of complexities making it difficult to measure the charges and because industry representatives suggested that port charges are relatively insignificant. (Munim & Schramm, 2018)did examine the effect of port charges on port performance but found a non-significant effect in the case of Korean and Chinese ports.

In respect of Economic Activities & Development the result revealed that it has significantly negative effect on Impact of Port ED (β=-.0.001, t=0.504, p>0.05).

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However, the finding of this study contradicts many studies conducted in developed countries(Laing, 2021). Research showed that this factor indeed has a significant influence on the port performance. “Of various economic factors, the value of direct imports turned out to be the most reliable and influential determinant of throughput volumes (Laing, 2021).

Overall, the findings of the study are consistent with the existing transport economics literature, which underlines the fundamental contributions of port infrastructure quality and logistics performance to the economic growth of a country. However, associations among the quality of port infrastructure, logistics performance and seaborne trade, and their effects on yearly growth of country economy, should be further examined using latent growth models. It would be interesting for future studies to investigate the interaction effect between port size and economy classification. Investigation of the comparative economic impact of hub and gateway ports could also be considered. Studies should also examine the impact that quality of port infrastructure and logistics performance has on the growth of neighbouring landlocked countries’ economy. Finally, economic contribution of value added activities at ports (e.g. through development of logistics parks) may also be investigated in future research.

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