

## **The Potential impact of Intermodalism, mobility, Safety and Security on Sustainability of Multimodal Transportation in Suez Canal Hub**

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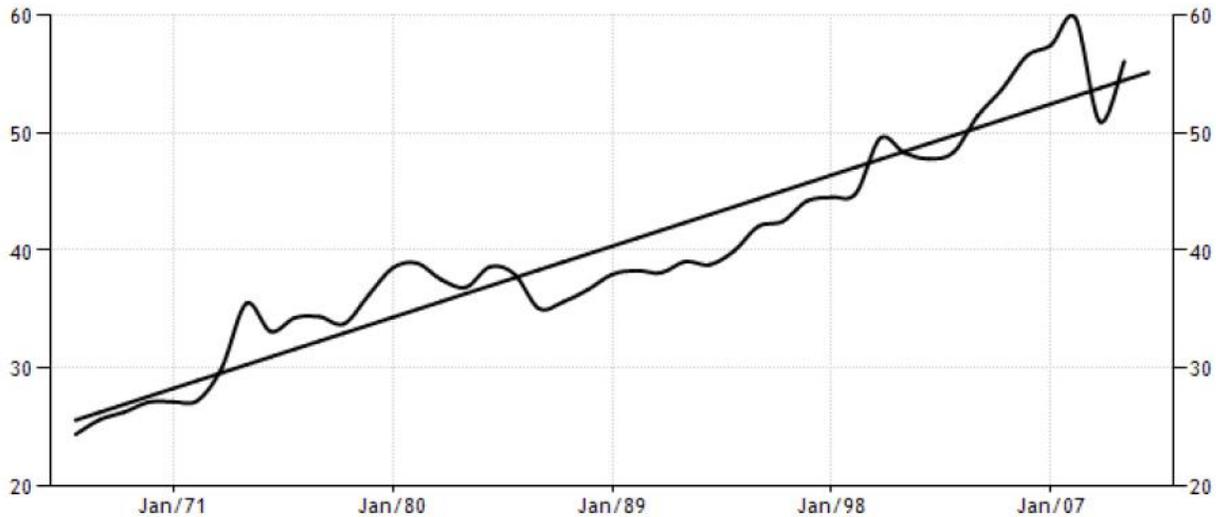
### **Abstract**

*The Suez Canal Hub Development is highly expected to influence almost all of the transportation regular routes when it comes to global trade. It is known that most of the shipments that go through Suez Canal, competitors take place from Asia and the United States. According to the East Coast, it consists of U.S. Intermodal System and the Panama Canal as well. However, this cannot deny that the Suez Canal is an efficient route. The reason is that it can reach the maximum expected capacity. Particularly, it is safe to state that the Suez Canal route is having a real competition with Panama Canal supporting the South and Southeast of Asia and the U.S. The main objective of this paper is to expose and draw a comparison and analysis between the Suez Canal and the Panama Canal. Moreover, it investigates the impact of Secure Transportation on Sustainability of Multimodal Transportation, intermodalism, safety and mobility. According to the findings of this study, it has shown and confirmed that safety and security are the main and most essential influencing parameters related to Sustainability of Multimodal Transportation in Suez Canal Hub.*

**Keywords:** *Intermodalism, mobility, Safety and Secure Transportation, Sustainability, Multimodal Transportation, Suez, Panama Canal.*

## 1. INTRODUCTION

It is important to mention that the International trade is one of the turbocharged engines when it comes to global economic growth. This is driven by containerization that facilitates intermodal freight movements in the first place. It also decreases the costs of shipping and this result in an increasing scale of economies from ever-larger container ships and the different types of supply chain. This ends with a rising level of necessity of reliable and timely freight movement. It is a fact that international trade rapidly grew as a share of world GDP from 20% in the year 1970 to nearly 60% in the year 2008. The below figure shows the same.



**Figure 1: International Trade as a Percent Share of World GDP, 1971-2007**

It is noticed that the total growth of international trade led to considerable changes in the entire infrastructure of global freight. Furthermore, it led to a wide-ranging and increased capacity of carriage when it comes to container ships and this resulted in a greater level of achievement regarding the economics of scale, greater prominence on logistics hubs to boost the intermodal transfer and a modernized freight movement, taking in consideration the transportation corridors to be able to accelerate road and rail freight movements well (Snyder et al., 2013).

According to the Panama Canal, it is 51 miles long (82 km) and it connects both the Caribbean Sea with the Pacific Ocean. Vessels that transit within the canal are raised and lowered 26.2 meters. The reason is that the ship transits via the locks from one ocean to another (Aldworth, 1999). The time of average in-transit has risen in 1999 from 9 hours to reach 13.04 hours in 2008 (Aldworth, 1999; ACP, 2009). By focusing on the statements of the Panama Canal Authority (ACP), it has been witnessed that during the 1<sup>st</sup> quarter of the year, the average canal water time (CWT) in 2008 was 35.09 and this led to such delays that are caused by some of the emergent and developing maintenance tasks. Suez Canal is capable of handling Post-Panamax vessels (ACP 2006). This presents an increased level of revenue and which results in more productivity (Slain, 2010).

### *Safety Security*

As an important security measure, having a pilot on board is a very important factor for the crew of the ship to have the full rights for utilizing the safety equipment and to be covered by insurance companies other than the insurance of the Suez Canal. The main goal is addressing problems related to pilots and focus on some of the recommendations to improve the situation as a whole and minimize the percentage of accidents. As far as the author is concerned, the main goal is to define the problems encountering pilots and to shed the light on some recommendations so as to improve the upshot of events and to minimize accidents which may sometimes lead to the pilot's death.

### *Port of Rotterdam*

Port of Rotterdam is known to be the largest industrial hub and logistics facility in Europe. The complex of this industrial area expands over the length of about 40 kilometers. Starting from 2012 till the current time, Maasvlakte 2 will be included according to this calculation. Moreover, the port area of this spot has a great access to the sea. According to the improvement taking place in this area, Netherlands held the second position in this field.

### *Mobility*

HTF is the main primary mechanism for funding Federal highway programs that are authorized by the Moving Ahead for Progress in the 21st Century Act. Kirk et al. (2012) reauthorizes the Federal-aid highway program for two financial years starting in 2013. This was to reduce the Federal programs from over 90 to less than 30 and to combine different and several freight programs into only one program presented to focus on the movement of goods.

### *Intermodalism*

National Freight Strategic Plan leads DOT to be able to develop a national freight strategic plan. It makes it easy to appraise the status and the whole performance of the network of national freight, address the bottlenecks of highway that cause serious freight congestion, predict the volumes of freight and address the major trade gateways and national corridors of freight, identify routes that providing access to energy areas, address the best practices for improving the performance of the national freight network and to mitigate the movement of freight impacting on communities.

### *Operational Changes at Rail Intermodal Terminals*

Ports serve different areas in their hinterland and their foreland as well. Hinter land areas include the ones that lie behind the port and where imports and exports take place. Forelands are the land areas that are located beyond maritime space and this is where ships export the goods and deliver them as well (Hoare, 1986; Hayuth,1982).

### *Sustainability*

The competitive advantage of a port is more likely to be assessed by holding a comparison between its performance in regard with other ports. It became clear that the competitive position of ports is influenced by other factors such as reliability, quality and frequency of roads, rails and inland waterway connections.

## **2. RESEARCH PROBLEM**

Defining and measuring sustainability was a hard task, especially sustainable transportation that tends to address the environmental, social and economic developments for the current and future coming generations. For that, the research problem lies in the insufficiency of studies and researches related to the Sustainability of Multimodal Transportation Models in Egypt and the parameters that might affect the same in the future. Katsanevakis et al. (2013) stated that there is more than half (51.9%) of the marine alien species in European Seas were presented by shipping. Marine (Suez) and inland passages ranked the second most common pathways of introduction (40.3%). After that comes the aquaculture (16.4%) and aquarium trade (2.8%). This concludes that importance of having the Suez Canal Hub Development Project to address the concept of sustainability.

## **3. RESEARCH QUESTIONS**

The researcher frames the major and minor research questions as mentioned below:

**RQ1:** Does Safety and Secure Transportation affect the Potential Sustainability of the Multimodal Transportation in the Suez Canal Project?

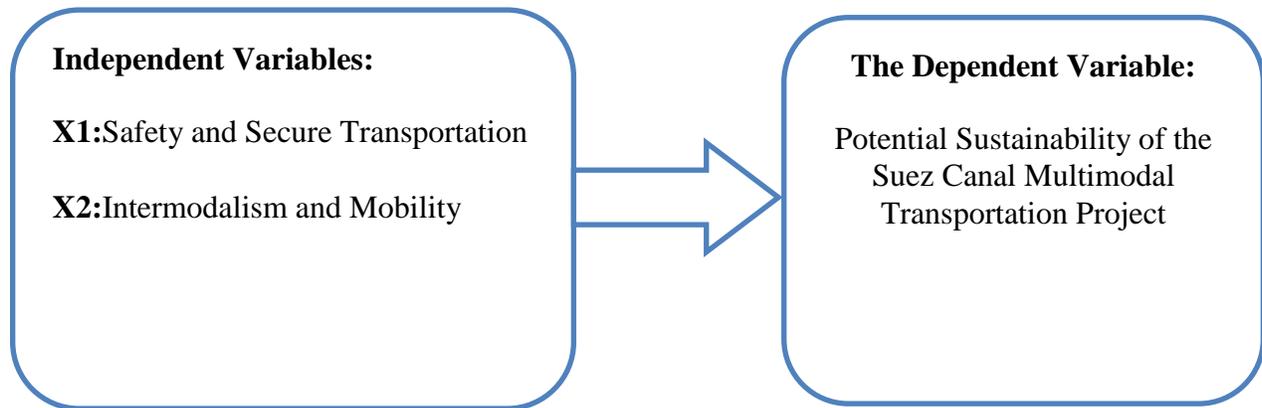
**RQ2:** Does Intermodalism and Mobility affect the Potential Sustainability of the Multimodal Transportation in the Suez Canal Project?

## **4. RESEARCH METHODOLOGY**

An online literature review has been conducted to focus on the current and future activities of cargo related to the expansion of the Suez Canal, the potential impacts of intermodalism and mobility, safety and security on Transportation on Sustainability of the Multimodal Transportation. Moreover, in the 1<sup>st</sup> of June 2015, a questionnaire has been created and presented for Suez Canal stakeholders and representatives.

## **5. PROPOSED THEORETICAL FRAMEWORK**

The proposed theoretical framework as shown below is based on the literature review in (Mashaly, 2014). Interview and questionnaire distributed among the experts and stakeholders hence.



**Figure 2: The Proposed Theoretical Framework**

The Research Methodology followed a qualitative and quantitative approach. Data has been collected via the use of interviews and questionnaires distributed among experts and stakeholders involved in the Suez Canal Development Project. The expected number of sample was thirty (30) stakeholders. Eventually, the researcher was able to conduct interviews with only eight (8) Experts and stakeholders related to the Suez Canal Development Project; the researcher interviewed the following: Two decision makers in the Suez Canal Authority, Two Marine Captains, Two Pilots and, Two Business men who have investments in the Canal area. The Researcher intended to use quantitative approach, secondary data analysis. A quantitative framework is proposed through SPSS(descriptive, correlation, and regression) in order to identify the potential sustainability of multimodal transportation model and the effect of Intermodalism, mobility, Safety and Security of Transportation on Sustainability of the Multimodal Transportation.

### Results

The results of descriptive statistics are as shown in table (1), where the dimension of safety and security was more perceived to be higher than intermodalism and mobility.

Dimension	Mean
<b>Safety and Secure transportation</b>	<b>4.07</b>
• Consider flexibility with design standards	4.17
• It is appropriate and doesn't degrade safety.	4.13
• Improve the safety locations where modes intersect.	4.13
• Promote education and enforcement of speed limits,	4.10
• Apply efficient and effective transportation security measures.	3.97
• Promote driving restrictions, and other travel –related regulations.	3.93

<b>Intermodalism and mobility</b>	<b>3.99</b>
• Provide alternatives for people and goods across the state.	4.10
• Encourage intermodalism to maximize the accessibility,	4.03
• Provide effective and economical transportation choices	4.03
• Improve communication and coordination regional and local transportation agencies.	4.00
• Improve communication and coordination among state.	3.97
• Use an efficient connectivity of the overall transportation system.	3.90
• Expand freight planning.	3.90
<b>Sustainability of the Multimodal Transportation in Suez Canal Hub</b>	<b>4.13</b>

**Table 1: Descriptive Statistics**

As shown in Table (2), relations were measured among the parameters of safety and security, intermodalism and mobility, and the sustainability of the Multimodal Transportation in Suez Canal Hub. Significance was shown in the relations were significant as the dimension of safety and security was higher than intermodalism and mobility.

		Safe	Mobility	Sustainability
Safety and Security	Pearson Correlation	1	.902(**)	.767(**)
	Sig. (2-tailed)		.000	.000
	N	30	30	30
Intermodalism and Mobility	Pearson Correlation	.902(**)	1	.693(**)
	Sig. (2-tailed)	.000		.000
	N	30	30	30
Sustainability	Pearson Correlation	.767(**)	.693(**)	1
	Sig. (2-tailed)	.000	.000	
	N	30	30	30

**Table 2: Correlation**

As shown in Table (3), the dimension of safety and security explains 58.8% of the sustainability of the Multimodal Transportation in Suez Canal Hub.

**ANOVA<sup>s</sup>**

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	9.097	1	9.097	39.986	.000 <sup>a</sup>
Residual	6.370	28	.227		
Total	15.467	29			

- a. Predictors: (Constant), Safe  
b. Dependent Variable: Sustainability

**Table 3: ANOVA**

As shown in Table (4), and via the stepwise regression, it is obvious that whenever safety and security rate is increased by one unit and which would affect the sustainability of the Multimodal Transportation in Suez Canal Hub to become 0.9.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.244	.621		.393	.697
	Safe	.956	.151	.767	6.323	.000

- a. Dependent Variable: Sustainability

**Table 4: Coefficients**

As shown in Table (5), it is shown that mobility and intermodalism do not affect sustainability if there is no safety and security.

**Excluded Variables<sup>§</sup>**

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	Mobility	.007 <sup>a</sup>	.025	.981	.005	.187

- a. Predictors in the Model: (Constant), Safe  
b. Dependent Variable: Sustainability

**Table 5: Excluded Variables****6. CONCLUSION**

In conclusion, and by having a view on the current developments taking place, it is witnessed that there will be a stark competition and this is because of the new hub established in the Suez Canal. According to stakeholders, they observed that the factors of safety and security, mobility and intermodalism are in a good state. They assured also that the parameters of safety and security are very essential for Sustainability of Multimodal Transportation in Suez Canal Hub.

The interviews have been conducted with experts and stakeholders in the field all assured the same according to the Suez Canal Development Project through the results of the questionnaire.

The relations among safety and security, mobility and intermodalism with the sustainability of Multimodal Transportation in Suez Canal Hub show a great significance. The reason is that the dimension

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and range of safety and security has been proved to be on a higher level when compared to intermodalism and mobility.

The dimension of safety and security revealed 58.8% of the sustainability of Multimodal Transportation in Suez Canal Hub. Safety and security increased by one unit via the implementation of stepwise regression and which would affect the level of sustainability the of Multimodal Transportation in Suez Canal Hub by 0.9.

It is important to state that without safety and security, there is no significance of influence to be mentioned when it comes to mobility and intermodalism.

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### Abbreviations

<b>CWT</b>	:	Canal Water Time
<b>TUE</b>	:	Twenty Foot Equivalent
<b>ACP</b>	:	Panama Canal Authority
<b>FMCSA</b>	:	Federal Motor Carrier Safety Administration's
<b>CSA</b>	:	Compliance, Safety, Accountability
<b>SMS</b>	:	Safety Measurement System
<b>TWIC</b>	:	Transportation Worker Identification Cards