

Impact of COVID-19 on the Container Shipping Industry: An Evidence from Egypt

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Abstract

Purpose: This paper aims to investigate the impact of the COVID-19 pandemic on the container shipping industry and illustrates the challenges of container shipping flow during the global pandemic and the mismatch of demand and supply resulting from increasing consumer demands because of the pandemic precautions.

Design/methodology/approach: based on qualitative research design, the investigation was conducted through literature and 5 semi-structured interviews from the port administration, two shipping lines, and two freight forwarding companies.

These methods helped the study to achieve its objectives to: (1) Identify the impacts of COVID-19 on the shipping lines, freight forwarding companies, and ports; (2) Investigate container transport problems during the pandemic, and (3) Evaluate container shortage consequences.

Findings: The research confirmed that the pandemic has negatively affected the global economy and changed the global trade network. Besides, it identified the damaged area in the supply chain that happened due to the pandemic, investigated container transport problems during the pandemic, evaluated container shortage consequences, developed a solution in the short term to balance between demand and supply freight rates and proposed a plan to face a long-term increase in worldwide containerisation transport.

The study concludes that the shipping industry was one of the biggest winners in the global pandemic, while some others were negatively affected. Shipping lines were the biggest winners due to the reduction in capacity, which led to higher freight rates. Meanwhile, small freight forwarders were negatively impacted due to the lack of containers for exports or imports and the reduction of shippers, while larger freight forwarders were not significantly affected as they provided multiple services to clients. Ports in North America and Europe were also negatively impacted due to congestion and reduced labour capacity.

Research implications and limitations: The output of the study allows companies in the global shipping industry to develop strategies to find solutions to the consequences of the pandemic on the industry. These strategies must be regularly reassessed in response to the pandemic's evolution, and they can help companies find suitable solutions to the challenges faced during the pandemic. The research findings can also inform policymakers and

stakeholders in the shipping industry about the impact of the pandemic and the need for more efficient and resilient supply chains in the future.

Originality: *The study provides a comprehensive overview of the effects of COVID-19 pandemic on the global shipping industry and offers valuable insights for companies operating in this industry. By identifying the challenges faced by the industry and offering recommendations on how to deal with them, the study helps companies prepare for similar situations in the future and enables them to be better prepared to either the impact of future pandemics or global events.*

Key Words

COVID-19; Global Economy; Global Container Shipping Industry; Global trade; Container.

Introduction

COVID-19 pandemic is spreading in many parts of the world, impacting all aspects of human society. Negative influences on port throughput primarily include shipping line locked-down or reduced performance, transportation market disruption, and increased health risks of international goods and crew (UNCTAD, 2020).

The coronavirus first appeared in China in December 2019. In January 2020, China went into full lockdown, immediately impacting trade volumes as production activities were halted and ports were forced to scale back their operations. This pandemic breakout led to shipping lines' announcing the first wave of blank sailings, given the time it takes to sail from Asia to major markets in Europe and North America. So, since the virus outbreak, the world economy has been in a disorderly situation (Notteboom, 2021).

Since China is the world's largest exporter, a series of unfortunate events for the shipping industry began to unfold. Due to strict lockdowns, manufacturing halted, and Chinese companies withdrew from purchase contracts, significantly dropping raw material imports. Because these containers had to be rearranged and discharged to alternate ports, shippers faced significant congestion surcharges (Notteboom, 2021).

Asia's supply shock was dissipating at the time as factories reopened in large numbers. However, a demand shock resulted from the sharp increase in full and semi-lockdown situations. Economic activity has decreased significantly worldwide because of the heavy lockdown imposed on

almost all countries. The nations faced negative local production results. Countries implemented lockdowns as the pandemic spread from its Asian epicentre, halting economic movement and production. Many factories were temporarily closed, resulting in many containers being held at ports (Bragagni & Xhaferraj, 2021).

Global economy is still catching up after practically pausing during the pandemic's peak. The increase in demand was more substantial than expected and was not met with a sufficient supply of shipping capacity. The reasons for this shortage were manifold. The global freight movement was delayed by coronavirus-related shutdowns, which increased demand for consumer goods, and the lack of shipping containers has caused long waits at ports worldwide. The shipping container has become a prized and costly lifeline for the country's shops and manufacturers. The container crisis is also a reflection of a slowdown and delays across the maritime supply chain due to strains caused by the pandemic, such as port labour shortages, port congestion, and capacity constraints in truck and other inland transport systems due, for example, to delays in undergoing necessary testing or delays by factories in returning containers. These factors meant that container dwell times increased, and empty containers could not return to the system where they were most needed (UNCTAD, 2020a).

Therefore, the world is living in unprecedented times, with numerous challenges imposed by COVID-19 pandemic. Container shipping prices

have reached all-time highs, owing primarily to the disruption of maritime logistics chains.

Based on all of these, the study attempts to answer the central question: How has COVID-19 pandemic affected global supply chain? By identifying the damaged area in the supply chain that happened due to the pandemic, investigating container transport problems during the pandemic and evaluating container shortage consequences, a solution in the short term should be developed to balance demand and supply freight rates and propose a plan to face a long-term increase in worldwide containerisation transport.

Literature Review

Maritime transport is one of the most important modes of transportation, critical for international trade and plays an important role in the context of globalisation. Hlali and Hammami, (2019) have proven that containerisation has had a great impact on the growth of international trade since 1966 and that the main aspect of globalisation is containerisation (Hummels D (2007). It led to increased global trade rates, and ocean shipping also greatly impacted the ships' development (Bernhofen, el-Sahli, & Kneller, 2016).

COVID-19 Pandemic Rise

Because of the widespread distribution of COVID-19 pandemic in March of 2020 over the world, countries-imposed lockdowns; as a result, limiting economic movement and manufacturing. Many factories were temporarily closed, resulting in a large amount of cargo being held in the port, and Carriers reduced the number of ships at sea to cut costs and deteriorate ocean rates. This slowed down imports and exports and resulted in empty containers not being picked up.

Asian continent - the first victim of the pandemic - was the first to recover. While China began resuming exports, almost all remaining containers in Asia to Europe during the pandemic did not return quickly enough. Containers began to pile

up due to lack of staff. Containers are stacked in North America and Europe, where they are unnecessary, whereas Asian countries, especially China, are in severe need. The industry leader, Chinese container makers, charges roughly \$2,500 for a new container, up from \$1,600 last year. Moreover, this lack of available containers has also increased the cost of new containers. Container leasing rates have skyrocketed by about 50% in just six months (Irakli, 2021).

Supply and Demand Shocks

Supply shocks are sudden changes in the availability of raw materials, parts, and production capabilities. Not only may costs rise, but essential components may also become unavailable due to a shortage of raw materials, parts, or the labour required to get them. The supply shock may take some time to be felt across a supply chain, depending on the existing buffer, such as energy, grain, components, or raw materials stocks (Notteboom, 2021).

On the other hand, demand shocks refer to a sudden shift in demand caused by unexpected events. Expectations for several commodities, such as food, can lead to storing, which leads to rising demand, resulting in several items becoming unavailable. Optional purchases such as vehicles, clothing, furniture, and appliances are frequently postponed, and energy demand falls in lockstep with passenger and freight movement. Medical equipment and drugs experience a rise during a pandemic. Consumers shift their consumption patterns toward critical commodities and adjust their consumption based on scarcity and price. During the second wave of European lockdowns in November 2020, consumption of specific product groupings, such as computers, had unusual peaks and resilience (Notteboom, 2021).

Impact of Covid-19 on Ship Calls

Any disruption to global maritime transportation networks can have far-reaching consequences for an increasingly globalised international economy. Allowing continued port access to commercial

ships during crises such as COVID-19 pandemic ensures that the world continues to function, with maritime trade consistently delivering the world's food, energy, raw materials, and manufactured goods and components, including critical medical supplies. However, because the pandemic expanded in a staggered pattern across regions, keeping maritime transport moving and trade flowing during the disruption has been challenging.

Reduced port visits and Automated Identification System (AIS) data tracking and tracking ship movements provide near-actual information on marine transport and trade in motion. Marine Traffic's AIS data on weekly port calls for the first 24 weeks of 2020 provides a good indication of both the magnitude of the disruption as well as the resilience level of the maritime supply chain. For instance, Global ship calls fell 8.7 % in the first 24 weeks of 2020 from 1.1 million in the same period in 2019. The majority of the fall occurred in Week 12 of 2020, when COVID-19 was declared a pandemic. The picture changed significantly when countries began implementing economic and social limitations and lockdowns. The number of calls dropped by 17%, or 95,206 calls, in the second quarter compared to the same period in 2019. The overall number of ships' calls decreased by 13.2 % between Weeks 13 and 16. The following two weeks (weeks 17 and 20) saw a 15.4 % drop. In comparison to 2019, the drop from Week 21 to Week 24 was 20.8 % (Notteboom et al., 2021).

Freight Rates

Although the world supply chain had been broken during COVID-19 outbreak, widespread, immediate disruptions were avoided due to decreasing demand for most items and the temporary closure of industrial operations. However, the global trade system inefficiencies have caused shortages that have impacted containerised maritime freight shipping (CMFS) costs and threatened global supply chains. Maritime transportation routes have the highest cost increases, longer delivery delays, and reduced stockpiles. Worldwide shipping prices

increased by 180% yearly, according to the Freight Baltic Index (FBX) global container freight index. For instance, CMSF costs from East Asia increased by 220% on average year on year. According to industry reports, lack of shipping containers is the primary cause of increased CMFS pricing. This diagnosis, however, may be describing the symptom rather than the underlying cause. The container scarcity may be better understood as a reduction in container inventory due to pandemic-related inefficiencies. Therefore, the number of shipping containers leaving East Asia exceeds the number of containers returning (E. Notteboom, 2020).

The slow repositioning of empty containers could be attributed to carriers' unwillingness to transport empty containers from European and American ports to Asia. The cost of transporting empty containers is high, including handling fees at terminals and ports, warehouse storage and maintenance, and hinterland trucking services. As a result, the combination of these issues has exacerbated container shortage, eventually driving the ocean freight rate to unprecedented levels since 2020.

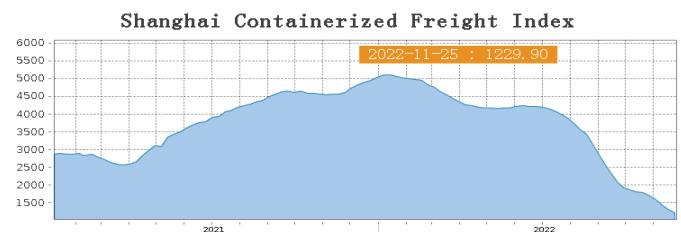


Fig. 1. Shipping Disruption and Freight Rate in the Wake of COVID 19

Source: adapted from Shanghai Containerized Freight Index (as of 22 November 2021)

Shipping Lines

Shipping companies have developed innovative service and storage solutions to reduce booking cancellations. They introduced blank sailings and adapted container shipping capacity to meet lower demand (UNCTAD, 2020). Blank sailing, defined as Void Sailing, happens when an ocean line service operator decides to cancel a call or skip a particular port, region, or possibly an entire

leg on the scheduled route. During the pandemic, there were two waves of blank sailing by the shipping lines, the first wave in February 2020 involved the withdrawal of nearly 36% of sailings from Asia to Europe, and 28% of the transpacific carriers have withdrawn up to 20% of their network overall capacity on the main trade lanes and put more than 2.7 million TEU of fleet capacity on idle. This calculates for more than 11% of the world container fleet. By May 2020, the blank sailings rate for Asia–United States route reached 19% of cancelled capacity (47 out of 249 calls were blanked) (Notteboom, 2021).

Based on all the above, understanding the effects of COVID-19 on specific shipping activities in many sectors of the container shipping industry has received enough consideration. Thus, it was necessary to evaluate the difficulties imposed by COVID-19 and the specific effects that impact the industry, including shipping lines, freight forwarding companies, and port operations. Furthermore, it would be necessary to offer recommendations for strategies and assess their efficacy to detect any weaknesses in the industry's resistance to future crises, besides investigating who was the most affected sector, positively and negatively, in the overall industry and how they could adapt to or face it during interviews with each of them.

Methodology

This paper aims to investigate the negative consequences of COVID-19 pandemic on the container shipping industry's global supply chain. To achieve this, a qualitative case study approach was used, based on 5 semi-structured interviews with representatives from three different entities within the maritime industry: a port administration, a shipping lines company, and a freight forwarding company.

The port administration interviewed was DP World Sokhna, part of DP World's global network of 60 terminals across 31 countries and strategically located at the southern entrance of the Suez Canal on the Red Sea. The interview

was conducted with a port planner and a financial manager. The shipping lines companies interviewed were CMA CGM S.A., the third-largest container shipping company in the world, and Maersk Line, the world's largest container shipping company in terms of fleet size and cargo capacity. The interviewees from CMA CGM were held with sales directors, while two sales directors were interviewed from Maersk Line. The freight forwarding company was Globelink Egypt, a leading logistics firm offering multi-modal transportation solutions and international freight forwarding services. The interview was conducted with the general manager.

The interviewees were selected based on their work experience in the maritime industry to ensure a comprehensive analysis. The questions used in the interviews were both general and industry-specific, with general questions aimed at understanding the impact of COVID-19 on the container shipping industry and its operations, while specific questions focused on identifying the approaches taken by industry participants to address the issues caused by COVID-19 and evaluating the effectiveness of these approaches. The data collected through the interviews were analysed using NVivo, a qualitative data analysis tool¹.

Results and Discussion

The thematic analysis has been conducted, and its main aspects will be presented in this section, followed by discussion and recommendations sections based on the findings of the analysis.

Economic Change

The pandemic significantly impacted both the demand and supply sides of the shipping industry. Initially, demand was low due to reduced production in China, the largest exporter. However, when people started staying at home, demand increased, and factories struggled to keep up with orders. Supply was reduced due

¹ For more information about the interviews and interviewees please check the Appendix 1

to pandemic lockdowns, political reasons, and changes in shipping routes. These factors led to delays and disruptions in the supply chain and shortage of resources in the market.

A. Demand Side

At first, the demand was reduced due to low production, especially in China, the biggest exporter. The country then locked down because of the pandemic, so there was no production in the middle of the year 2019 since all the factories were locked. The demand at that time was low or at least lower than the supply, which made shipping lines generate losses due to low shipping prices. This is what happened in China. However, when people started sitting at home, their demand increased, which piled up a massive number of orders for factories to produce, which were working only with 30~40% of their main capacity.

B. Supply Side

On the other hand, supply was reduced due to several conditions. First is the pandemic lockdown, which reduced shipping lines' working capacity all over the globe; Second and according to Mr. Sameh², for confidential political reasons, a group of commercial container vessels were put under the authorities' control, to serve military purposes, loaded with empty containers to one of the countries in the Far East, which in fact increased the shortage. The transit time increased too as it takes the container 70 days to arrive from the Far East to Egypt, which was the reason for the delay and disruption in the supply chain operation and the lack of resources in the market. Another reason is the change in routes that took place due to change in demand, the emergence of a new trade that does not pass through the line under study (this line from the Far East revolves around a part of Asia and then enters the Red Sea to the Mediterranean Sea until its trade is complete). This new trade takes the opposite path to connect America

because there is a very high demand on the western coast of America, and this was a more accessible and more economical way than going around Asia and then entering America from the east coast (it goes around America to reach the west coast or they do land logistical operations to reach the west coast). Because this way is more expensive, a new dilemma arose. Aside from ships that sailed away for political reasons, numerous shipping corporations forced ships to shift routes to satisfy demand, significantly reducing the supply in Egypt.

Shipping Lines

At first sight, it appears that because supply was decreased, shipping companies must have suffered losses; nevertheless, this is not the case. According to the shipping line, they sold 30% of their service, but due to different improvements, they produced revenues 60% more than before Covid-19. Shipping lines got fuel at extremely low prices and reached a negative price at specific moments or for free because of the lack of fuel consumption during the lockdown, significantly impacting profits.

Secondly, the increase in container prices genuinely generated huge profits even if a smaller number of containers moved. At the beginning of lockdown, large shipping companies own half of them, and the other half are chartered. So, they have no trouble paying the daily rent rather than the double sum of shipbuilding with increasing rental costs. As for a big shipping line such as Maersk, if they were to build those ships, it would cost them between 30 and 50 million dollars and take them five years to recover the costs. As a result, renting was a better alternative than building ships. So, companies such as Transmar and the Egyptian, ALmasrya, began buying vessels at the beginning of the pandemic; everyone thought they were crazy. They were one of the few that provided vessels spaces and made a huge amount of money renting their vessels. They may face a problem after COVID-19 period is over.

Regarding blank sailing, it was always there, but it increased during the pandemic. However,

² Mr.sameh: general manager of Globelink Company "freight forwarding".

it is just a trick shipping lines use to maintain demand higher than supply and keep the prices high. During July and August of 2021, freight decreased to 25000 from 30000 on the long leg (Far East, North America, and Europe), so the shipping line simply took some vessels from that line to another line with high demand for a week or two, making the demand increase on the long leg to exceed supply, then brought the vessels back when the freight increased.

Port Conditions

During COVID-19 pandemic, lockdowns in America and Europe provided financial support to port workers, including drivers, which resulted in the scarcity of drivers, chassis, and vehicles. This disrupted the supply chain and caused a shortage of containers, particularly in China, where the return of containers was not fast enough. In Egypt, the situation was slightly different as the lower container traffic and less stringent curfew allowed for smoother operations. However, customs processes, including customs requests, checks, and payments, still caused significant delays.

To mitigate the impact of these disruptions, companies typically conducted truck visits to pick up containers during the night shift, as this was considered safer and allowed for a larger number of trucks and RTGs to handle loading. However, the curfew imposed during COVID-19 pandemic limited the ability of trucks to reach the port during these hours, forcing companies to manage container movements during the day when customs activities were taking place. The head of the customs authority also decided to decrease workers' capacity in each shift by 25% to reduce the risk of the virus spread.

The reduced availability of drivers, coupled with the limitations imposed by the curfew and customs processes, resulted in an increase in the age of released containers within the terminal, slowing their movement and making it difficult to find spaces to accommodate the newly released containers. To address this issue, some of the containers were stored in the empty container

yards, taking advantage of the limited number of empty containers available at the time and the empty newly constructed docks with no vessels to occupy or operate on.

Despite the challenges posed by the limited availability of drivers and equipment, the business adapted by building a pool of outsourced workers and equipment operators. This resulted in increased costs for outsourced labour as the daily order grew. However, over time, the performance of the new equipment operators improved, positively influencing port productivity. This solution helped to solve the major problems faced by the terminal during COVID-19 pandemic.

Freight Rates

The end of the lockdown resulted in a surge in demand that surpassed supply capabilities and resulted in a shortage of vessel space. Shipping lines capitalised on this by increasing freight rates, as there was no opposition to the increase. For instance, the freight cost of a 40-foot container from the Far East to Egypt rose from \$1,300 prior to the pandemic to a range of \$17,000 to \$18,000 in the first quarter of 2021. To address the high demand for small and medium vessels from the Far East to North America, shipping lines such as CMA reallocated 60% of their vessels from the Mediterranean and Europe to the East, which led to even higher freight rates. To alleviate this issue, CMA deployed newly ordered vessels, which came into service by 2021, and implemented faster training for new crews, reducing training time for each new employee by 26%, according to CMA's official records. This resulted in a decline in freight costs, reverting to \$8,000 to \$7,000 for Egypt.

Similarly, Maersk, aiming to increase revenue, charges more for moving a 20-foot container from the Far East to North America and Europe (\$10,000 to \$12,000) than from the Far East to the Middle East (\$2,500). To maximise profits, Maersk took six out of ten vessels from the Far East to the Middle East and redirected them to the Far East-Europe route. However, this impacted spaces in Egypt, as demand increased

due to increased ordering in various industries, particularly the food and technology industries, while people were confined to their homes. This further intensified the demand-supply imbalance and resulted in an even higher increase in freight rates. Despite the higher freight costs, the Far East to North America route still generates higher profits with a more favourable container cycle. In conclusion, the insane increase in freight rates can be attributed to the basic economic principle of demand exceeding supply.

Conclusion

The global pandemic of COVID-19 had a significant impact on the maritime transport industry, creating a divide between the winners and losers. In order to better understand the effects of the pandemic on this industry, the study conducted interviews with representatives from shipping lines, port administrators, and freight forwarders. Through these interviews, a clear picture of the winners and losers emerged.

First: Winners:

- Shipping lines:

During the pandemic, the global trade industry experienced significant disruptions, with lockdowns and restrictions on movement reducing shipping capacity. However, this reduction in capacity created a scarcity of available spaces on vessels, driving up freight rates. Shipping lines were the biggest beneficiaries of this trend, as the high freight rates provided them with significant profits. The reduction in fuel prices, caused by a decrease in vehicle movement, further increased the profits of shipping lines. Shipping lines leveraged this opportunity by using blank sailing as a means to maintain a higher demand for shipping services. This helped to further drive up freight rates and increase profits for the shipping lines.

Thus, the combination of reduced shipping capacity, high freight rates, and lower fuel prices

allowed shipping lines to emerge as the biggest winners in the maritime transport industry during the pandemic. These factors allowed shipping lines to generate significant profits and cement their position as key players in the global trade industry.

Second: Losers:

- Freight forwarders:

The pandemic caused significant disruptions in the global supply chain, leading to a decrease in shipping capacity, through a fall in the number of containers available for both exports and imports, besides the restrictions on travel and trade, which led to a skyrocket in freight rates. This meant that fewer containers were available, making it more challenging for small freight forwarders to secure the containers they needed to transport their clients' goods. Furthermore, the high freight rates made it less attractive for shippers to use the services of freight forwarders, as they had to pay significantly higher prices for the same services. This reduction in the number of shippers directly affected the revenue of small freight forwarders, making it difficult for them to sustain their operations and remain competitive in the market.

The result was that many small freight forwarders were forced to close their companies, unable to withstand the financial burden of the pandemic. On the other hand, big freight forwarders were better equipped to weather the storm, providing a wider range of services to their clients, including air and land transportation, warehousing, and consolidation, among others. These services provided alternative sources of revenue, helping big freight forwarders to remain profitable even during the pandemic.

This highlights the vulnerability of small freight forwarders who rely heavily on ocean freight as their primary source of revenue. With limited resources and limited diversification, they were susceptible to the effects of the pandemic and faced greater challenges compared to their larger counterparts, who have multiple sources

of revenue.

- Ports industry:

COVID-19 pandemic has profoundly impacted the shipping and port industry, causing significant disruptions and challenges that have negatively affected the industry and the global economy.

One of the biggest impacts of the pandemic was on the supply chain. The lockdowns and border closures put in place to slow the spread of the virus led to major disruptions in the flow of goods and services, causing a slowdown in global trade. This significantly impacted the shipping and port industry, which relies on the smooth flow of goods to remain operational. The disruptions in the supply chain caused delays and added costs for businesses and consumers alike, putting pressure on the industry.

Another major impact of the pandemic was reduced demand for goods and services. The global economic slowdown caused by the pandemic led to a decrease in demand for many products, which in turn led to a decrease in shipping traffic. This reduced demand put pressure on shipping companies, who had to reduce their fleets or lay off workers in order to stay afloat. The financial strain on the industry was further compounded by increased costs, such as those associated with implementing new safety protocols and procedures.

The situation was further complicated by the worker shortage: Ports, particularly in North America and Europe, were negatively impacted by the pandemic. Government payments to truck drivers to stay at home during the pandemic resulted in a shortage of workers once restrictions were lifted. This led to congestion at ports and slowed the global supply chain. The situation was further compounded by the fact that truck drivers, who continued to receive payments, had no incentive to return to work.

In conclusion, COVID-19 pandemic has deeply impacted the container shipping industry, leading to winners and losers. Shipping lines emerged as the biggest winners, while freight forwarders

and ports were among the biggest losers. Understanding the consequences of the pandemic and how it has affected different entities in the container shipping industry will be important for mitigating its future impact and ensuring the resilience of the global supply chain. The study highlights the importance of diversification and adaptation in the face of unpredictable events, such as pandemics, in order to remain successful in the maritime transportation industry.

Recommendations

The shipping industry is facing numerous challenges, including the need to reduce emissions and operate in an environmentally sustainable manner. COVID-19 pandemic has further highlighted the importance of conserving the environment and improving the efficiency of freight transportation. In order to address these challenges, port administration, shipping lines, freight forwarding companies, and governments must collaborate and take practical steps to promote sustainability and efficiency in the supply chain.

- Port Administration:

To enhance operational efficiency and reliability, the Port Administration can undertake the following measures:

1. Implement automation technologies such as Automated Guided Vehicles (AGVs), Container Terminal Operating Systems (CTOS), and Automated Stacking Cranes (ASC) to minimise human error and optimise container handling processes.
2. Invest in renewable energy sources, such as wind and solar, to power port operations and reduce dependency on fossil fuels. This will also help reduce the port's carbon footprint and contribute to a greener environment.

Train the employees in using new digital technologies and processes to support the transition to an automated port. This will help build

a skilled and capable workforce that adapts to new changes and challenges.

- Shipping Lines:

The Shipping Lines can improve their operations and minimise their impact on the environment through the following steps:

1. Invest in the latest fuel-efficient vessels equipped with advanced navigation systems and real-time communication technologies to optimise routes, lower transit times, and reduce fuel consumption.
2. Adopt digital technologies like GPS tracking, Electronic Data Interchange (EDI), and real-time communication to streamline operations and increase supply chain visibility.
3. Collaborate with ports and freight forwarding companies to promote sustainable supply chain practices and environmental responsibility. This includes promoting the use of foldable containers that have proven to reduce operational expenses and CO₂ emissions.

- Freight Forwarding Companies:

Freight Forwarding Companies can improve their operations and support sustainability through the following measures:

1. Offer eco-friendly and sustainable transportation options such as rail and barge to reduce emissions and support the environment.
2. Implement digital technologies like Electronic Data Interchange (EDI) to streamline operations and minimise paper usage, reducing waste.
3. Collaborate with shipping lines and ports to implement environmentally conscious practices and reduce waste. This includes promoting the use of foldable containers, which can result in cost savings of up to

35.7% and reduce storage space in yards and depots by 80%.

- Governments:

Governments can play a crucial role in promoting sustainability and efficiency in the shipping industry by:

1. Providing tax incentives and subsidies to promote investment in renewable energy and sustainable transportation practices.
2. Implementing regulations to reduce emissions from shipping and promote the use of cleaner fuels.
3. Encouraging collaboration among industry stakeholders to promote sustainability and efficiency in the supply chain.

- Stakeholders:

All the stakeholders in the shipping industry can contribute to promoting sustainability and environmental responsibility through the following measures:

1. Promoting sustainability and environmental awareness across the entire supply chain, including suppliers, manufacturers, and customers.
2. Collaborating to develop industry-wide standards and best practices for sustainability and environmental responsibility.
3. Investing in research and development to find new and innovative solutions to reduce the shipping industry's impact on the environment. This includes researching and developing more sustainable and cost-effective foldable container designs.

In conclusion, implementing these recommendations will help the shipping industry to become more environmentally responsible, reduce operating costs, and improve efficiency. By working together and investing in renewable

energy, sustainable transportation practices, and digital technologies, the industry can help to create a more sustainable future for all. However, these efforts must be supported by all stakeholders, including suppliers, manufacturers, and customers, to drive positive change truly. The shipping industry has a unique opportunity to lead the way in promoting sustainability and protecting the environment, and it is up to us to seize this opportunity.

Limitations and Future Research

– **Limitations:** the study is based on the impact of COVID-19 pandemic on the maritime transportation industry, so the findings may not be applicable to other industries or future pandemics. Furthermore, the study focuses mainly on the effects on shipping lines, freight forwarders, and ports and does not consider other actors in the maritime transport industry.

– **Future Research:** This study focuses on the impact of COVID-19 pandemic on the maritime transport industry, and there is potential for future research to expand on this topic. For example, future research could consider the effects on other actors within the industry, such as ship owners, cargo owners, and ship agents. Additionally, future research could examine the long-term effects of the pandemic on the industry, and the measures that have been put in place to mitigate these effects. Moreover, the research could compare the impact of COVID-19 pandemic on the maritime transport industry with other crises, such as the 2008 financial crisis, to understand how the industry responds to and recovers from major disruptions.

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Appendix 1

About Interview Questions

COVID-19 pandemic has brought significant changes and challenges to the global container industry, affecting shipping lines, freight forwarders, ports, and many other related industries. In order to better understand the impact of the pandemic on the industry, the following questions aim to address key areas of concern, including the effect on supply and demand, freight rates, lead and transit times, the role of freight forwarders, the response of shipping lines, the impact on ports and port productivity, the delivery of essential goods, regulations and policies, and technological advancements. These questions will help shed light on how the industry has adapted to the challenges posed by COVID-19 and the measures taken to improve container availability and reduce supply chain disruptions.

1- Shipping Lines

- Can you describe the response of shipping lines to the global pandemic?
- What is the reaction of shipping lines with to the global pandemic?

2- Freight Forwarders

- What is the impact on the freight forwarding company?
- Can you discuss the impact that COVID-19 has had on the freight forwarding industry?
- How have freight forwarders and logistics companies adapted to the challenges posed by COVID-19?

3- Ports

- What impact has COVID-19 had on ports and port productivity?
- How have shipping lines and ports responded to the changes in demand for containers during the pandemic?

4- Impact on Supply Chain

- What is the effect of the pandemic on supply and demand?
- How has COVID-19 pandemic impacted supply and demand for containers?
- What are the main factors contributing to the current container shortage?
- How has COVID-19 pandemic affected the overall container industry and the flow of goods?
- What measures have been taken to improve container availability and reduce supply chain disruptions during COVID-19?
- How has the pandemic affected the delivery of essential goods and the transport of hazardous materials?

5- Challenges

- What are the big issues you faced during COVID-19?
- Can you share some of the biggest challenges you faced during the pandemic?
- How has the pandemic affected the relationship between shippers, carriers, and other stakeholders in the container industry?

6- Freight Rates

- What is the effect on freight rates?
- Can you discuss the changes in freight rates due to the pandemic?

7- Lead Times and Transit Times

- What is the effect on the lead time and transit time?
- How have lead times and transit times been affected by COVID-19?

8- Regulations and Policies

- Have there been any changes in regulations and policies related to the container industry during the pandemic?

9- Technology

- Have there been any advancements or innovations in technology that have helped the container industry during the pandemic?

Appendix 2

About Companies

1- Port Administrative

The port was **DP World Sokhna**: It is part of DP World's international network, which currently encompasses 60 terminals across 31 countries, making DP World one of the largest marine terminal operators in the world. Its place just below the southern entrance to the Suez Canal on the Red Sea makes it strategically located to handle cargo transiting through one of the world's busiest commercial waterways. The port interview was conducted with two interviewees: a port planner and a financial manager.

2- The shipping lines

- **CMA** is CMA CGM S.A., a French container transportation and shipping company. It is the third-largest container shipping company in the world. With a presence in 160 countries through 400 offices, 750 warehouses, 130,000 employees, and a vast fleet of 566 vessels, CMA CGM serves 420 of the world's 521 commercial ports and operates 257 shipping lines.

- **Maersk** Line is a Danish international container shipping company, the largest subsidiary of the Maersk Group, a Danish conglomerate. It was founded in 1928 and now operates 374 ports in 116 countries, making it the world's largest container shipping company in terms of fleet size and cargo capacity. Maersk Line has a total capacity of about 4.1 million TEU and operates more than 708 vessels. It offers numerous services. The interview was conducted with two interviewees, both sales directors.

3- The freight forwarding company

Globelink Egypt is one of Egypt's leading logistics firms, offering multi-modal transportation solutions that include sea freight, air freight, and inland transportation. Its primary services include consolidation, LCL activities, warehousing, and international freight forwarding. Globelink Group was founded in 1988 to provide international freight forwarding services and has since grown to become a premier non-vessel operating common carrier (NVOCC). It has more than 100 offices in 28 countries. The interview was with the general manager.

Appendix 3:

The table showing the impact of COVID-19 on the maritime transport industry

Maritime Component	Impact of COVID-19	Explanation
Shipping Lines	Positive	Due to the lockdown and reduced capacity, shipping lines could take advantage of the situation by implementing blank sailing to keep demand higher than supply and freight rates high. They also benefited from lower fuel prices during the pandemic.
Freight Forwarders	Negative (Small Forwarders) / Neutral (Large Forwarders)	Small freight forwarders were negatively affected by the lack of containers for exports and imports and the reduced number of shippers due to high freight rates. However, larger freight forwarders were not significantly impacted as they offered additional services to clients, providing alternative sources of revenue.
Ports	Negative	COVID-19 was causing disruptions in the supply chain, reduced demand, crew change problems, increased pressure on ports, and worker shortages. The pandemic has decreased productivity, reduced profits, and added costs.

Source: Compiled by the authors

