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US SHIPPING IN THE GLOBAL ECONOMY AND THE
ECONOMIC IMPACT OF COVID - 19

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Abstract

The Covid-19 outbreak disrupted supply chains, port operations, and crew changes, posing hitherto unheard-of obstacles for the world maritime sector. A set of guidelines for the resurrection of the marine industry emerge as nations negotiate the road to recovery. With innovations like contactless operations and remote monitoring boosting efficiency and transparency, digital transformation emerges as a critical pillar. Governments are urged to acknowledge sailors as critical employees and facilitate safe crew changes as crew welfare takes centre stage. Eco-friendly technologies and cleaner fuels are being adopted by the sector as sustainable practises gain prominence. Governments, international organisations, and business stakeholders must work together to harmonise protocols and ensure resilience. With the help of these actions, the shipping sector plots a route for recovery, resiliency, and a more promising marine future, ready to meet problems head-on with creativity and teamwork.

Keywords: US, shipping, marine, economic impact, Covid - 19

TABLE OF CONTENTS

| | |
|---|----|
| <u>Abstract</u> | 2 |
| <u>TABLE OF CONTENTS</u> | 3 |
| <u>Table of images</u> | 4 |
| <u>Introduction</u> | 5 |
| 1. <u>The Significance and Evolution of Maritime Transport</u> | 7 |
| 1.1. <u>Introduction</u> | 7 |
| 1.2. <u>A historical journey connecting continents</u> | 7 |
| 1.3. <u>The Evolution of Maritime Trade</u> | 9 |
| 1.4. <u>The history from caravels to container ships</u> | 11 |
| 1.5. <u>Maritime shipping</u> | 14 |
| 1.6. <u>Conclusion</u> | 16 |
| 2. <u>Importance of US Shipping in Global Trade</u> | 17 |
| 2.1. <u>Introduction</u> | 17 |
| 2.2. <u>Major US Ports and Maritime Gateways</u> | 17 |
| 2.3. <u>Shipping Companies and Container Carriers</u> | 18 |
| 2.4. <u>Role of Shipping Industry in Supporting Other Sectors</u> | 20 |
| 2.5. <u>Export and Import Volumes through US Ports</u> | 22 |
| 2.6. <u>Role in Supply Chain Management</u> | 23 |
| 2.7. <u>Contribution to National and Global Economies</u> | 24 |
| 2.8. <u>Conclusion</u> | 25 |
| 3. <u>Pre-COVID-19 Economic Landscape</u> | 26 |
| 3.1. <u>Introduction</u> | 26 |
| 3.2. <u>Growth Trends and Trade Patterns</u> | 26 |
| 3.3. <u>Employment and Labor Force in Shipping</u> | 27 |
| 3.4. <u>Technological Innovations in the Shipping Industry</u> | 28 |
| 3.5. <u>Conclusion</u> | 30 |
| 4. <u>Container shipping challenges amidst COVID-19</u> | 32 |
| 4.1. <u>Introduction</u> | 32 |
| 4.2. <u>Challenges with container transportation</u> | 32 |
| 4.3. <u>COVID-19's impact on port operations</u> | 34 |
| 4.4. <u>The effects of the pandemic on American ports</u> | 37 |
| 4.5. <u>Conclusion</u> | 38 |
| 5. <u>US and other countries in maritime</u> | 40 |
| 5.1. <u>Introduction</u> | 40 |

| | |
|---|----|
| <u>5.2. European Union: Unforeseen Challenges in the Maritime Industry Amid Covid-19</u> | 40 |
| <u>5.3. India's Maritime Industry Amid Covid-19: Challenges and Responses</u> | 41 |
| <u>5.4. United Arab Emirates (UAE) Maritime Industry in the Face of Covid-19 Challenges</u> | 43 |
| <u>5.5. Brazil's Maritime Industry and the Unpredictable Covid-19 Impact</u> | 45 |
| <u>5.6. Conclusion</u> | 47 |
| <u>6. Measures for the recovery of the shipping</u> | 48 |
| <u>6.1. Introduction</u> | 48 |
| <u>6.2. Steps to restore the shipping industry</u> | 48 |
| <u>6.3. Conclusion</u> | 53 |
| <u>Conclusions</u> | 54 |
| <u>Bibliography</u> | 57 |

Table of images

| | |
|---|----|
| <u>Figure 1 Maritime Transportation</u> | 14 |
| <u>Figure 3 Shipping industry before and after COVID 19</u> | 34 |

Introduction

The COVID-19 pandemic epidemic has had a significant effect on a number of facets of the world economy, particularly maritime transportation. The spread of the virus has presented maritime commerce with a number of difficulties and disruptions as an integral part of global trade. Particularly in American ports, there have been major consequences that have changed the dynamics of shipping modes and port volumes. The effects of the pandemic on American ports will be explored in this section, along with changes to port operations, maritime freight costs, and shipping volumes (Jackson and K, 2021).

It is critical to comprehend how American ports have been harmed and how these difficulties have affected the container shipping industry within the extraordinary conditions caused by the pandemic. The COVID-19 incident has highlighted the marine industry's weaknesses and the necessity for adaptability and resilience in the face of unforeseen events. We can learn more about the changes made by stakeholders in the container shipping industry and the methods used to deal with the difficulties brought on by the crisis by examining the effects of the epidemic on American ports. In addition, comprehension of the broader consequences on international trade and supply chains depends on understanding the effect of COVID-19 on port operations and cargo volumes. The importance of examining the effects of the pandemic on American ports is further highlighted by the marine industry's connections to various sectors, as ports are important entry points for international trade and play a crucial role in facilitating the movement of products (Nicola et al., 2020).

The aim of this thesis is to analyze the role of the United States shipping industry in the global economy and investigate the specific economic impact of the Covid-19 pandemic on this critical sector. By conducting a comprehensive study, the thesis seeks to provide a thorough understanding of the challenges faced by the US shipping industry during the pandemic and its subsequent recovery, as well as its broader implications on the global economic landscape.

The methodology that will be used in this thesis is a research approach method and literature review to comprehensively analyze the role of the United States shipping industry in the global economy and the specific economic impact of the Covid-19 pandemic on this critical sector.

This thesis investigates the US shipping industry's role in the global economy and the economic impact of the Covid-19 pandemic on this critical sector. The literature review explores the industry's historical development, its role in global trade, and its impact on economic growth and development. The pre-Covid-19 section delves into historical trends and performance, highlighting the industry's contributions to the global supply chain and economy. The economic impact of Covid-19 is analyzed, including disruptions in supply chains, logistics, consumer behavior, and trade patterns. The financial implications for shipping companies are also analyzed. Coping Strategies and Recovery Efforts provide insights into the industry's response to the pandemic, government interventions, support measures, and collaborative efforts. The Comparative section compares the US shipping industry's performance during the pandemic, identifying similarities and differences. The Future of US Shipping in the Global Economy section projects the long-term implications of Covid-19 on the industry, analyzing potential opportunities and challenges for growth in a post-pandemic world. Recommendations for policy and business strategies are provided, offering actionable insights for policymakers, industry leaders, and stakeholders (Jackson and K, 2021).

This thesis makes several significant contributions to the understanding of the US shipping industry's role in the global economy and the impact of the Covid-19 pandemic. Firstly, it provides a comprehensive analysis of the key economic indicators and performance of the shipping sector during the pandemic, helping to identify the specific challenges faced by the industry. Secondly, the literature review offers insights into the coping strategies and recovery efforts employed by shipping companies and stakeholders. These insights can be valuable for industry practitioners and policymakers in navigating future crises and ensuring the resilience of the sector. Lastly, the comparative with other countries' shipping industries provides a broader perspective on the global economic impact of the pandemic and highlights potential best practices and lessons learned that can be applied in various contexts.

1. The Significance and Evolution of Maritime Transport

1.1. Introduction

Maritime shipping, which shows how smart and curious people are, has always been an important part of our past and is still a key part of the global economy. The seas have been used as trade routes for hundreds of years. They link countries and cultures, help the economy grow, and move human progress forward. Over time, maritime travel has not only made it easier to move goods and raw materials, but it has also helped ideas, technologies, and cultural impacts move from one place to another. From the powerful caravels that took explorers to faraway places during the Age of Discovery to the highly efficient container ships that rule modern trade lines, the development of maritime shipping has been nothing short of amazing (Koilo, 2019).

1.2. A historical journey connecting continents

Maritime shipping, which shows how smart and curious people are, has always been an important part of our past and is still a key part of the global economy. The seas have been used as trade routes for hundreds of years. They link countries and cultures, help the economy grow, and move human progress forward. Over time, maritime travel has not only made it easier to move goods and raw materials, but it has also helped ideas, technologies, and cultural impacts move from one place to another. From the powerful caravels that took explorers to faraway places during the Age of Discovery to the highly efficient container ships that rule modern trade lines, the development of maritime shipping has been nothing short of amazing (Davidson et al., 2018).

Maritime transport, the practice of moving people and goods through water by ship, has played a pivotal role in shaping human history and connecting distant regions and continents. From the earliest forms of coastal trips to the technologically advanced vessels that traverse oceans today, maritime transport has been a catalyst for exploration, colonization, cultural exchange, and economic growth. Throughout the ages, maritime transport has been a driving force behind international trade, allowing nations to expand their economies and industries on a grand scale. The merchant

marine, comprising a nation's fleet of ships operated by well-trained crews, forms a crucial component of global commerce. Countless tons of goods and commodities are transported across vast distances by sea, contributing billions of dollars to the global economy (Gilbert and Pearl, 2012).

The term "maritime transport" refers to the practice of moving people and/or goods through water by ship. It permits the export and import of goods using different kinds of vessels all over the world. The merchant marine is a nation's fleet of ships, manned by crew members who have undergone training and been given the IMO's seal of approval. Ships carry a sizable portion of the world's commerce. Large volume and bulk commodities are typically transported via this method since it is more cost-effective given the long distances, large quantity, and heavy load. To get beyond the obstacles and distances that separate him from other countries and continents, man has created ways of transportation. He has discovered a versatile tool in sea transport for his endeavors to conquest, link, enhance, and grow his economic plans through national and international trade (Asariotis et al., 2011). Despite the lack of evident social and public acknowledgment, maritime transport has a significant impact on the global economy. This is especially true given the benefits it offers to people's daily lives as much of what they own has previously been transported by sea. International trade, which relies heavily on sea transit, makes it feasible for countries to expand their economies and industries to a large extent. Through this route, millions of tons have been carried globally in recent years, adding billions of dollars to the global economy (Koilo, 2019).

Man has needed to move from one place to another throughout history. One of the mechanisms through which man has been able to carry out discoveries, colonies, victories, and cultural and commercial interchange has been transportation. There are regions that were once divided by relief but later joined by the sea. The earliest forms of maritime transportation were developed around 3500 B.C. Small loads and few sailors could be transported along brief coastal trips at the time. As technology developed and new materials were used, the distances grew steadily longer. The Vikings created vessels that could travel via both rivers and oceans. It should be emphasized that they traveled from the Scandinavian Peninsula to England, the Mediterranean Sea, and finally North America for the first time. Later, the Europeans too accomplished this accomplishment. Throughout history, maritime transport has

been crucial for moving goods, people, and artifacts across incredibly great distances to and from various locations on the planet (Jacks and Pendakur, 2010).

The first ships to traverse the seas were those built by the Romans. Then, additional boat kinds that were also propelled by wind started to appear. These boats improved in terms of their capacity for displacement. Other vessels, like galleys, had big sails but were propelled on the water's surface by the force of the convicts and slaves who rowed them. Later came the caravels, which were able to attain maneuverability and speed by maximizing the wind's incidence on the placement of the masts. These caravels were in charge of transporting people and goods to the New World in ancient times. The world-spanning voyages of Juan Sebastián Elcano and Christopher Columbus, who both landed in America, are illustrative of maritime history. Another instance is the technologically challenging transit of South American gold to Spain, where up to 2 tons per vessel were held (Lee, Kwon and Ruan, 2019).

1.3. The Evolution of Maritime Trade

Between the fourteenth and the seventeenth centuries, warships or frigates began to appear to take on the responsibility of guarding international trade. They had excellent speed, which made them effective in combating corsairs. During the conflict, these boats engaged in combat with enemy traffic, and the larger units supported the advancing ships. Before these devices were invented, they served as radars and radios in a form of scouting mission on the flanks and in front of the army to find potential threats. During the Cold War, Europe possessed frigate fleets that provided defense against air and submarine attacks. With the invention of the motor, shipping goods over the ocean has had an unstoppable and rapid growth over the past 200 years (Kosowska-Stamirowska, 2020). Ships have developed into such efficient and effective modes of transportation that the building of port stations, where massive ships land, has emerged, generating a global network of connections. Hong Kong, Taiwan, Singapore, and South Korea, the so-called "four Asian tigers," who have surpassed the Western economy by establishing dominance through marine trade, control the majority of the most significant ports. The Port of Long Beach near Los Angeles is notable in the West. In terms of global importance, it comes in sixth place (Kosowska-Stamirowska, 2020).

Rotterdam is the most influential representative of the continent of Europe. Steam and motor ships came after sailing ships. New methods and boat designs facilitated trade and established connections with faraway cultures. International shipping's history is intimately entwined with the evolution of human culture. From the ninth century, the widespread voyages and raids of the Vikings were what spurred the development of boat building. The Greeks and Romans engaged in significant trade by ship even in antiquity. From the 12th century, when the merchants of the North German Hanseatic League cruised the North and Baltic Seas, shipping then saw a genuine heyday. For a very long period, the "Hanseknoge" served as the norm for travelers from northern Europe (Lundgren, 1996).

Models were longships that the Vikings had used to travel the North and Baltic Seas, the Mediterranean Sea, and the Atlantic Ocean starting in the ninth century. The Viking ships were built with a high arch at the bow and stern, while the Hanseatic cogs were designed with a straight stern and bow and a mast. Additionally, they had a lot more cargo to transport. The rectangular yard-sailed Hanseatic cogs had a capacity of about 200 tons for cargo. Another common practice was the Vikings' adoption of the clinker construction technique. The ship's planks, which were bent over the fire, were fastened together with nails similar to those used for roofing before being caulked, or sealed, with a mixture of hemp, jute, and pitch. By the seventh century, a different kind of ship had already made a name for itself in the Mediterranean (Ducruet, 2020). The so-called naos and caravels were primarily constructed by the seafaring nations of Spain and Portugal, which at the time ruled the oceans. It was also used by famous explorers including Ferdinand Magellan, Vasco da Gama, and Christopher Columbus to set sail. One of the distinguishing characteristics of these ship designs was their three masts. In the event of strong winds and large loads, they made sure that the load on the material was more evenly distributed throughout the entire ship. The so-called carvel construction was another aspect. The planks of the ship were fastened flat to one another on inner frames rather than lying on top of one another. This was a huge benefit, especially on lengthy trips, as it made it simpler to carry out little hull repairs. The first ship in a series was built using the frame constructed in accordance with the designs (Hassan and Hasan, 2017).

1.4. The history from caravels to container ships

The great voyages of discovery at the end of the 15th century marked the start of a new era in the history of global shipping. Fast ships like caravels that could be utilized abroad were needed in the search for new maritime routes to faraway countries. because they involved lengthy, dangerous expeditions into completely uncharted territory. Such journeys and the development of new marine charts would have been extremely difficult without advancements in navigation technology (SCHWARZ, 2008). For a very long time, mariners could only describe the route and position of ships with very basic knowledge. This involved not only viewing the sun and stars, but also the wind's direction, the waves' motion, and estimating the water's depth or the sea's currents. Early seafarers' direction was aided by birds' presence and behavior. The compass, the most crucial navigational tool aboard ships, was likely brought to Europe by Arab traders in the 12th century from China. More and more mariners began using the so-called Jacob's staff in the fifteenth century. It was employed to calculate the angle between the sun or the horizon and the North Star (Antunes, 2002).

The Dutch were primarily responsible for the significant rise in international trade throughout the 17th century. Based on the North German Hanseatic League, they established the "East India Company" in Amsterdam in 1602; during the next 200 years, this required a large number of ocean-going ships. The "East India Company" used ocean-going three-masters, the so-called Pinas ships, although smaller vessels like the Dutch Fleute were frequently used in the coastal region and in the North and Baltic Seas. These were adaptable three-master square-rigs. In the nineteenth century, merchant shipping was still dominated by this style of ship. The biggest drawback of square sails was how challenging it was to cross downwind with them. Only once it was possible to set gaff or ratchet sails at the stern and bow in the longitudinal direction of the ship in order to divert various wind forces onto the ship in this manner did this improve. In the 18th and 19th centuries, thousands of majestic windjammers that were used as freight and passenger ships cruised the seven seas. (Roland, Bolster, and Keyssar, 2008) The name "Bark" has become the de facto standard for this nowadays.

The history of land transportation, as well as movement on land and in the water, was completely altered by the steam engine. The first inventors began attempting to

create steam-powered ships even around the end of the 18th century. Prior to the opening of the first railway line in Prussia, the paddle steamer "Princess Charlotte von Prussia" assumed responsibility for the post and passenger service on the Havel and Spree in 1817. Where the main mast on the sailing ship was fixed, the steamer's massive paddle wheel was located in the center of the hull. One paddle wheel was built on the port side and one on the starboard side of later paddle steamers. Steamers with rear-wheel drives came next. The propeller with the ship's screw drive quickly established itself as the superior technology, even if paddle steamers soon also traversed the Atlantic because they were more susceptible to choppy seas (Jarvis, 1958).

It may sound unusual, but people are currently considering harnessing wind power for propulsion in modern container transportation. To assist save fuel, cargo ships might potentially be fitted with enormous stunt kites. One of the first to test such stunt kites in action was Bremen shipowner Niels Stolberg and his shipping firm "Beluga Shipping." Other shipping firms have now acknowledged that, given the high cost of gasoline, purchasing a towing kite would be a wise investment. The initiative is being supported by the European Union and the Ministry for Research and Education due to the fact that such kites can also lower the emission of dangerous greenhouse gases. Along with bulk carriers and container ships, the first big fishing trawler has a stunt kite as well. Ideas for new drive concepts are still being developed (Gould, 2011).

1.4.1. Categories of Maritime Transport

The maritime industry includes a wide variety of ships that are built to meet the needs of various cargoes and passengers. These ships are essential for bridging vast geographic distances, promoting global trade, and fostering economic development. As we can see from Figure 1 some of the well-known types of vessels that make up the maritime transport sector (Bicer & Dincer, 2018).

Solid commodities including grains, ores, cereals, and mixed items may only be transported by bulk carriers. These ships effectively raise and lower their cargo thanks to their cranes. The holds are strengthened to withstand strong impacts when carrying big loads, ensuring the commodities be transported safely (Ejder and Arslanolu, 2022).

Malcolm Mclean's ground-breaking invention of container ships in the 1950s changed marine transportation. Large amounts of dry cargo may be transported securely and effectively on these ships in standardized containers while causing the least amount

of environmental damage and maximizing profit. The containerization process streamlines international trade by allowing for the smooth transfer and delivery of commodities (Cudahy, 2007).

Tankers and oil tankers are specially designed ships for moving liquids like oil and gases that have been liquefied. These ships make it easier to transport crude oil from nations that produce it to nations that import it. Refined product tankers are often smaller in size and are designed to meet specialized transportation needs, such as those for chemicals like alcohol and acids (Gutnick and Rosenberg, 1977).

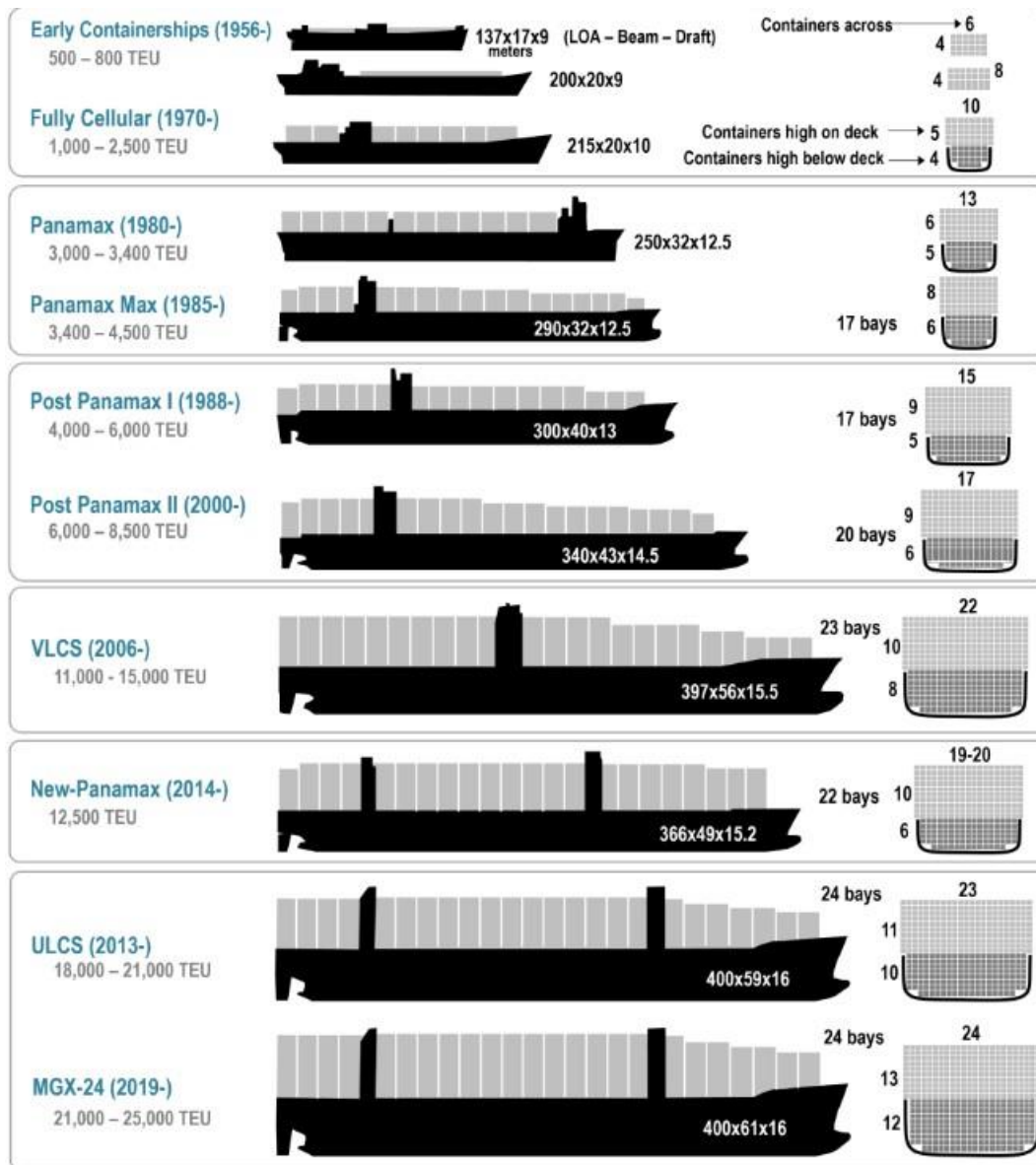
Reefer ships, commonly referred to as refrigerator ships, are made to carry frozen cargo, especially perishable products and food items like fish and shellfish. To keep the temperature under control, these vessels have specific cellars with thermal insulation. To avoid overheating, reefers' exteriors are frequently painted white (Vyngra et al., 2019).

Rolling load ships offer platforms to support vehicles while transporting cargo on wheels. These ships use complex pump systems that feed water to correct any inclination brought on by an uneven distribution of the cargo in order to counterbalance the possible shifting of the weight and preserve vertical alignment (Turnbull and Dawson, 1995).

Cruise ships serve the tourism sector by providing opulent experiences and leisurely trips. There is a separation between crew members and passengers on these massive ships. Cruise ships offer lengthy itineraries with stops at numerous ports thanks to their extensive amenities, allowing guests to experience various locations while on board (Dowling and Weeden, 2017).

The maritime transportation sector is always changing and looking for new ways to lessen its negative effects on the environment and increase its energy effectiveness. Each vessel type, from bulk carriers to cruise ships, meets certain transportation demands while stimulating cross-national cultural interchange and making a positive contribution to the global economy (Christiansen et al., 2007).

Figure 1 Maritime Transportation



Source: *The geography of Transport Systems (2020) Maritime Transportation*. Available from: <https://transportgeography.org/contents/chapter5/maritime-transportation/> (Accessed 12 August 2023)

1.5. Maritime shipping

The primary means of transportation for international trade in commodities, which includes goods brought into the United States, primarily involve maritime and air freight transportation. Commencing in early 2020, the outbreak of the COVID-19 pandemic had a substantial impact on both aviation and sea cargo systems, resulting in a range of issues such as delays, cancellations, and shortages of shipping containers. The

consequences of these interruptions on imports into the United States from Northeast Asia were particularly severe. These disruptions heightened the instability of prices for marine and air freight across different regions and led to significant delays in the delivery of imported goods to the United States, especially when combined with changes in demand resulting from the COVID-19 pandemic. This chapter can be divided into two sections: the first part outlines the various disruptions in shipping that occurred during the pandemic, while the second part examines how these disruptions affected the costs of freight, available transportation choices, and the timing of imported goods arriving in the United States. (Oyenuga, 2021).

The COVID-19 pandemic-related delays in marine shipping and their effects on imported goods can be categorized into two main parts. During the first half of 2020, the volume of maritime container imports to the United States experienced a 7.0 percent decrease compared to the same period in 2019. However, there was a significant increase in the second half of the year, as indicated by the OECD in 2022. Specifically, containerized imports saw a volume increase of 9.5 percent in the second half of 2020 when compared to the same period in 2019, and they exhibited a year-over-year growth of 16.4 percent in the fourth quarter. (Cerutti, Gopinath, and Mohommad, 2019).

The substantial increase in the volume of U.S. merchandise imports during the second half of 2020 triggered a surge in the imports of maritime shipping and port services. Data on U.S. merchandise trade reveals that a significant portion of this growth in maritime freight services imports was driven by robust trade with Asia, notably China, during the third and fourth quarters of 2020. When comparing the second half of 2020 to the same period in 2019, the value of U.S. imports of maritime freight transport services, which involve the transportation of U.S. goods by foreign marine vessels, increased by 16.5%. Similarly, in the second half of 2020, U.S. exports of port services, which are associated with the provision of goods and services to foreign ships arriving at U.S. ports, rose by 3.5 percent year over year (Helling and Poister, 2000).

Maritime transport remains an indispensable pillar of the global economy, contributing significantly to international trade, economic growth, and cultural exchange. As we continue to navigate through the challenges and opportunities of the modern world, the significance of maritime shipping in shaping the global landscape cannot be underestimated. The enduring journey of maritime transport will undoubtedly

continue to shape the future of human civilization and connectivity across oceans and continents (Caschili and Meda, 2012).

1.6. Conclusion

The way shipping has changed over time shows how resilient and flexible people are in the face of constantly changing needs and difficulties. From the first reed boats and wooden ships to the huge container ships that cross the seas today, maritime travel has always pushed the limits of what was possible. Throughout history, it has not only helped the economy grow and become more prosperous, but it has also been a way for people to meet and share their cultures. It's clear that maritime travel is still an important part of trade and business around the world. The fact that marine transport is divided into different parts shows how varied it is and how many different needs it meets, from bulk carriers to tankers to container ships to specialized carriers. As the marine business heads toward a more environmentally friendly and technologically advanced future, it will have to face new challenges. Innovation is driven by worries about the environment, technology, and the desire to be more efficient. This leads to greener shipping practices and smarter logistical solutions (Lister, Poulsen and Ponte, 2015).

2. Importance of US Shipping in Global Trade

2.1. Introduction

The influence of the shipping industry extends far beyond transportation; it plays a critical role in supply chain management, impacting manufacturing, retail, energy, agriculture, and infrastructure development. By facilitating the timely movement of goods, the industry supports manufacturing processes, streamlines production cycles, and reduces inventory expenses. Retailers rely on the shipping sector to maintain consistent product availability, both in physical and online stores. Additionally, the industry transports energy resources, agricultural products, and various goods, ensuring a stable supply of resources and sustenance. Furthermore, it generates employment opportunities and fosters infrastructure development, strengthening local economies and communities (Talley, 2012).

2.2. Major US Ports and Maritime Gateways

The United States prides itself on possessing a highly sophisticated and extensive array of ports and maritime gateways, which play a crucial role in facilitating connectivity and facilitating the efficient functioning of the global shipping sector. The aforementioned ports play a vital and irreplaceable role in the facilitation of international trade, as they serve as crucial entry points for imports and departure points for exports. Within the realm of significant ports in the United States, the Port of Los Angeles and the Port of Long Beach emerge as prominent entities, both geographically located within the Southern California region. The conglomeration of these proximate ports represents the most extensive port complex within the nation, assuming a significant role in facilitating the country's trade relations with Asia. Specifically, these ports serve as crucial entry points for commodities originating from nations such as China and Japan (Ducruet, Joly and Cam, 2014).

On the antithetical shoreline, the Port of New York and New Jersey assumes a position of considerable import. Situated along the Eastern seaboard, this port complex assumes a crucial role in facilitating the transportation of goods originating from Europe and other diverse regions worldwide. The entity in question has successfully

positioned itself as a pivotal nexus for the transportation of goods stored in containers as well as petroleum products, thereby facilitating the smooth and uninterrupted movement of trade.

The Port of Houston holds a pivotal position within the Gulf of Mexico. Operating as a significant conduit for the exportation of energy resources, such as oil and petrochemicals, this entity effectively broadens its scope by facilitating the handling of a wide array of commodities. The inherent versatility of this entity solidifies its pivotal position in the realm of commerce, particularly in its interactions with nations of Latin American origin (Yap, 2014).

When considering the relocation to the state of Georgia, it is worth noting that the Port of Savannah assumes a position of utmost significance owing to its profound harbor and strategically advantageous placement. Being a prominent port for containerized cargo on the Eastern seaboard, it effectively functions as a pivotal point for facilitating trade linkages with various regions encompassing Europe, Asia, and the Americas.

In the context of the Pacific Northwest region, it is imperative to acknowledge the pivotal significance of the interconnected ports of Seattle and Tacoma, as they assume an irreplaceable role in facilitating trade activities with the Asian continent. The aforementioned ports play a crucial role in the facilitation of goods from nations such as China and South Korea, making significant contributions to the region's trade and economic engagements on a global scale (Jacks & Pendakur, 2010).

2.3. Shipping Companies and Container Carriers

The multifaceted and ever-evolving nature of the shipping industry in the United States is bolstered by a wide range of shipping companies and container carriers, all of which assume a crucial function in enabling the worldwide transportation of commodities. Within the realm of these formidable entities, Maersk Line undeniably occupies a preeminent stance. Maersk Line, widely recognized as a prominent global entity in the container shipping industry, assumes a pivotal role in facilitating vital linkages between the United States and diverse international markets. The company's substantial fleet and extensive global reach not only emphasize its significance but also establish it as a pivotal catalyst for the United States' engagement in global trade. The

operations of this entity span across various continents and oceans, thereby guaranteeing the optimal and dependable facilitation of goods transportation to and from the nation's coastlines (Talley, 2012).

Originating from the transatlantic region, the CMA CGM Group, a prominent French maritime enterprise, exerts its considerable influence upon the shipping domain within the United States. This consortium functions as a pivotal intermediary, establishing a crucial connection between the United States and a wide array of geographically distinct areas including Europe, Asia, and Latin America. The notable role of this entity in transatlantic and transpacific trade is particularly noteworthy, serving as a prime example of its adeptness in successfully navigating the intricate intricacies of international shipping routes. The operations of the CMA CGM Group serve to facilitate the efficient and uninterrupted exchange of goods and commodities, thereby solidifying the United States' position within the intricate web of global trade (Van Hassel et al., 2016).

Directing focus towards the transpacific trade routes, Evergreen Marine emerges as a prominent participant. This company assumes a pivotal role in facilitating the connection between the United States and dynamic Asian markets, with a primary focus on container shipping. The specialized operations of this entity play a crucial role in facilitating the seamless transportation of goods across the vast expanse of the Pacific Ocean. This serves to strengthen the economic interdependencies and trade connections between the United States and its Asian counterparts.

The landscape is further enhanced by the notable inclusion of APL (American President Lines), a prominent entity within the domain of container shipping. The company's range of products and services transcends national boundaries, thereby enabling the establishment of linkages between the United States and various regions encompassing Asia, Oceania, and the Middle East. The extensive network established by APL highlights its significant role in upholding the United States' involvement in diverse global trade corridors. The operations of this entity exhibit a notable resonance with the multifaceted demands emanating from various regions, deftly interweaving the complex tapestry of global trade (Talley, 2012).

2.4. Role of Shipping Industry in Supporting Other Sectors

2.4.1. Manufacturing and Trade

In addition to its primary purpose of facilitating the movement of goods, the shipping industry assumes a pivotal role in fortifying various sectors of the economy, thereby generating extensive repercussions that reverberate on a global scale (Umar et al., 2021).

The central essence of the shipping industry's impact resides in its function as a facilitator for worldwide commerce. Through the provision of a cost-effective and efficient means of transportation for the movement of goods across continents, the industry facilitates and empowers manufacturers in their endeavor to effortlessly access materials and markets on a global scale. The facilitation of accessibility engenders economic expansion by empowering corporations to leverage resources, technologies, and consumer demographics across heterogeneous geographical areas. The shipping industry serves as the vital conduit that interlinks divergent economies, facilitating global trade and fortifying the economic well-being of nations (Umar et al., 2021).

2.4.2. Retail and Consumer Goods

Retailers are heavily dependent on the shipping industry to maintain a consistent and uninterrupted supply of products in order to effectively cater to the demands of consumers. Shipping plays a pivotal role in facilitating consumer access to a wide array of goods, encompassing electronics, clothing, perishable items, and various other products available both in physical retail spaces and virtual marketplaces. The efficient and uninterrupted dissemination system, facilitated by the shipping sector, plays a pivotal role in upholding the accessibility of a wide range of products, thereby enhancing the assortment of options accessible to consumers and stimulating commercial endeavors (Vakulenko et al., 2019).

2.4.3. Energy and Resources

The transportation of energy commodities, including but not limited to petroleum, natural gas, and coal, holds significant significance in ensuring energy stability and meeting the demands of diverse sectors and individuals. The shipping industry functions as the intermediary for these essential resources, facilitating their transportation across vast bodies of water to areas experiencing a demand for them.

Through the facilitation of the worldwide transportation of energy resources, the shipping industry plays a crucial role in enabling various industries to effectively fulfill their energy requirements. Consequently, this pivotal function contributes to the maintenance of economic stability and fosters sustainable growth (Lee & Nam, 2017).

2.4.4. Agriculture and Food

The shipping industry assumes a crucial and indispensable role in facilitating the intricate global distribution network of agricultural products, thereby guaranteeing nations' access to a copious and varied assortment of sustenance and resources across all seasons. The aforementioned mechanism holds utmost significance in ensuring not only the sustenance of food security but also the preservation of agricultural trade relationships. Through the establishment of connections between agricultural producers and consumers on a global scale, the shipping industry plays a pivotal role in enhancing the availability and stability of food resources worldwide (Lee & Nam, 2017).

2.4.5. Job Creation and Infrastructure Development

In addition to its profound influence on the facilitation of trade and commerce, the shipping industry assumes a pivotal role as a substantial generator of employment prospects. A diverse range of occupational positions are established to facilitate the various functions within the maritime operations and logistics sector, including port management and its related services. Moreover, the exponential expansion of the industry serves as a catalyst for the advancement of infrastructure, as ports undergo substantial expansion and augment their capabilities to effectively accommodate larger vessels and accommodate the escalating volumes of trade. The present expansionary endeavor not only serves as a catalyst for the industry in question, but also engenders a consequential surge in economic activity within the surrounding sectors (Sahoo & Bishnoi, 2016).

2.5. Export and Import Volumes through US Ports

The United States occupies an indisputably crucial position within the global trade milieu, as its shipping sector serves as a pivotal component in enabling the transportation of commodities across vast expanses of land and sea. The significance

of United States shipping resonates through multiple dimensions, encompassing the considerable quantities of imports and exports traversing its ports, its pivotal function in overseeing supply chain operations, and its substantial contributions to both the domestic and global economies.

The ports located within the United States function as pivotal gateways that establish a connection between the nation and the expansive global marketplace, effectively managing a significant portion of the world's trade movements. The considerable scale of import and export volumes transiting through these ports highlights the utmost importance of United States shipping within the dynamics of global trade (Blonigen and Wilson, 2007). The Port of Los Angeles and the Port of Long Beach, which together constitute the most extensive port complex in the United States, serve as prime illustrations of this significant phenomenon. The adjacent harbors in question effectively manage a significant proportion of the country's trade with the Asian continent, specifically with prominent economic entities such as China and Japan. The optimal geographical positioning and cutting-edge infrastructure of the establishment allow for the effective management of inbound and outbound shipments, thereby fostering the facilitation of global trade. The Port of New York and New Jersey, situated on the East Coast, assumes a pivotal role as a gateway for commodities originating from Europe and diverse global regions. Situated within a densely populated area characterized by robust economic vitality, this port complex functions as a central node for the handling and distribution of containerized cargo and petroleum commodities. The voluminous nature of goods traversing its terminals serves as a testament to the pivotal role played by United States shipping in facilitating the intricate dynamics of global trade flows (Cariou and Notteboom, 2022).

Located in close proximity to the Gulf of Mexico, the Port of Houston emerges as a pivotal conduit for the exportation of energy resources. The aforementioned entity assumes a pivotal function in guaranteeing the seamless conveyance of oil and petrochemical substances to global markets, thus making a noteworthy contribution to the overall stability and assurance of worldwide energy supply. Furthermore, it is noteworthy to mention that the port's extensive range of cargo handling capabilities serves to establish it as a pivotal center for facilitating trade with various Latin American countries, thereby emphasizing its multifaceted significance within the global trade landscape (Jones et al., 2011).

The Port of Savannah, situated in the state of Georgia, possesses a profound harbor and an advantageous geographical position, rendering it a prominent participant in the realm of containerized cargo transportation along the Eastern seaboard. Functioning as a pivotal nexus linking the United States with diverse regions spanning Europe, Asia, and the Americas, it effectively establishes itself as a conduit facilitating the seamless flow of international trade. In the region known as the Pacific Northwest, the Ports of Seattle and Tacoma play a crucial role in facilitating international trade, particularly with the Asian countries of China and South Korea. The strategic positioning of their geographical location facilitates the adept management of the substantial influx of goods originating from these thriving Asian economies, thereby amplifying the significance of United States shipping in the realm of global trade (Marie-Anne Descalle et al., 2006).

2.6. Role in Supply Chain Management

The influence of the shipping industry in the United States extends significantly beyond the mere facilitation of goods transportation. Rather, it assumes an indispensable role in the management of supply chains on a global scale. Supply chains are highly complex and interconnected systems that traverse vast geographical regions, establishing connections between various stakeholders such as suppliers, manufacturers, distributors, and retailers. The shipping operations within the United States serve as a crucial conduit that guarantees the uninterrupted movement of goods within these intricate networks. The efficacy of the industry's transportation of goods guarantees the timely arrival of materials and components at manufacturing facilities, thereby facilitating uninterrupted production processes. The enhanced efficiency of operations plays a pivotal role in mitigating inventory expenses and streamlining production cycles, thereby fortifying the competitive edge of industries heavily reliant on punctual resource inputs. Furthermore, it is imperative to acknowledge the equally substantial role played by the industry in the process of delivering finalized products to the end consumers. Retailers rely heavily on the shipping industry to sustain a consistent influx of merchandise, thereby guaranteeing the availability of products on store shelves and facilitating seamless operations on e-commerce platforms. The

expeditious and proficient fulfillment of consumer demand is contingent upon the dependability and efficacy of the shipping sector (Banomyong, 2005).

2.7. Contribution to National and Global Economies

The economic contributions of the United States shipping industry are not limited solely to domestic affairs, but rather extend to encompass a global scale. At the national level, the industry is responsible for generating significant employment opportunities and stimulating economic activity across multiple sectors. Maritime operations, logistics, port management, and their associated services collectively contribute to the employment of a multifaceted workforce. The process of job creation permeates various communities, providing sustenance to individuals' means of living and fortifying the economic foundations of localities. Moreover, the industry's dependence on comprehensive infrastructure, encompassing ports, terminals, and transportation networks, stimulates investments in infrastructure development. Ports undergo expansions and improvements in order to effectively accommodate the burgeoning size of vessels and effectively manage the ever-growing volumes of trade. The aforementioned improvements in infrastructure not only yield advantages for the maritime transportation sector, but also make a significant contribution to the broader economic well-being of the respective localities in which they are located (Munawar et al., 2021).

When examining the US shipping industry from a global standpoint, it becomes evident that its contribution is intricately linked to its function as a catalyst for international trade. By effectively facilitating the transportation of commodities across international boundaries, it substantiates and fosters economic expansion in diverse nations. It facilitates the integration of developing nations into the global marketplace, thus fostering economic advancement and alleviating poverty. The inherent interconnectedness of various systems serves to fortify the interdependence of economies, thereby facilitating the cultivation of collaborative efforts and the attainment of collective prosperity. The fiscal ramifications stemming from the United States' shipping industry resonate across trade balances and economic indicators. A resilient shipping industry plays a pivotal role in fostering advantageous trade balances, as it facilitates the efficient transportation of exports to global markets and effectively

manages imports. The aforementioned equilibrium serves as the foundation for maintaining economic stability at the national level, while simultaneously bolstering the country's competitive edge in the global arena.

2.8. Conclusion

The significance of the United States shipping industry within the realm of global trade is both profound and multifaceted. The industry's impact is undeniably profound, encompassing the management of substantial import and export volumes across major ports, as well as playing a pivotal role in supply chain management. Moreover, it makes significant contributions to both national and global economies. The United States shipping industry, serving as a catalyst for trade, economic growth, and international cooperation, continues to hold a pivotal position within the global trade ecosystem. Its influence extends to shaping the movement of goods and fostering prosperity on a global scale (Banomyong, 2005).

3. Pre-COVID-19 Economic Landscape

3.1. Introduction

Prior to the onset of the COVID-19 pandemic, the global economic milieu was distinguished by a dynamic interplay of growth trajectories, trade dynamics, labor market fluctuations, and technological advancements. In the given context, it is evident that the shipping industry played a pivotal role in facilitating global trade, benefiting from technological progress and an expanding workforce (Phang et al., 2023).

3.2. Growth Trends and Trade Patterns

The years antecedent to the COVID-19 pandemic were characterized by a prolonged phase of economic expansion and the gradual transformation of trade dynamics. The global economy was characterized by a high degree of interconnectedness, as evidenced by the extensive supply chains that spanned across multiple continents, thereby enabling the smooth and uninterrupted movement of goods. The burgeoning economies were undergoing a swift process of industrialization and urbanization, thereby engendering a surge in the need for raw materials, manufactured goods, and consumer commodities. In contrast, developed economies persistently engaged in the enhancement of their production methodologies and the utilization of technology to fortify their competitive edge within the international markets. The shipping industry assumed a pivotal role within the economic landscape by facilitating the interconnection of producers and consumers on a global scale. The advent of containerization brought about a significant paradigm shift in the realm of goods transportation, ultimately leading to enhanced efficiency and cost reduction. The prevalence of mega-container ships has increased, thereby facilitating economies of scale and enhancing the efficiency of maritime transportation. Ports globally have made substantial investments to augment their capacity in order to effectively accommodate these larger vessels, thereby facilitating the seamless movement of goods with minimal disruptions.

The global trade patterns underwent a significant transformation, mirroring the evolving dynamics of production and consumption. Asia, with China at the forefront,

has emerged as a formidable force in the realm of manufacturing, thereby stimulating the need for raw materials from nations abundant in resources and facilitating the production of a diverse range of consumer goods for the purpose of exportation. The growing significance of the transpacific trade route, which connects Asia and North America, is exemplified by the prominent role played by the Port of Los Angeles and the Port of Long Beach in facilitating trade with Asia (Phang et al., 2023).

3.3. Employment and Labor Force in Shipping

The employment landscape within the shipping industry is characterized by a rich and varied tapestry, encompassing a multitude of roles that collectively contribute to the efficient and uninterrupted flow of goods across global maritime routes and intricate supply networks. The aforementioned industry has historically served as a substantial source of employment prospects, encompassing pivotal maritime positions essential for the smooth functioning of maritime operations, as well as an assortment of land-based responsibilities that are indispensable for optimizing the industry's efficacy.

Seafarers, as the fundamental pillar of the maritime sector, bear the weighty responsibility of facilitating the seamless functioning of maritime vessels, overseeing the intricate processes of cargo handling, navigating the vast expanses of the ocean, and safeguarding the well-being of both crew members and valuable cargo. The multifaceted nature of this role necessitates a specialized set of skills, encompassing adeptness in navigation, technical prowess in vessel machinery, and a comprehensive comprehension of maritime regulations. The individuals occupying the roles of captains, deck officers, engineers, and other crew members play a vital and indispensable role in the efficacious implementation of maritime expeditions, particularly those encompassing extensive durations spanning several weeks or even months. Seafarers are tasked with the arduous duty of traversing treacherous waters, grappling with unfavorable meteorological circumstances, and upholding compliance with global maritime protocols. The unwavering commitment and unwavering professionalism exhibited by these individuals guarantee the secure and punctual conveyance of commodities, thereby bolstering the dependability and efficiency of the industry (Terry, 2011).

In addition to maritime occupations, the shipping sector heavily depends on onshore personnel who oversee diverse facets of the logistics network. Port workers constitute an indispensable component of the labor force, assuming responsibility for supervising the intricate processes of cargo handling and vessel berthing, while also effectively regulating the movement of goods within terminals. They engage in a collaborative partnership with customs officials, thereby facilitating the seamless transit of commodities across global borders, while concurrently ensuring adherence to regulatory frameworks and mitigating potential time-related setbacks. In conjunction with these operational functions, it is imperative to recognize the significance of administrative and managerial roles in facilitating the efficacy of supply chain management. Logistics experts adeptly orchestrate the intricate process of facilitating the seamless transfer of goods from their point of origin to their intended destination. Their expertise lies in meticulously strategizing and fine-tuning the most efficient routes and transportation methods, all with the overarching goal of minimizing expenses and enhancing the expeditiousness of deliveries. Port managers are responsible for the supervision and management of the daily activities within ports, with the primary objective of ensuring the seamless and optimal functioning of port facilities. Furthermore, these entities also assume a pivotal role in the realm of strategic foresight, effectively addressing the burgeoning requirements of the maritime transportation sector (Jacks & Pendakur, 2010).

3.4. Technological Innovations in the Shipping Industry

During the period preceding the COVID-19 pandemic, the shipping industry found itself at the precipice of significant technological advancements that were fundamentally altering the dynamics of maritime operations and the management of supply chains. The aforementioned innovations not only served to augment operational efficiency, but also effectively tackled prevailing environmental issues, thereby heralding a paradigm shift towards sustainability and interconnectedness within the industry.

Automation and digitalization have emerged as pivotal facilitators of enhanced efficiency and heightened precision within the realm of maritime operations. From the realm of navigation to the intricacies of cargo handling, these cutting-edge technologies

have undeniably ushered in a paradigm shift, effectively revolutionizing erstwhile conventional processes. The deployment and testing of autonomous vessels, outfitted with sophisticated sensors and navigation systems, holds great potential in augmenting safety measures and mitigating human fallibility in the context of extensive transoceanic journeys. The process of digitalization has been further expanded to encompass port operations. Smart ports have been observed to emerge as significant centers of innovation, effectively integrating advanced technological solutions to enhance the optimization of berthing schedules, efficient management of container traffic, and the seamless streamlining of customs procedures. The proliferation of real-time data exchanges has engendered a pervasive trend, facilitating the seamless transmission of information among maritime vessels, ports, and the diverse array of actors involved in the intricate web of the supply chain. The utilization of real-time information flow facilitated the amelioration of delays, diminishment of turnaround times, and augmentation of overall operational efficiency (Wan et al., 2018).

The blockchain technology, renowned for its inherent decentralization and immutability, has garnered considerable attention as a prospective catalyst for disruption within the shipping sector. The application demonstrated considerable potential, particularly within the domains of documentation and supply chain management. Through the provision of an immutable ledger of transactions, the blockchain technology has presented an opportunity for heightened levels of transparency and security within various processes, including the creation of bill of lading, settlement of payments, and tracking of cargo. Moreover, it is worth noting that the utilization of blockchain technology holds the inherent capacity to enhance traceability within the intricate network of the supply chain, thereby augmenting the level of accountability while concurrently mitigating the occurrence of fraudulent activities. By leveraging blockchain-based frameworks, it becomes possible to securely monitor the provenance, trajectory, and state of commodities, thereby guaranteeing that consumers and stakeholders are equipped with precise and up-to-date data pertaining to the merchandise they are engaged with (Poulis et al., 2013).

In light of escalating environmental apprehensions, the shipping sector has been diligently engaged in the pursuit of cleaner and more sustainable technologies. One of the foremost challenges entailed the mitigation of greenhouse gas emissions originating from maritime vessels. Vessels were undergoing the process of conceptualization and modification to incorporate cutting-edge propulsion mechanisms, such as liquefied

natural gas (LNG) and hybrid alternatives. These technological advancements have facilitated a reduction in emissions and an enhancement in fuel efficiency, thereby conforming to the international regulations established by the esteemed International Maritime Organization (IMO). Furthermore, the research and development endeavors were primarily directed towards exploring alternative fuel sources, including biofuels and hydrogen, with the aim of propelling ships while simultaneously mitigating their carbon emissions. Sustainable practices transcend the realm of propulsion systems, encompassing a broader spectrum of endeavors aimed at mitigating waste generation, optimizing ballast water management, and augmenting the recycling processes pertaining to ship construction materials.

The era preceding the COVID-19 pandemic bore witness to an industry that underwent swift evolution in order to confront the multifaceted challenges of enhancing efficiency, fortifying security measures, and promoting sustainability. Technological advancements were not solely responsible for the transformation of discrete elements within maritime operations, but also engendered the imperative for cooperation among diverse stakeholders. Collaborative efforts were being undertaken by shipping companies, port authorities, technology providers, and regulatory bodies in order to ensure the seamless assimilation of these progressive developments (Halff et al., 2019).

3.5. Conclusion

The economic landscape prior to the COVID-19 pandemic exhibited a portrayal of vibrant expansion, shifting trade patterns, labor complexities, and swift technological progressions within the domain of the shipping sector. The prevailing epoch was distinguished by the interdependence of economies, wherein the maritime sector played a pivotal role in facilitating international commerce, optimizing supply chain operations, and fostering worldwide economic expansion. In our contemplation of the diverse facets that characterized this temporal epoch, we acknowledge the intricate interplay of various forces that have influenced the industry's position within the broader global economic landscape. The pre-COVID-19 economic milieu stands as a testament to the pivotal role that the shipping industry assumes within the interdependent global economy. This statement serves as a poignant reminder that despite the fluctuations in circumstances, the enduring importance of the industry

persists, driving nations towards prosperity, cooperation, and progress within the dynamic landscape of our ever-evolving world (Wang et al., 2021).

4. Container shipping challenges amidst COVID-19

4.1. Introduction

The COVID-19 pandemic has caused a global disaster that has never happened before. It is hurting every part of people's lives and the economy. As the pandemic messed up trade flows, supply lines, and port operations, container shipping faced a lot of problems in the maritime business. This part goes into detail about the problems container shipping is facing because of COVID-19, with a focus on how it affects American ports. As the pandemic spread around the world, it shook up the container shipping business, which is a key part of foreign trade. Lockdowns, limits on travel, and social isolation led to a drop in customer demand and problems in manufacturing, which had a domino effect on cargo volumes and port operations. As supply lines got smaller, container shipping companies had to deal with a complicated world of unknowns, changing costs, and logistical limits (Zhao, Ye and Zhou, 2021).

4.2. Challenges with container transportation

The COVID-19 pandemic had a profound and unprecedented impact on the global container shipping industry, causing significant disruptions to trade patterns and supply chains. To counter the effects of overcapacity and cost reduction in response to the decline in U.S. merchandise trade and the slowdown in Chinese manufacturing, container shipping companies implemented substantial measures (Vo and Tran, 2021). These measures included the cancellation of scheduled sailings, known as "blank sailings," and the consolidation of shipping routes, with a focus on major ports in the first half of 2020. These actions allowed shipping companies to reduce expenses and mitigate the impact of overcapacity on freight rates. For example, in June 2020, the three largest container shipping alliances announced the suspension of 94 sailings between Asia and Europe and 126 scheduled sailings between Asia and North America until August 2020. More than 1,000 cruises were canceled by container shipping

companies in the first half of 2020. As a result, spot rates for maritime freight stabilized in mid-2020 at levels slightly higher than those of 2019, as businesses anticipated slower global trade and an economic recovery from the COVID-19 pandemic. However, as commerce rebounded and exceeded shipping capacity in the latter half of 2020, marine freight prices saw a significant increase (Zhao, Ye, and Zhou, 2021).

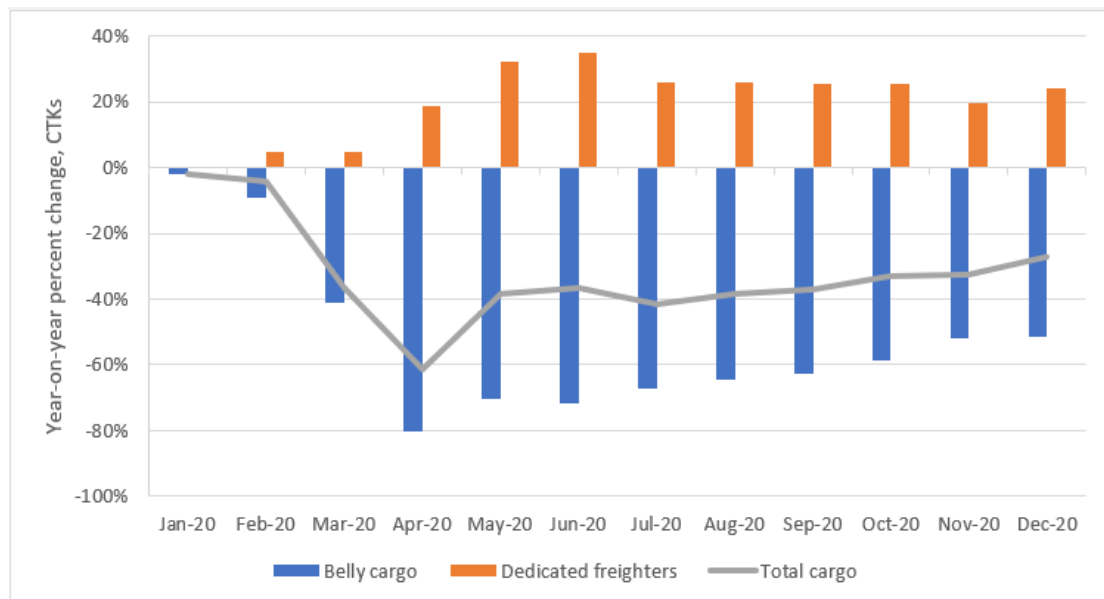
The surge in economic activity and rapidly growing consumer demand in mid-2020 led to a shortage of capacity in the maritime freight industry. Container shipping companies struggled to return capacity to pre-recession levels. For example, the surge in online sales caused U.S. imports from Asia to rise by nearly 30% in December 2020 compared to December 2019. The second half of 2020 witnessed an insufficient supply of shipping containers to meet customer storage needs and higher-than-expected import demand from consumers. Businesses faced challenges in delivering products to customers due to this unforeseen demand recovery (LaRocca, 2021).

While major international shipping company Maersk initially anticipated weak demand in the first half of 2020, container transport companies were operating at nearly full capacity by the fourth quarter. By October 2020, the percentage of blank sailings had decreased from 21% of all voyages in May 2020 to just 1%. The surge in demand for international marine freight transportation necessitated running container ships at close to full capacity, which further reduced the supply of shipping containers at crucial ports (Notteboom, Pallis, and Rodrigue, 2021).

The container shortage was exacerbated by the improper allocation of containers within the distribution system. Early in the pandemic, orders for new container manufacturing decreased along with container demand, and some containers were repurposed for long-term storage. In the latter half of 2020, the demand for containerized imports in the U.S. exceeded expectations, surpassing both demand for eastbound exports and container production. This led to a focus on repositioning containers for transporting imported goods from Asia, especially China. Longer turnaround times for containers, resulting from growing shipping bottlenecks at ports, particularly in high-volume trade lanes between northern Asia and the U.S. West Coast, contributed to the container shortage (Fox-Hodess, 2021).

To meet the demand for containers in Asia for exports to the United States, it was estimated that 30 to 35 percent of all containers exported from the United States were sent back empty. Returning empty containers to Asia proved financially more lucrative for ocean carriers than shipping American goods in containers to Asian markets. The container shortage increased costs for American importers and posed a barrier to American exports, particularly agricultural products (Khasawneh, 2020).

Figure 2 Shipping industry before and after COVID 19



Source: United States International Trade Commission, (2020), *The impact of the Covid-19 pandemic of freight transportation services and U.S. merchandise imports*, Available from https://www.usitc.gov/research_and_analysis/tradeshifts/2020/special_topic.html (Accessed 20 July 2023)

4.3. COVID-19's impact on port operations

High COVID-19 infection rates among port workers had a significant impact on port operations, leading to limitations on the movement of cargo to and from ships. This resulted in shipping container backlogs at ports, causing delays in cargo loading and unloading. Updated health regulations and working conditions may have affected the productivity of the ports. Furthermore, labor shortages had repercussions on the world's supply systems, affecting the availability of goods and raising prices for

onshore transportation systems, such as rail and trucks (Alamouh, Ballini, and İcer, 2021).

The COVID-19 pandemic hindered the movement of goods by preventing maritime workers from traveling internationally and increasing the cost of maritime staff. Many governments imposed travel restrictions and quarantine measures as the pandemic spread globally, which restricted the mobility of workers in the maritime industry. In 2020, as reported by the International Labour Organization (Wu et al., 2020), around 800,000 sailors were unable to board or disembark from their ships. Starting in May 2020, some nations addressed this issue by allowing companies to charter planes within designated "safe transit corridors." This enabled seafarers to travel from their home countries to specific ports, alleviating the situation for stranded workers. These and other challenges increased labor costs, including hardship pay to compensate for workers stranded on ships, travel costs for repositioning personnel, and the expenses associated with COVID-19 testing and quarantine. According to one source, the cost of maritime employees was expected to increase by 6.2 percent in 2020 due to rising labor-related expenses (Wang et al., 2021).

4.3.1. The impact of COVID-19 on maritime freight costs

In the latter part of 2020, the COVID-19 pandemic resulted in a significant surge in maritime freight prices originating from Northeast Asia. During the first half of 2020, global shipping demand decreased due to shipping companies canceling planned shipments (blank sailings) in response to falling global demand. This initially kept shipping costs relatively stable despite the pandemic's impact. However, by June 2020, shipping rates began to rise, driven by a resurgence in consumer demand for goods, a shortage of available containers, and the various challenges mentioned earlier. Freightos, an online marketplace for international freight, reported that from January to December 2020, the weekly index price to transport a container from China to the North American West Coast increased by 178 percent, equivalent to \$2,676 per container (Dagestani, 2022). These rising transportation costs had consequences for businesses, causing some to exit the market and prompting changes in inventory management strategies (Gray, 2020).

While shipping costs make up a relatively small portion of the total value of imports, this share only saw a slight increase. The largest increase in insurance and freight costs as a percentage of the landed duty-paid value of imports was observed in energy-related goods. However, this increase was primarily due to significant price drops in energy products, rather than rising freight costs, which pushed insurance and freight expenses from 4.4 percent of the value of imports to 5.7 percent. The second-largest increase was seen in forest products, with insurance and freight costs rising from 6.9 percent to 7.8 percent of the value of imports. In the fourth quarter of 2020, the most significant increases in imports from Northeast Asia were expected in the following categories: minerals and metals (rising from 5.4 percent to 6.6 percent), textiles and apparel (increasing from 4.3 percent to 5.3 percent), and machinery (going from 3.5 percent to 4.5 percent). It's important to note that these costs did rise over the course of the year (Cullinane and Haralambides, 2021).

4.3.2. COVID-19's Impact on shipping modes and port volumes

The impact of the COVID-19 pandemic on shipping was not uniform across industries, except for the textile and garment sector. In 2020, the means of transportation for imports from Northeast Asia remained largely unaffected. However, the share of goods shipped by air freight significantly increased for textiles and apparel, climbing from 9 percent in 2019 to 22 percent in 2020. This shift was largely due to the substantial volume of personal protective equipment (PPE) transported via air freight. In other sectors like chemicals and electronic products, there were smaller increases in the share of goods shipped via air freight, likely due to certain COVID-19 related trends that encouraged the use of air freight for specific goods (Abralde et al., 2022).

The COVID-19 pandemic's impact on U.S. ports contributed to disruptions in the flow of goods. Monthly volumes at these ports fluctuated throughout the year, with decreases in the first half and increases in the second. As of March 2020, there were 3.1 million 20-foot equivalent units (TEUs) handled monthly, representing a 17.5% decline from 3.7 million TEUs in January. Monthly volumes remained at these levels until June, when they began to rise. Over the following four months, the number of containers handled increased by 34%, from 3.3 million TEUs in June to 4.4 million TEUs in

October, and these high volumes continued through the end of the year. The three busiest ports—Los Angeles, Long Beach, and New York and New Jersey—experienced the most significant monthly volume increases (Abad Alkasasbeh and Al-kasasbeh, 2022).

Disruptions in the maritime shipping industry resulted in delays in the shipment of goods. These delays were more frequent and longer-lasting in 2020 compared to 2019. These bottlenecks had broad implications for maritime freight, cargo processing facilities, onshore transportation networks, and the international supply chains of major U.S. retailers and small businesses that import finished products and intermediary parts. The extended and frequent delays led to reduced inventory for businesses and slower customer deliveries (Pereira and Chung, 2020).

Small importers were disproportionately affected by the shipping challenges and cost increases in the second half of 2020, despite businesses of all sizes being impacted. There are several reasons for this. Firstly, shipping companies may prioritize large clients who conduct significant business with them, potentially giving them priority for freight. Secondly, smaller businesses may be required to pay higher spot prices for shipping as they are less likely to have long-term contracts. Lastly, large businesses, due to their ability to export significant quantities, may have better negotiating power to secure discounts (Steven, Tony, and Technology, 2021).

4.4. The effects of the pandemic on American ports

The Coronavirus Disease 2019 (COVID-19) pandemic has brought to light the potential weaknesses of global supply chains, which segment production processes (such as sourcing raw materials, assembling parts, and distribution) into separate phases spread across numerous nations to ensure efficient production. Companies move intermediate commodities between several nations for processing before they are delivered globally as finished items, relying on a complex, global network of transportation services, particularly container shipping. When many Asian nations imposed COVID-19 lockdowns at factories and ports and reopened at various periods, the pandemic interrupted typical commerce flows, clogging seaports around the world

when products eventually left Asia. As the epidemic changed American customers' purchasing patterns from the service sector to the products sector in the fall of 2020, merchandise started to back up at U.S. seaports. Retail sales from March through July 2021 were 20% higher than for the same time period in 2019, excluding sales of cars and gasoline. A rise in containerized cargo is caused by the fact that many retail products are entirely or partially produced in Asia. Several ships are currently waiting to dock in the Ports of Los Angeles and Long Beach while they are at anchor. There are typically few or none. Factory and retail shortages have been brought on by the back-up. U.S. exporters have lost sales as a result of the delay in the availability of empty containers after their imported items have been unloaded (Cariou and Notteboom, 2022).

Ports have been taking the brunt of the effects from the various supply chain interferences for months. The situation at the ports of Los Angeles and Long Beach, which are overrun with unclaimed empty containers, is one extremely pertinent example. A risky vicious cycle is created by the insufficient space to unload, which causes significant delays for ships approaching the port. Both ports have coordinated their efforts, taking steps like extending their hours of operation or succeeding in changing laws so that containers can be stored next to the port in neighborhoods. The only thing that actually works, though, is the prospect of incurring late fines for abandoned empty containers. Since October 24, there has been a 53% decrease in the number of import containers remaining at the Los Angeles port for longer than they should have. The measure will ultimately take effect on January 30 due to the fact that there are still too many empty containers at the terminals. For empty containers that are kept for more than nine days, carriers must pay an additional fee (Makowska et al., 2021).

However, a number of experts concur that until demand returns to normal, any effort done by the ports will be insufficient. Forecasts are still pessimistic, at least until the first half of 2022. In the near to medium term, rising shipping rates are anticipated as a result of the pandemic's prolonged impact on shipping demand (Cariou and Notteboom, 2022).

4.5. Conclusion

The COVID-19 plague has turned out to be a problem that has never been seen before for both container ships and American ports. As the world tried to stop the virus from spreading, it caused problems in the marine industry on a scale that had never been seen before. The effect on port operations was huge, and transportation operations were slowed down and backed up because of a lack of staff, stricter safety rules, and changing cargo amounts. The effects of COVID-19 on the cost of shipping goods by sea made a situation that was already hard to handle even worse. Demand and supply changes caused freight rates to change, which made it hard for container shipping companies to keep their business models stable. Changes in customer behavior and manufacturing habits also caused changes in shipping methods and port traffic, which added to the problems facing the industry. Even with these problems, the American ports showed that they were strong and able to change. Some of the steps taken to lessen the affects of the pandemic were to use technology-based solutions, change port protocols, and improve contact with shipping partners. American ports were a big part of keeping the world economy going during this rough time. They did this by putting worker safety first and making sure that important supply lines kept running (Gracia et al., 2022).

5. US and other countries in maritime

5.1. Introduction

With its extensive web of economic and maritime trade networks, the European Union (EU) encountered a number of unanticipated difficulties as a result of the Covid-19 epidemic. The pandemic caused economic shocks and exposed weaknesses in the interrelated economies of the area. It also impacted numerous aspects of the EU's marine economy.

5.2. European Union: Unforeseen Challenges in the Maritime Industry Amid Covid-19

5.2.1. Port Operations and Border Controls:

The pandemic's immediate effects included the implementation of border controls and lockdowns in all EU member states. These steps were taken to stop the virus's spread, but they severely disrupted the maritime supply chain as a result. The efficient movement of commodities was hampered by delays at ports brought on by health and safety procedures, a smaller workforce, and uneven laws. Confusion resulted from the absence of consistency in measures among nations, which had an effect on the effectiveness of trade and maritime logistics (Selkou & Roe, 2022).

5.2.2. Tourism and Ferry Services:

Many EU states largely rely on tourism as a major economic engine, and the maritime sector is essential in transporting tourists to well-liked locations. Nevertheless, the pandemic halted all foreign travel, which reduced the number of cruise ship arrivals and ferry services. Countries like Greece, Italy, and Spain, which are known for their thriving cruise tourism, saw a dramatic decline in tourists. This had an impact on allied industries including accommodation, retail, and transportation in addition to the cash provided by maritime tourist (Selkou & Roe, 2022).

5.2.3. Changing Demand Patterns:

The demand for some products changed as a result of people being forced to adjust to remote work and different consumption patterns as a result of lockdowns and restrictions. Other industries saw a dip while demand for consumer electronics and medical goods increased. The utilisation of containers, shipping lanes, and eventually freight rates were all impacted by the shifting demand. To survive, the marine sector had to swiftly adapt to these changes (Selkou & Roe, 2022).

5.2.4. Supply Chain Disruptions:

The successful operation of the EU's integrated economies depends on effective supply chains. The pandemic exposed flaws in these supply networks and highlighted the dangers of relying too heavily on particular suppliers or geographical areas. The timely supply of raw materials and components became questionable when borders closed and companies closed. This emphasised the need for supply networks to be more resilient and to diversify in order to reduce future disruptions (Selkou & Roe, 2022).

5.2.5. Labor Challenges and Seafarer Welfare:

Seafarers from all over the world are needed by the maritime sector to operate ships. However, due to travel limitations and quarantine regulations, personnel changes became a serious difficulty. After their contracts expired, many seamen found themselves stuck on ships unable to go home. This not only sparked worries for their welfare but also had an impact on how effectively vessels operated. The crewing crisis prompted demands that countries recognise sailors as important employees and enable crew replacements (Selkou & Roe, 2022).

5.3. India's Maritime Industry Amid Covid-19: Challenges and Responses

The Covid-19 pandemic had a significant effect on India's maritime sector, which is essential for trade, energy supply, and the nation's overall economic prosperity. The difficulties India's marine industry encountered during the pandemic demonstrated a diverse range of problems that necessitated both immediate solutions and long-term concerns.

5.3.1. Crewing and Seafarer Crisis:

The crewing crisis was one of the most serious problems India's marine sector had during the pandemic. Crew changes became very challenging due to travel restrictions and lockdowns on foreign soil. Due to the closure of ports and limitations on crew changeovers, many Indian sailors found themselves stuck on ships after the expiration of their contracts. This created difficult operating problems for maritime firms as well as major worries about the mental and physical health of sailors. The classification of sailors as essential employees and the facilitation of crew changes were international initiatives (Zhao et al., 2022).

5.3.2. Port Congestion and Labor Shortages:

Due to a lack of available labour and safety precautions, India's major ports encountered congestion and operational difficulties. Operations for loading and unloading were impacted because of the lower personnel capacity caused by the necessity to maintain physical distance and adhere to health guidelines. Supply chains and trade flows were impacted by the ensuing delays, which in turn had an impact on the economy as a whole (Zhao et al., 2022).

5.3.3. Drop in Oil Demand:

India, a significant oil importer, had difficulties in the maritime sector as a result of the sharp decline in global oil demand. Lockdowns and decreased economic activity had an influence on the nation's oil imports and storage facilities since they decreased oil consumption. This had an impact on distribution as well as related processes like refining and crude oil shipment (Zhao et al., 2022).

5.3.4. Digitalization and Technological Adoption:

India's maritime industry has increased the deployment of digital technologies in response to the problems posed by the pandemic. To provide smoother operations even during lockdowns, contactless operations, electronic documentation, and remote monitoring became more popular. This move towards digitization not only preserved business continuity but also demonstrated the long-term advantages of greater technological integration (Zhao et al., 2022).

5.3.5. Supply Chain Disruptions:

The smooth operation of international supply chains is crucial to India's maritime trade. The pandemic's disruptions revealed weaknesses in these supply networks, especially in industries like manufacturing and medicines. To reduce future disruptions, the importance of diversified sourcing and creating robust supply chains has grown (Zhao et al., 2022).

5.3.6. Government Initiatives and Seafarer Welfare:

The difficulties facing the maritime industry were addressed by the Indian government. Onboard safety and wellbeing were prioritised, crew transfers were made easier, and seafarers were acknowledged as crucial employees. Guidelines were released by the Directorate General of Shipping (DGS) to solve the crewing crisis and safeguard the wellbeing of seafarers (Zhao et al., 2022).

5.4. United Arab Emirates (UAE) Maritime Industry in the Face of Covid-19 Challenges

The Covid-19 outbreak presented a special set of difficulties for the United Arab Emirates (UAE), a country that is well-known as a hub for worldwide logistics and trade. The nation is a significant player in international transport and trade thanks to its advantageous position and well-developed ports. However, the epidemic brought about unforeseen disruptions that called for creative solutions and adaptations.

5.4.1. Air and Sea Cargo Disruptions:

Due to its function as a re-export centre and trade facilitator, the UAE's economy is primarily dependent on air and marine freight. The pandemic's effects on international aviation and sea travel caused delays in the UAE's freight operations. The movement of commodities into and out of the nation was hampered by the grounding of flights and delays on shipping routes. Businesses who depend on on-time delivery for their operations were adversely affected by this setback (Alalawi et al., 2022).

5.4.2. Cruise Tourism Setback:

Due to travel limitations and health issues, the tourism industry in the UAE, and particularly cruise tourism, experienced a setback. The number of cruise ships visiting the well-known cruise ports of Dubai and Abu Dhabi sharply decreased, which had an effect on the money made from tourism-related activities. The difficulties faced by the cruise industry brought to light the pandemic's wider effects on the tourism and hospitality industries (Alalawi et al., 2022).

5.4.3. Suez Canal Blockage Impact:

The Suez Canal blockage in March 2021 had an indirect impact on the UAE's maritime industry in addition to the difficulties the pandemic itself presented. The Ever Given container ship's grounding disrupted the flow of cargo between Europe and Asia. The incident had repercussions for the nation's shipping and logistical operations given the UAE's position in enabling international trade (Alalawi et al., 2022).

5.4.4. Adaptation and Digital Transformation:

The marine sector in the UAE adopted digital transformation and creative solutions to lessen the pandemic's interruptions. As a strategy to sustain operational continuity while adhering to safety regulations, contactless operations, digital documentation, and remote monitoring have become more popular. The industry's productivity and adaptability are expected to be negatively impacted by this faster use of digital technologies (Alalawi et al., 2022).

5.4.5. Diversification and Future Preparedness:

The difficulties the UAE's maritime industry encountered served as a reminder of the value of diversification and long-term planning. The nation has long been committed to diversifying its economy beyond the oil industry, and the pandemic highlighted the need to keep doing so in industries like tourism, manufacturing, and technology. Through this aim at diversification, the UAE can lessen its reliance on particular industries and navigate future crises of a similar nature (Alalawi et al., 2022).

5.5. Brazil's Maritime Industry and the Unpredictable Covid-19 Impact

The Covid-19 pandemic presented a complicated and very wide range of issues to Brazil's maritime sector. Brazil's marine industry is deeply entwined with its economy and international trade as a major player in resource exports and a nation with a long coastline. The pandemic's effects on the sector exposed weaknesses and generated solutions to deal with the situation.

5.5.1. Resource Demand Fluctuations:

Brazil is a big supplier of goods like soybeans and iron ore. The pandemic's effects on the world's economies affected how much these resources were in demand. The demand for several commodities fell as economies slowed down, which had an impact on shipping volumes and revenue from resource trading. This variation in demand demonstrated how susceptible the sector is to changes in the world economy (Silva et al., 2022).

5.5.2. Port Worker Safety Measures:

Brazil established safety measures in its ports to slow the spread of the virus. Although these steps were required to protect the health of port employees and to sustain operations, they also created operational difficulties and slowed down cargo handling. Worker safety and operational effectiveness needed to be balanced, which became a critical factor (Silva et al., 2022).

5.5.3. Oil Price Volatility:

Brazil is a major oil exporter as well, and the pandemic's effect on the world's oil consumption caused price volatility. Brazil's offshore drilling activity and oil shipping operations were impacted by changes in oil prices. Investment choices and income predictions in the maritime and energy industries were impacted by the volatility in the oil markets (Silva et al., 2022).

5.5.4. Digitalization and Technological Adoption:

Brazil's marine industry, like many others, hastened the deployment of digital technologies in response to the problems provided by the pandemic. In order to maintain operational continuity during lockdowns and travel restrictions, contactless operations, electronic documentation, and remote monitoring have become more

popular. Long-term, this digital revolution has the potential to improve transparency and efficiency (Silva et al., 2022).

5.5.5. Supply Chain Resilience:

Pandemic-related interruptions revealed supply chain vulnerabilities, sparking debates about the need for greater resilience. Brazil had to review its supply chain tactics to ensure the timely flow of commodities given its resource-exporting economy. The epidemic made it clear how crucial it is to have supply systems that can endure unforeseen shocks (Silva et al., 2022).

5.5.6. Government Responses and Future Planning:

The difficulties facing the maritime industry were addressed by the Brazilian government. It put policies into place to assist the continuation of port operations, ease cargo flow, and guarantee the wellbeing of seafarers. The crisis brought home how crucial it is for the public and private sectors to work together in order to overcome new obstacles (Silva et al., 2022).

5.6. Conclusion

The Covid-19 pandemic, an unforeseen and relentless force, tested the mettle of the maritime industry in regions as diverse as the European Union, India, the United Arab Emirates, and Brazil. These regions faced distinct challenges, from disrupted crew changes and supply chain vulnerabilities to fluctuating demand for resources and digital transformation imperatives. However, amidst these challenges, resilience and adaptability emerged as key themes. Nations and industry stakeholders rallied to address immediate concerns, from safeguarding seafarer welfare to ensuring the continuity of port operations. The pandemic acted as a catalyst for digital transformation, ushering in contactless operations and electronic documentation, which promise long-term benefits in terms of efficiency and transparency.

6. Measures for the recovery of the shipping

6.1. Introduction

The Covid-19 pandemic presented unparalleled difficulties for the worldwide shipping sector, resulting in the disruption of supply chains, trade routes, and port operations. In light of the global economic recuperation efforts following the profound repercussions of the pandemic, numerous strategies have been and can be employed to bolster the reinvigoration of the maritime sector within the United States and other nations (Gavalas et al., 2022).

6.2. Steps to restore the shipping industry

The paramount importance lies in the assurance of the well-being and security of individuals employed in the maritime industry. In order to ensure the uninterrupted functioning of port operations while mitigating the potential transmission of viruses, it is imperative for governmental bodies and industry stakeholders to engage in collaborative efforts (Abad Alkawasbeh et al., 2022). This entails the establishment and implementation of rigorous health protocols, which are aimed at minimising the risk associated with virus transmission. The implementation of routine testing, diligent temperature monitoring, provision of personal protective equipment (PPE), and the facilitation of vaccination campaigns among maritime personnel can effectively cultivate a sense of assurance within the workforce while simultaneously upholding operational fortitude (Zhang et al., 2021).

The implementation of comprehensive health and safety protocols is of utmost importance in order to safeguard the physical and mental well-being of individuals employed in the maritime industry, as well as to uphold the seamless continuation of operational activities. This encompasses the implementation of routine testing, comprehensive health screenings, and the facilitation of personal protective equipment (PPE) distribution (Bicer & Dincer, 2018). The establishment of a collaborative framework between port authorities, shipping companies, and medical professionals holds significant potential in the development of efficacious protocols aimed at mitigating the transmission of viral pathogens. Such protocols, while prioritising the

preservation of public health, must also facilitate the seamless and expeditious movement of goods (Verschuur et al., 2021).

The augmentation of digitalization endeavours has the potential to bolster the efficacy and lucidity of maritime operations. The integration of digital platforms for the purposes of documentation, cargo tracking, and communication has the potential to optimise operational procedures, diminish the reliance on physical paperwork, and mitigate the need for face-to-face engagements. The implementation of automation and remote monitoring systems has the potential to enhance operational efficiency and offer timely and valuable insights into the intricacies of supply chain dynamics (Zhang et al., 2021).

The advent of digitalization holds immense potential to fundamentally transform the shipping industry through its ability to optimise operational efficiency, mitigate financial burdens, and augment the level of transparency within the sector. The implementation of advanced technological solutions such as blockchain has the potential to significantly augment the traceability of cargo, thereby mitigating the need for excessive paperwork and minimising the occurrence of potential delays (Fox-Hodess, 2021). The utilisation of data analytics and predictive modelling techniques holds the potential to optimise shipping routes, thereby resulting in a notable reduction in both fuel consumption and emissions. The utilisation of remote monitoring systems facilitates the real-time tracking of vessel performance and cargo conditions (Verschuur et al., 2021).

The imperative of attending to the crewing crisis is of utmost significance, as it encompasses both humanitarian considerations and the indispensable operational efficacy of the industry. It is imperative for governmental bodies and maritime institutions to undertake the responsibility of acknowledging seafarers as indispensable personnel. In order to achieve this, they must facilitate the seamless transition of crew members by establishing secure transit corridors, arranging charter flights, and expediting visa procedures. The meticulous observance of global labour norms and the implementation of initiatives aimed at safeguarding the welfare of seafarers have the potential to augment the overall welfare of crew members (Bicer & Dincer, 2018).

The acknowledgment of seafarers as indispensable labourers and the guarantee of their well-being constitute a paramount imperative. Governments possess the capacity to institute specialised transit corridors and secure travel pathways for the purpose of facilitating crew changes, thereby guaranteeing that seafarers can efficiently

embark upon or disembark from their vessels without encountering unwarranted hindrances. The establishment of standardised protocols pertaining to crew rotations across nations has the potential to optimise the procedure and mitigate the persistent crewing predicament (Gavalas et al., 2022).

The imperative nature of investing in port infrastructure and facilities cannot be overstated, as it plays a pivotal role in facilitating the seamless movement of goods. The augmentation of ports to accommodate larger vessels, the enhancement of cargo-handling equipment, and the optimisation of storage and logistics capabilities have the potential to bolster operational efficiency and facilitate economic recovery. Governments possess the capacity to engage in collaborative endeavours with private stakeholders in order to secure financial resources for the implementation of said projects (Zhang et al., 2021).

The allocation of resources towards the development and enhancement of port infrastructure, equipment, and logistics facilities can yield extensive and profound advantages. Contemporary port facilities have been enhanced to accommodate more sizable watercraft, thereby facilitating economies of scale and diminishing the expenses associated with transportation. The implementation of enhanced cargo-handling equipment has the potential to optimise turnaround times, thereby mitigating congestion and augmenting overall operational efficiency (Fox-Hodess, 2021).

The global health crisis has brought to the forefront the inherent dangers associated with excessive reliance on particular suppliers or geographic areas. It is imperative that governmental entities and commercial enterprises collaborate in order to foster supply chain diversification, thereby discerning substitute origins for indispensable commodities and materials. This has the potential to ameliorate forthcoming disturbances and bolster the industry's capacity to withstand unforeseen adversities (Fox-Hodess, 2021). Dependence upon a solitary source for essential commodities can engender susceptibilities within the supply chain. The potential for collaboration between governments and businesses lies in their joint efforts to ascertain alternative supply sources, thereby mitigating the vulnerabilities associated with disruptions arising from geopolitical tensions or natural calamities. The phenomenon of diversification can, in addition, engender heightened levels of competition, thereby potentially instigating a decline in costs (Verschuur et al., 2021).

The phase of recovery presents a favourable occasion to incorporate sustainable practises within the maritime industry. The reduction of the industry's carbon footprint

can be achieved through the adoption of cleaner fuels, the optimisation of routes to enhance fuel efficiency, and the implementation of environmentally friendly technologies. Governments possess the capacity to stimulate environmentally conscious behaviours by means of regulatory frameworks, fiscal incentives, and financial assistance (Bicer & Dincer, 2018). The carbon emissions stemming from the shipping industry have emerged as a matter of considerable concern. By embracing sustainable practises, such as the adoption of cleaner fuels, the optimisation of vessel design for enhanced fuel efficiency, and the investment in renewable energy solutions, one can effectively contribute to the protection of the environment. Moreover, these practises have the potential to enhance operational efficiency and yield long-term cost reductions (Abad Alkasasbeh et al., 2022).

The imperative for a synchronised recovery necessitates the establishment of robust partnerships among governmental entities, international organisations, and industry associations (Zhao et al., 2022). The act of disseminating optimal methodologies, empirical evidence, and personal narratives has the potential to engender enhanced efficacy in problem-solving endeavours. The implementation of crisis management teams and the establishment of effective communication channels can significantly augment the state of preparedness in anticipation of forthcoming disruptions (Fox-Hodess, 2021). The imperative for a successful recovery lies in the imperative of fostering close cooperation among governmental entities, international organisations, and various industry stakeholders. The dissemination of optimal methodologies, personal anecdotes, and empirical evidence has the potential to engender heightened levels of discernment in the process of decision-making. The establishment of effective communication channels and the implementation of robust crisis management mechanisms are imperative in order to facilitate a cohesive and coordinated response to forthcoming challenges (Gavalas et al., 2022).

Governments possess the capacity to extend monetary assistance, in the form of financial support, grants, and low-interest loans, to shipping companies, port operators, and other interconnected industries that have encountered substantial adversities as a result of the ongoing pandemic. The provision of incentives to companies that engage in the investment of digital technologies, sustainability initiatives, and workforce development has the potential to foster innovation and facilitate economic recovery (Zhao et al., 2022). The implementation of financial assistance, in the form of support, grants, and incentives, has the potential to mitigate the economic burden experienced

by shipping companies and their associated sectors. Governments possess the capacity to provide tax incentives in the form of breaks to stimulate investments in the domains of technology, sustainability, and workforce development. Financial assistance can serve as a vital means for companies to navigate through the current crisis and strategically position themselves for subsequent expansion (Fox-Hodess, 2021).

The imperative of allocating resources towards the cultivation of the maritime workforce is paramount in guaranteeing the presence of a proficient and versatile labour force. Training programmes, workshops, and courses have the potential to furnish maritime professionals with the requisite knowledge and skills indispensable for effectively navigating the ever-changing landscape of industry trends and technologies (Verschuur et al., 2021). The implementation of training and development initiatives within the maritime sector has the potential to augment the proficiencies of its professionals, thereby fostering their capacity to effectively navigate the ever-evolving landscape of novel technologies and industry patterns. These programmes encompass a diverse array of domains, spanning from the cultivation of digital literacy and technical proficiencies to the cultivation of competencies in safety and crisis management (Bicer & Dincer, 2018).

In light of the inherently globalised nature of the shipping industry, the imperative to establish a harmonised framework for health protocols, crew change procedures, and safety standards across nations becomes apparent. Such harmonisation endeavours hold the potential to engender enhanced operational efficiency and mitigate uncertainties within the industry. The attainment of harmonisation can be greatly facilitated through the active involvement of international organisations and agreements (Zhang et al., 2021).

In light of the intricate interdependence inherent in the shipping industry, the pursuit of global harmonisation of protocols and standards holds the potential to engender enhanced operational fluidity and diminished ambiguities. International organisations, exemplified by the International Maritime Organisation (IMO), possess the capacity to exert a substantial influence in expediting the process of harmonisation (Abad Alkasasbeh et al., 2022).

It is imperative that governmental bodies, commercial enterprises, and pertinent industry stakeholders engage in a collaborative effort to undertake resilience planning. The aforementioned process encompasses the utilisation of scenario analysis, risk assessment, and the formulation of contingency plans aimed at alleviating potential

disruptions. The implementation of such strategic planning has the potential to significantly bolster the industry's resilience in the face of forthcoming crises (Gavalas et al., 2022).

6.3. Conclusion

In nations that exhibit a significant dependence on cruise tourism and passenger transport, governmental bodies possess the capacity to collaborate with the industry in order to effectively institute health and safety protocols that serve to reinstate a sense of assurance and trust among prospective travellers. The implementation of unambiguous directives pertaining to the secure execution of activities, obligatory immunisation prerequisites, and all-encompassing hygienic measures can effectively contribute to the revitalization of this particular industry (Fox-Hodess, 2021).

Conclusions

The Covid-19 pandemic has presented a significant challenge to the global shipping industry, testing its ability to withstand and respond to adverse circumstances, as well as its level of readiness. In light of the tumultuous repercussions of the pandemic, the maritime sector is currently endeavouring to recuperate. Consequently, a number of pivotal insights and approaches have come to the fore.

The global health crisis has exposed the inherent weaknesses and intricate interconnections present within the maritime transportation sector. The expeditious reaction to the crisis showcased the sector's robustness and capacity to acclimatise to exceptional circumstances. The significance of diversifying supply chains, embracing digitalization, and fostering collaboration among governments, industry stakeholders, and international organisations has become readily apparent. The aforementioned lessons shall serve as a guiding force for the industry as it navigates its trajectory towards a future characterised by enhanced resilience and preparedness.

The onset of the pandemic unexpectedly triggered a rapid advancement in the process of digital transformation within the maritime sector. The implementation of contactless operations, electronic documentation, remote monitoring, and data analytics has demonstrated the potential for enhanced efficiency and transparency. The present

technological progression represents not a transitory reaction, but rather a profound transformation that shall redefine the very fabric of the industry's topography in the forthcoming years.

The crewing crisis, characterised by the predicament of seafarers being marooned in distant lands owing to travel limitations, underscored the maritime industry's unwavering dedication to safeguarding the welfare of its labour force. The acknowledgement of seafarers as indispensable labourers and the prioritisation of their well-being highlight the imperative for harmonised endeavours among governmental entities, maritime enterprises, and global organisations. The aforementioned experience shall undoubtedly exert a profound impact on the ongoing discourse surrounding the rights of seafarers, their working conditions, and the formulation of protocols that prioritise the humane facilitation of crew changes.

The deceleration of economic activity resulting from the pandemic provided an opportunity to observe atmospheres with reduced pollution and bodies of water with improved clarity, thereby stimulating a revived emphasis on the concept of sustainability. In light of the industry's embarkation upon the path of recovery, it becomes imperative to prioritise the adoption of ecologically conscious practises. The transition towards more environmentally friendly fuels, technologies that prioritise ecological considerations, and the utilisation of optimised routes not only demonstrates a harmonisation with worldwide sustainability objectives but also serves to augment operational efficacy and mitigate long-term expenses.

The ongoing global pandemic has served to underscore and fortify the significance of collaboration and collective action. It is imperative for governments, industry associations, and international organisations to persist in their efforts to exchange optimal methodologies, synchronise protocols, and institute mechanisms for crisis management. The industry's resilience in the face of challenges, as evidenced by its collective and cooperative approach, will serve as a source of strength in mitigating future uncertainties.

The resurgence of the maritime sector is not an individual odyssey, but rather a collaborative endeavour that encompasses nations, corporations, and societies. As the global community gradually emerges from the pervasive influence of the pandemic, the maritime sector finds itself presented with a unique opportunity to undergo a profound renaissance. The aforementioned renaissance postulates a paradigm wherein the industrial sector not only embraces technological advancements, but also places a

significant emphasis on sustainability, prioritises the well-being of humanity, and adeptly navigates through obstacles with resilience and proactive anticipation.

By delineating this novel trajectory, the maritime sector possesses the capacity to emerge as a symbol of optimism, exemplifying the inherent capabilities of fortitude and ingenuity amidst the most tempestuous tempests. By leveraging historical insights and capitalising on the synergistic potential of collective efforts, the maritime sector can embark upon a trajectory aimed at recuperation, revitalization, and a more promising outlook for the future of maritime endeavours. In light of the dynamic shifts permeating the sector, it becomes evident that the shipping industry is poised to not merely endure, but rather flourish, deftly navigating obstacles and charting a course towards uncharted realms of prosperity.

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