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The Suez Canal Blockage in March 2021: The Causation of the Incident and Its Economic and Social Influences

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Abstract: As one of the most traveled areas for shipping transport, the incident heavily disrupted global commerce for a week, and it is worth discussing and researching the 2021 Suez Canal blockage to pinpoint the exact scale of the economic influences over the events. This essay will examine the case of a blockage event in the Suez Canal caused by the ship Ever Given. The introduction of the Suez Canal will be covered, including its historical background and some related simplified Egyptian History. The case is elaborated in detail, covered by the containership and the canal information, the date, and the situation during the time. Then, the essay will go over the reasons for the collision and the way the event changed the supply chain and global economy, explaining the importance of the Suez Canal and the change in the transporting routes, disruption in the supply chain, local economic impact, disruption in the market price of commodities and resources. Besides the analysis, there are suggestions to avoid the incident and the method to reduce or minimize the impact the incident can convey.

Keywords: Suez Canal, Ancient Egypt, Maritime Transportation, Supply Chain, Inflation

1. Introduction

1.1. Research Background

Egypt is a country in the Middle East and Northern Africa region with a prolonged history spanning over five thousand years. The prototype of modern Egypt is Ancient Egypt, a dominant civilization across the Mediterranean from its reunification until its downfall and extinction after the conquest of the Achaemenid Empire and Macedonia Empire by Alexander the Great.

The history lies between 3100 B.C. and 332 B.C. is the era of the Ancient Egypt, captivated by experts from archaeology and history, they created Egyptology by the field of its own [1]. It is a subject dedicated to researching and deciphering the mystery history of Ancient Egypt, from either archaeological sites or monuments that have been carved on Egyptian hieroglyphs. Except for the Great Pyramid of Giza, which is one of the world's seven wonders, there exist a sequences of small canals that connect the Nile River to Lake Timsah, Great Bitter Lakes and the Gulf of Suez of the Red Sea.

Although these small canals were built and utilized around 4,000 years ago, Ancient Egyptians still attentively connected the Red Sea to the Eastern Mediterranean. Nonetheless, it was considered impossible due to the likely sea-level elevation differences of the two oceans [2]. Ancient Egyptians

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still figured out their ways. They ruled out the feasibility of linking the Red Sea directly to the Mediterranean Sea. Instead, they tried to connect the Red Sea to Bitter Lakes first, a lake between the Red Sea and the Mediterranean Sea, about 25km north of the former and 100km south of the latter. And then, it constructed a channel between Bitter Lakes and River Nile that flows from the Eastern Africa to the Mediterranean Sea, or the known longest in the world. The canal itself was named the "Canal of the Pharaohs".

The idea was mentioned by Egyptian Pharaoh Senusret III around 1850 B.C. However, the actual construction possibly only began after the 7th century B.C., and it was credited to the Pharaoh Necho II [3].

The region west of the Sinai Peninsula lies the Isthmus of Suez, stretching approximately 125km longitudinally and acts as a land bridge between Asia and Africa. Due to its special geological location, the region is regarded as a "hot spot" for other colonizing powers with the thoughts of a canal establishment. The serious attempt that assisted the evolution of the Suez Canal was the French expedition in 1798 led by Napoleon Bonaparte, along with French experts in various aspects. The scheme of the Suez Canal was developed but attributed to some erroneous calculations regarding the tide difference; the project was deemed impracticable, and the voice of the canal's construction went silent for the next 50 years [4].

In early 1859, the construction officially began in the northernmost port city of Port Said. Despite being controversial, an rough estimation indicated that about 1.5 million people were involved in the construction, and at least tens of thousands of slave laborers died during the excavation process in the lens 10 years before the ultimate completion of the Suez Canal. The construction limitation and constant uprisings against the French and English colonization in Egypt accompanied political and social disturbance. The total expenditure on the Suez Canal was twice as much as the initial budget's anticipation, to around $100 million [2].

The Suez Canal's evolution has continued to these days, as the current canal is 15 times larger than the canal on its opening day in 1869 [4]. Besides the expansion, numerous tiny canals were being built to develop agriculture and industries on both sides, encouraging the region's economic development.

According to Egypt's Suez Canal Authority (SCA), there was 1 billion tonnes of cargo carried by the canal in 2019, which accounted for four times as much of the tonnes passing through the Panama Canal during the same time [5].

In March 2021, a Chinese container ship collided to the bank of the Suez Canal and got stranded, causing at least 100 ships to a halt at the both ends of the canal [2]. As one of the most traveled areas for shipping transport, the incident heavily disrupted global commerce for a week, and it is worth discussing and researching the 2021 Suez Canal blockage to pinpoint the exact scale of the economic influences over the events.

1.2. Literature Review

Khan & Rahman analyze the importance of the Suez Canal and its global impact, the blocking of the Suez Canal, and the potential reasons for navigation failure. They also exemplify the suggestions for improving future navigation and salvage efforts in the Suez Canal [6].

Ozkanlisoy & Akkartal describe the incident in detail: the Suez Canal blockage in March 2021. They also assume the alternative scenario during the blockage and dig deeply into the effects of the Suez blockage on supply chains [7].

Novak & Kutnjak & Hrustek enumerated disruptions in supply chain management and discussed digital transformation and supply chain management [8].

Most of the researchers include the historical background of the Suez Canal and provide data on the shipment that transits through the canal to demonstrate the importance of this vital passageway

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toward global trading. The case itself, the blockage, is also widely covered by the majority of the articles, along with some economic impact analyses.

1.3. Research Framework

This article will briefly outline the overall picture of the incident to visualize the scenario better. After this, it will inspect the causation of the incident and trace back to the construction phase of the Suez Canal to find the possible geographically influential factor. Afterward, the economic analysis is going to be interpreted, including the subtopic of why the event affects the economy, how the event impacts the supply chain, and the further influences of other factors around the world. Eventually, it will illustrate the suggestions for the event, both geographically(mechanically) and economically.

2. Case Description

On March 23, 2021, Ever Given was stranded in the Suez Canal (as shown in Figure 1). The bow of the vessel crashed into the eastern bank of the Suez Canal [9]. The ship Ever Given belonged to one of the 11 G-Type Container Ship and was built on September 25, 2018. It was designed to have a 20124 Twenty-Foot Equivalent Unit (TEU), a speed of 23 knots, a Deadweight Tonnage (DWT) of 198886, a Gross Tonnage (G.T.) of 219079, as well as a length of 399.98 and a breadth of 58.80, measured in meters [10]. The ship belongs to a Taiwan (Republic of China) privately held company of Evergreen Marine Corp registered in Panama from the Evergreen Group [11]. Ever given can transport as many goods as 200 trains can carry at once, and it can transport all these goods from China to Europe in a single journey. Ozkanlisoy and Akkartal, cited from Taube, said that it reveals why the share of maritime transport is more than 95%, while rail has a 1-2% share in China-Europe trade volume [7]. A plan with significant ambitions to deepen the Suez Canal and construct a brand new lane branch of 22-mile was publicized in August. 2015, the expansion was finished with a 22-mile lane parallel to the original waterway [9].

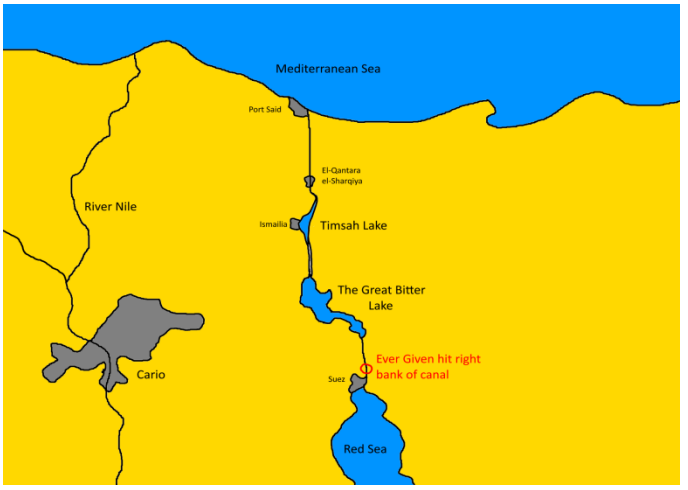

Figure 1: The location of the collision of Ever Given and the traffic in the Suez Canal [9]

Although the waterway's expansion allows multiple ships to travel in different lanes simultaneously, the Ever Given hit the Suez Canal in the southern part, where there is only one canal between the Great Bitter Lake and the Gulf of Suez of Red Sea. As a result, the collision blocked all the possible transits in the canal completely. According to Port Economics, Management, and Policy, 7.5 to 8.5 knots is the ordinary speed for canal transit, while the containership Ever Given was sailing at around 13.5 knots. Additionally, tugboats escorted the two vessels ahead of the Ever Given, but not for the Ever Given, despite such action is not entirely necessary [9].

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The rescue mission is assisted by removing amount larger than 30,000 cubic meters of sand from the bow of the Ever Given, with the aid from the large dredgers to dig and backhoe cranes to remove the sand. The six-day-long blockage ended on March 29 after tugging from 11 tugboats. The stranded Ever Given floated again and was towed Northward to the Great Bitter Lake [9].

3. Analysis on the Problem

3.1. Reasons for the Collision

After the collision in the Suez Canal by the super-containership Ever Given on March 23, 2021, the event intrigued many experts in different fields to examine and investigate the causation of the wreck. One of the most obvious reasons should be the comparison between the length of the Ever Given and the width of the Suez Canal at the point of the collision. After locating the point of the incident and measuring the width of the canal from Google Maps, the width of the Suez Canal is approximately 313 meters at the site of the incident. And as mentioned earlier, the G-Type Container Ship of Evergreen Group has a length of 399.98 meters [10]. Therefore, it is entirely possible for the Ever Given to deviate from the waterway and collide with the banks to block the channel, as shown in Figure 2.

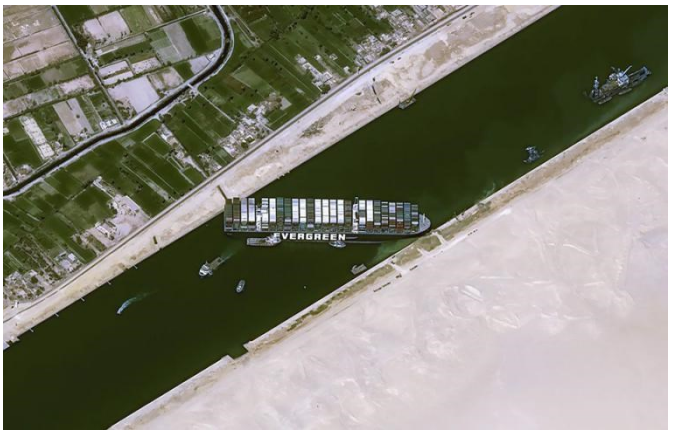

Figure 2: The image of the Ever Given [10]
(https://www.bbc.com/news/business-56533250)

Lebedev & Lebedeva & Butsanets described the fact that it was reported the chance of blockage in the waterway to happen again was still existent as the vessel had a sign to drift in the canal under winds, after restoring the bow of the Ever Given from the shallows by tugboats [12].

Hence, a possible factor that influenced the accident could be the weather. Suez Canal is on the verge of the Sahara Desert, so sandstorm conditions must be considered. Frequent sandstorm occurrence increases the possibility of a decrease in visibility and an increase in wind speed.

“Sandstorms in this area are frequent, and they are no less severe and fraught with consequences than snow charges at the Kara Gates and in the Vilkitsky Strait on the Northern Sea Route [12].” The author compares the sandstorms in the Middle East to snowstorms in the North Arctic to illustrate that the sandstorm deals no less damage than the snowstorm, which is deliberated as an extremely dangerous weather condition for any transportation.

It is reported that in some experiments, sandstorms or duststorms can result in train off-coursing since the sand is able to drift on the railway tracks [12]. Sandstorms convey enormous amounts of dust and particles from the deserts. Their momentum is larger than the wind at the same velocity, without “impurities”. If the wind blows not from the direction of motion but the sides of the ship at any angle, the impulse the vessel receives from the sandstorm can be larger than the one of the train,

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as the figure of the surface area of contact is bigger. Sandstorms can last for days, so it is feasible for the Ever Given to travel with the effect of sandstorms throughout the journey.

3.2. The Way the Event Changes the Supply Chain and Global Economy

3.2.1. Importance of the Suez Canal and the Change in the Transporting Routes

Not until recently had people realized the importance and the dominance of the Suez Canal in regard to marine transportation. About 30% of global container traffic with 12% of global trade transits through the Suez Canal, worth 1000 billion(1 trillion) dollars annually. On average, 50 vessels travel through the Suez daily, carrying a value ranging from 3-9 billion dollars. Typically, during the same period, the tonnage that transverses in the Suez Canal is quadruple the amount of that of the Panama Canal. According to Egypt's Suez Canal Authority, around 19000 ships utilized the route in 2020 [5].

The blockage of Ever Given certainly has blocked all the feasible maritime transportation routes that connect Asia to Africa. It was reported that during the 7 days long blockage, a figure larger than 430 ships were forced to queue up. And every further day waiting for clearance, an supplementary 0.5% of the worldwide shipping capacity is delayed [9].

Due to the geographical limitation, no other ideal alternatives to the Suez Canal exist. And that leaves the only option: the Cape of Good Hope. However, such a route has a larger travel distance of 9000km, or 6-14 days of travel [5].

Despite all these, security consideration was also taken due to the rampant piracy on the coast of Eastern Africa, specifically next to the coastline of Somalia.

3.2.2. Disruption in Supply Chain

Due to the fact that the Suez Canal was blocked and there were no passages, most of the shipments, especially those from Asia to Europe, had been delayed drastically. It is estimated and believed that the blockage halted as much as 9 billion dollar's worth in the international trading each day, causing the time costs of the goods to skyrocket, including constriction in shipment capacity and eventual exacerbation in the supply chain reliability [9]. Although the Ever Given was rescued and towed away, maritime traffic congestion was still generated. It was most likely due to the impact of COVID-19, which caused European countries to have massive shortages in various goods and resulted in rapid response to increased imports.

Added to blockage at the Suez Canal, most of the delayed vessels arrived at the ports within a similar time and peaked the shipping arrival or so-called congestion. Also, it is worth mentioning that the domino effect revealed its appearance, as the incident required the containers to reposition, like returning the containers to their departed port. Hence, the process was more costly, and it accelerated the increase in congestion.

3.2.3. Local Economic Impact

According to the Suez Canal Authority, including rescuing mission costs, possibly up to 100 million dollar, while the generated revenue by the Suez Canal transit fees meet a incredible 5.6 billion dollars in 2020. Additionally, the Suez Canal authority paid the expenses of the rescue of the Ever Given. The expenditure included the cost mobilization and utilization of tugboats and excavators, the wage of the operators, and the capital needed for canal repair and reforming.

3.2.4. Disruption in the Market and Price of Commodities and Resources

The incident certainly had some immediate impacts on the market. On March 29, 2021, the day that the Ever Given was salvaged and the canal was cleared, GCC market witnessed a share leap. The Abu

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Dhabi Securities Exchange (ADX) saw a 1.7% margin of increase, while it was 2.1% for the Dubai Financial Market after the re-floating of the vessel [5].

Furthermore, the fluctuation was also observed in the crude oil price. Mansour S. AlFadhli, Musaed S. AlAli, and Hazem A. AlKulaib published their research on the price study of crude oil during the Suez Canal Blockage. Using mean-adjusted returns and the market model methods, they concluded that the blockage demonstrated a positive correlation on crude oil returns, resulted a typically anomalous high oil price during the week-long blockage and a dramatic change between crude oil abnormal returns after the incident [13].

According to the World Bank's official website, many countries have seen a rise in core inflation between March 2021 and April 2021. Canada rose from 1.79% to 3.03%, China rose from 0.64% to 0.94%, Germany rose from 1.42% to 1.67%, United Kingdom rose from 1.07% to 1.54%, United States rose from 2.19% to 3.88%. These are some of the major economic hubs worldwide, and all suffered different extents of increase in core inflation.

The core inflation is much more severe for the countries next to or close to Egypt. Sudan had the figure rose from 110.65% to 150.42%, Jordan from 0.52% to 1.11%, Israel from 0.27% to 0.97%, Cyprus from 0.59% to 1.27%, Greece from -1.59% to -0.46% and Bulgaria from 0.43% to 0.96%.

Although it is incorrect to say the inflation is caused solely by the Suez Canal blockage, the regions and countries next to Egypt (Suez Canal) observed the most intense increase in inflation compared to the other countries worldwide. Therefore, it is safe to say the event almost certainly brought an economic impact to countries, particularly those whose coastlines are next to the Red Sea and Eastern Mediterranean.

4. Suggestions

4.1. The method to avoid the incident

As mentioned in the case description, a new lane with a length of 22 miles was built parallel to the original waterway. However, this expansion is limited from the Great Bitter Lake to El-Qantara el-Sharqiya, a town halfway between the Great Bitter Lake and Port Said, or the Mediterranean Sea. Therefore, another Northern Suez Canal expansion between El-Qantara el-Sharqiya and Port Said is favorable. As for the Southern Suez Canal from the Great Bitter Lake to the city of Suez or the Red Sea, construction for another waterway is also necessary since the collision of the Ever Given took place in this sector and blocked the entire canal.

This solution is the most effective, as two parallel lanes ensure the fluidity of traffic in the Suez Canal. Unless, in an almost impossible scenario, the two simultaneous blocking incidents are next to each other in different channels.

Considering that Egypt is still a developing country with ambitions to expand economically, it is undoubted to see the Egyptian government initiate a new construction phase toward the Suez Canal. However, the procedure can be extremely exorbitant and long-lasting.

Another factor that heavily influenced the incident was the weather. Make a common sense yet dismissive of the conspiracy theory like a deliberate attempt to smash into the bank; the loss of control of the ship caused the collision. An attribute of that can be the wind or the mentioned "purity" of the wind.

Wind direction is one factor. Wind coming from the bow and the stern, or in this case, Northern and Southern wind doesn't affect the vessels to deviate from its course. Instead, the wind blowing perpendicularly to the direction motion can decrease the ship's maneuverability.

Wind velocity, on the other hand, decides the magnitude of the force that a ship needs to undergo. Similarly, a larger wind velocity does not correspond to lower maneuverability, as the wind direction angle has more superiority over the velocity.

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As mentioned above in the Reasons for the collision of analysis on the problems, it is obvious that the difficulty to control the ship is skyrocketing if the dust and sand particles are denser, sided by the poor visibility.

Therefore, a weather forecast is crucial to the safety of the sailors and workers on the containership to prevent the incident and to secure the feasibility of passing through the canal without obstacles. To exemplify this, all traffic activities in the Suez Canal should be halted compulsorily during the severe sandstorm.

4.2. The Method to Reduce the Economical Impact

Imagine an incident like the blockage of the Suez Canal happens and lasts forever. The other thing that can minimize the effect on the economy is the change in the transportation method.

Transporting goods by airplane might be the prevalent transportation, but it is nowhere as cost-efficient as maritime transportation, despite the time taken for such a method to look appealing. One condition for massive cargo plane transportation requires a cargo airfield, as mixing domestic and industrial planes in an international airport is unsafe for the air regulations. Many cities and towns in the world have never been a part of the air system, so building an airfield dedicated to cargo transport is out of the blue, and not many companies have an air route for good transport.

Nonetheless, people had found a better option: rail transportation. Train traveling is able to convey a much larger volume of goods than the air in the form of separated units of containers. Although the consumption in time by rail is larger than air, it is generally faster than going across oceans. Most essentially, train transport might be “doable” as international railways can be interconnected based on the existing rail lines.

China, for example, is one of the largest trading partners for the European countries. Although most goods transit through the Suez Canal by sea, China is scrutinizing any other alternative. And since 2011, China has been trying to establish new lines between China and Europe. The outcome appeared to be a success due to the fact that the rail halves the time of that of the sea. For instance, the Chongqing-Duisburg railway was described as a German company’s most profitable route. Thereafter, the train interval became three times per week in 2016 to one train per day in 2018. Besides the Chongqing-Duisburg railway, many routes were founded, such as Harbin-Hamburg and Suzhou-Warsaw railway. Nevertheless, most of the new routes aim to find the supplies and demands between different regions for an optimal trade line that at least profits. Therefore, not all the railways were successful [14].

Yet still, it shows the determination of China to reduce the importance of the Suez Canal through numerous extensions of new China-Europe railways, as the land trips surged to 6235 in 2017, despite still being a relatively small figure for maritime transportation through the Suez Canal.

Of course, politics is also involved in international railway lines - it requires international corporations. At Khorgos on the Kazakhstan-China border, goods can be transferred in approximately three quarters, which is a good sign of a prosperous and efficient railway operation.

Since the 2022 Russo-Ukrainian War, rail transport has been thoroughly impacted, and the project is covered in uncertainties nowadays [14].

5. Conclusion

As analyzed, it is simple to understand the blockage of the Suez Canal does not happen even intentionally for most of the container ships because most of them do not exceed the canal’s width. Unfortunately, the Ever Given was sufficient in length to be blocked. Thus, it is worth considering the expansion of the canal’s width or constructing a new parallel lane next to the original one.

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The reason for the collision of the Ever Given is believed to be caused by the weather conditions, including the velocity of the wind, the direction of the wind, and the form of the wind with or without dust and sand particles. Thus, it is recommended to set up an alarm system to avoid traveling in dangerous weather conditions.

Since the completion of the Suez Canal, it has been the busiest canal in the world and has become the region with the busiest ocean traffic. The geographical advantages emphasize the importance of the Suez Canal, as another route that connects Asia to Europe might take two more weeks in the journey as it goes around the African continent through the Cape of Good Hope. Although the North Arctic line seems to have potential, its operating season is constricted as the North Arctic Ocean is only unfrozen for a few months.

Local economic impact and disruption in the market, price of commodities, and resources are also observable. The fluctuation in the market and price can be demonstrated by the trend in market shares and core inflation, respectively.

The way to counter the over-reliability in maritime transportation is to increase the trading volumes and railway lines through the Eurasian land bridge, and the benefits are shown in various aspects, as discussed earlier.

Suez Canal is and will remain one of the most pivotal corridors of the human society. It shadows its supremacy in terms of economy, geography, politics, and history. After the incident, most of the globe acquired an overall comprehension of the Suez Canal. With certain consideration of suggestions and improvements, further incidents or the consequent impact will be prevented, leaving a Suez Canal that retains thriving.

References

[1] *History, Ancient Egypt, 2009.10.14, 2023.08.21, https://www.history.com/topics/ancient-egypt/ancient-egypt*

[2] *History, Suez Canal, 2018.02.16, 2023.08.21, https://www.history.com/topics/africa/suez-canal*

[3] *History, 9 Fascinating Facts About the Suez Canal, 2014.11.17, 2023.08.22, https://www.history.com/news/9-fascinating-facts-about-the-suez-canal*

[4] *Hamza, M., & Abdel-Latif, M. (2003). The construction of the Suez Canal. WIT Transactions on The Built Environment, 65.*

[5] *NEW ZEALAND FOREIGN AFFAIRS & TRADE, The Importance of the Suez Canal to Global Trade, 2021.04.18, 2023.08.22, https://www.mfat.govt.nz/en/trade/mfat-market-reports/the-importance-of-the-suez-canal-to-global-trade-18-april-2021/*

[6] *Khan, I. A., & Rahman, S. (2021). Review and analysis of blockage of Suez Canal region due to giant container ship. Marine Technology Society Journal, 55(5), 39-43.*

[7] *ÖZKANLISOY, Ö., & AKKARTAL, E. (2021). The Effect of Suez Canal Blockage on Supply Chains. Dokuz Eylül Üniversitesi Denizcilik Fakültesi Dergisi, 14(1), 51-79.*

[8] *Novak, E., Kutnjak, A., & Hrustek, L. (2022). Opportunities for a Digital Transformation of the Global Supply Chains: Case Study of the Suez Canal Blockade. In Central European Conference on Information and Intelligent Systems (pp. 137-147). Faculty of Organization and Informatics Varazdin.*

[9] *Port Economics, Management and Policy, Blockage of the Suez Canal, 2021.03, 2023.08.23, https://porteconomicsmanagement.org/pemp/contents/part6/port-resilience/suez-canal-blockage-2021/*

[10] *EVERGREEN LINE, G-Type Container Ships, Unknown date, 2023.08.23, https://www.evergreen-line.com/vesselparticulars/jsp/VSL_VesselType.jsp?vslType=G*

[11] *EVERGREEN MARINE CROP., Corporate Profile, Unknown date, 2023.08.23, https://www.evergreen-marine.com/tbi1/jsp/TBI1_CorporateProfile.jsp*

[12] *Lebedev, A. O., Lebedeva, M. P., & Butsanets, A. A. (2021, October). Could the accident of "Ever Given" have been avoided in the Suez Canal?. In Journal of Physics: Conference Series (Vol. 2061, No. 1, p. 012127). IOP Publishing.*

[13] *Alfadhli, M., Alali, M., & Alkulaib, H. (2022). The Effect of Suez Canal Blockage on Crude Oil Prices: An Event Study Analysis. J. Bus. Manag, 23, 64-66.*

[14] *Pomfret, R. (2018). The Eurasian land bridge: the role of service providers in linking the regional value chains in East Asia and the European Union.*