INVESTIGATING THE IMPACT OF COVID-19 ON MARITIME SUPPLY CHAIN SUSTAINABILITY AND TECHNOLOGY: A REVIEW

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Despite the increasing interest toward sustainability issues in supply chain over the academic and practitioners' perspectives, a comprehensive and updated assessment of the existing literature is still negotiated. Epidemic outbreaks are a unique case of supply chain (SC) risks which is particularly characterized by using a long-time period interruption lifestyle, and extreme uncertainty. As international transport stands at the front of trade and is mainly dependent on travel and human interaction, the shipping industry has been affected substantially from the epidemic of COVID-19 directly and indirectly. This paper represents a review that aims to investigate the impact of COVID-19 on the sustainability of maritime supply chains in general and also in selected geographical areas in terms of the regulations and restrictions imposed by specific organizations in some countries as well as the effect on the supply chain sustainability. In addition, the paper highlights the recent technologies that are currently applied in maritime supply chains and how they can be employed as proposed solutions to facilitate the supply chain flow, overcome the negative effect caused by the COVID-19, and provide further managerial insights to cope with this situation in the most efficient and effective way.

Keywords: Maritime Supply Chain Sustainability, Maritime Supply Chain Technology, Coronavirus/COVID-19.

INTRODUCTION

A supply chain is a network of various activities, people, entities, resources, and information. This network is between a company and its suppliers to manufacture and distribute a certain product or service to the end user. The supply chain includes the steps taken to move the product or service from its original state to the final consumer (Kenton, 2020). Sustainability is the future, understanding the level of social, economic and environmental effect and viability that suppliers and customers have. Sustainability is not only going green and being environmentally friendly. It also influences the whole manufacturing process, from where raw materials are obtained, to the processes within the factory, to the consumption and possible recyclability of the product or service (Grimshaw, 2019).

Organizations should track their success in a sustainable manner. This monitoring will require proper setting on Key Performance Indicator (KPI). Measuring success in these terms has a huge impact on the performance of organizations and makes tracking and keeping up to date in the motion easier. KPIs can be classified as financial and non-financial KPIs, which differ from one industry to another. Hence it can be difficult to compare KPIs. Procurement, warehousing, production, and transportation have their own defined KPIs for measuring sustainable efficiency (Smith & Van Der Heijden, 2017).

SUSTAINABILITY IN MARITIME SUPPLY CHAIN

“Sustainability” refers to studying how the natural systems purpose remain various and construct everything it needs for the ecology to remain in stability. Sustainability and sustainable development emphasizes on balancing the competing needs - the need to move forward economically and technologically, and the needs to protect the environments where we live. Sustainability has become a main priority in the plan and operation of supply chains in the twenty-first century. This emphasis on sustainability allows a supply chain to better set out more environmentally aware customers while improving supply chain performance (Chopra and Meindl, 2016).

Sustainable Supply Chain Management (SSCM) is a holistic view of supply chain activities, which have an impact on the environmental, social, financial and legal features of a supply chain's parts. Defining property SSCM as a group of social control practices that cover all the subsequent environmental effect as an essential consideration of all ranges across every product's overall chain; and a multi-disciplinary standpoint, surrounding the whole life-cycle of the product (Gupta and Palsule-Desai, 2011).

Maritime Supply Chains breaks the maritime chain into components, persistently bearing on them to the overall integrated supply chain. As maritime transport is a crucial linkage of the global supply chains, there are trade-offs to be made with other links, including the choice of port and transshipment as well as hinterland services. Managing maritime supply chains examines how such chains can be affected through exogenous developments and events, such as structural changes in worldwide trade, evolutions in the international fleet, and national and international maritime policymaking (Sys, 2020). Many transportation and logistics issues are controlled via maritime link. The complete SC to keep these things to do going requires robust support from materials such as fuel, spare components as these need to be managed and organized. It is also significant to manage the information flow. In addition, cash flow is required to be systematized through internet or enabling mechanisms such as e-commerce portals. Maritime SCM is a self-discipline that needs to be set in its deserved important position as regards its significance in global financial system and the sizable sea size it covers throughout continents (Deshmukh, 2014).

THE IMPACT OF CORONAVIRUS COVID-19 ON MARITIME SUPPLY CHAIN SUSTAINABILITY

Epidemic outbreaks are a unique case of supply chain (SC) risks which is distinctively distinguished by using a long-time period disruption lifestyle, and excessive uncertainty. The maritime industry is taking part in an important role within the short-run emergency response to the pandemic, by smoothing the transport of important commodities and merchandise, therefore sustaining jobs, international trade, and international economy. And discussing how to magnify sustainability and resilience of ports and maritime transport during and after the pandemic. The epidemic outbreak effect on the SC overall performance as opposed to an upstream disruption length or the speed of epidemic propagation. Other vital components are lead-time, lack of epidemic propagation, and the upstream and downstream disruption intervals within the SC (Kuhlman and Farrington, 2020).

The outbreak of COVID-19 has affected international transport and the shipping industry directly and indirectly. Operations of shipping companies and relevant industries, including ports, terminals, etc., have been affected due to personnel having been guided to

abstain from traveling or announcing to work. Decreased demand for commodities and raw material, and thus need for shipment, has reduced freight rates. Numerous shipping companies have commenced warning about decreased visibility of earnings and weak future earnings effects.

Genuinely, there do not appear to be any parts of the shipping enterprise that to this point have been proof against COVID-19. The shipping legal profession has been pouring over charter parties and investigating the probability of whether or not COVID-19 can represent force majeure, a factor with innumerable consequence to the charter marketplace. Supply chains and logistics as well were affected; for instance, the Chinese trucking industry has collapsed too, because the government has enforced travel limits, which prevents packing containers-for-export from reaching the loading dock, and containers-for-import stay piling on the dock awaiting discharging vessels (Kuo, 2020).

For the reason that freight marketplace for dry bulk vessels and offshore drilling assets has already been weak for some time, it'll not be sudden seeing COVID-19 motivating for bankruptcy protection during the year by a few financially insecure businesses in these sectors (Kuo, 2020).

IMPACT OF COVID-19 PANDEMIC ON SUSTAINABLE SHIPPING SC WORLDWIDE

Production and shipping is one part of the SC that was affected by COVID-19. Due to the COVID-19 pandemic lockdown and procedures taken. In the meantime, China manufactured half of the world's face masks and shipped them to different countries. However, the shipping industry is responsible for 3% of greenhouse gas emissions and has traditionally used cheap, polluting fuel, but new standards in the industry are forcing it to clean up its act as it still has a major environmental impact (Queiroz *et al.*, 2020).

Another major part affected is the crew. Airline and port restrictions in most of the countries have made it almost impossible for crew members to urge home if the governments don't construct particular measures. The safe return of the crew from the vessels would necessitate the collaborative efforts of the governmental agencies, the crew manning agency, and the owners. Finally regarding legal disputes, if the cargo is non-essential cargo it cannot be moved to the ports for the duration of national lockdown. Furthermore, before the vessel can take on cargo, it should be cleared by the port authorities, in the pandemic-affected countries the process of vetting the crew may additionally take time, and this delay will fall on the ship-owner as an alternative than on the charter (Ivanov, 2020).

Table 1. Impact of Covid-19 on the maritime SC sustainability over different geographical areas

Geographical Area: <u>Balkans</u> - Country: Bulgaria - Organization: The Bulgarian Maritime Administration
Regulations and Restrictions:
<ul style="list-style-type: none"> • Observance of the instructions of the Paris Memorandum of Understanding on Port State Control relating to COVID-19. • The whole available information about these ships, such as: last port (s) of call; crew nationality; any recent shifts in ports; any symptoms of COVID-19 on board; any instructions from the health authorities regarding the ship/crew. Based on the collected information, the regional coordinators assess the risk to the ship and if they determine a ship to be inspected, appoint the inspector(s) to carry out the inspection.

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Investigating the Impact of COVID-19 on Maritime Supply Chain Sustainability and Technology: A Review

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- During the on board inspection, inspector(s) shall wear appropriate personal protective clothing and Equipment and observe the distance as these are stipulated in the orders of the Minister of Health and the instructions of the health authorities.

Effect on supply chain sustainability:

- Local value chains will gain priority and ensuring a local source of responsible supplies will become a new contingency norm for sustainable supply chains.

Geographical Area: Europe - Country: Luxembourg - Organization: Ministry of the Economy Maritime Administration

Regulations and Restrictions:

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- Ministry of Infrastructure and Transport Italian Coast Guard Headquarters
 - Extension of the validity of seafarer documents beyond their expiry date
 - Extension of statutory certificates, surveys, audits and flag state inspections

Effect on supply chain sustainability:

- Showing that many corporate supply chains are vulnerable; needing more disinfection.

Geographical Area: Scandinavian - Country: Norway - Organization: The Norwegian Authorities

Regulations and Restrictions:

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- As a partial reporting of the Maritime Declaration of Health, all vessels are required to confirm through SafeSeaNet Norway that there is no detection or suspected infection on-board.
 - Specific functionality based on NCA reporting and information systems has been developed to collect data and analyses the effects of the COVID-19 measures on sea traffic.

Effect on supply chain sustainability:

- Efforts to unlock low-carbon growth in the maritime sector, the Norwegian government is supporting this process through the Green Coastal Shipping Programme, which brings industries and state departments together to implement a new maritime strategy.

Geographical Area: Central Europe - Country: Poland - Organization: Ministry of Maritime Economy and Inland Navigation Norwegian Authorities

Regulations and Restrictions:

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- Traffic at the maritime border has not been suspended.
 - Cargo vessels operations are carried as usual. Ferry traffic for heavy goods vehicles operate as usually.
 - All passengers of the ships are subjected to sanitary control, consisting of measuring the body temperature and filling out the location card.
 - All persons, with some exceptions, returning to the territory of the Republic of Poland, including the ship's passengers have to undergo a 14-day quarantine.

Effect on supply chain sustainability:

- Sustainable Development Goals and ensure that people have high awareness of health precautions.
- Investing more in technology solutions and working closely with their IT software and hardware suppliers to develop more automated supply chains that rely less on cross borders.

Geographical Area: South-eastern Europe - Country: Romania - Organization: The Romanian Authorities

Regulations and Restrictions:

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- After descending from the ship, the protective equipment is collected in bags and incinerated by the waste collection company with which the respective institutions have a contract.
 - Limiting contact with other essential crew members (master, watch officer, helmsman)
 - Keeping as much as possible the documents taken from the ship (pilot's vouchers) in a separate envelope in the pilot's bag (content that can be disinfected after getting on board).

Effect on supply chain sustainability:

- To support sustainable local production and supply of critical medicines, medical supplies and food in all nations.
 - Green recovery plan that enables supply chains to integrate more sustainable and ethical practices.
 - Operate within legal limits and comply with agreed-upon contractual requirements; addressing
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COVID-19 AND MARITIME SUPPLY CHAIN TECHNOLOGIES

COVID-19 makes the world recognize how greatly we depend on the interactions between humans to make things work. Businesses that are demanding labor, such as retailing, warehousing, manufacturing and logistics are the worst affected. COVID-19 has strongly pushed to rollout the utilization of robots and research on robotics. In recent weeks, robots have been employed to sterilize and sanitize areas and to deliver things to those in quarantine (Xiao and Fan, 2020).

Cash might transfer the virus, so central banks in China, US and South Korea have employed several measures to ensure banknotes are clean before they are being exchanged. Currently, contactless digital payments, either in the form of cards or e-wallets, are the suggested payment method to prevent the spread of COVID-19. Digital payments for even container customs and customs clearances service enable people to deal online to finish and continue working without any delays or affecting each other (Xiao and Fan, 2020).

Principal technologies of the Fourth Industrial Revolution, such as Cloud Computing; as its power to serve through daily sales data rapidly; shifting patterns quickly and forecast demand capacity with machine teaching algorithms and show these insights with predictive analytics. Internet-of-Things (“IoT”), Big Data and blockchain are gearing maritime SC failures revealed by Covid-19 and constructing a more resilient supply chain management system for the future by means of improving the accuracy of statistics and catalyzing records sharing. Blockchain additionally permit leaders to amplify the benefits and reduce the risks of the technology. SC resilience depends on transparency, trust, and unity. This can be enhanced through implementing the technologies of blockchain which provide a “shared truth” (May, 2020).

Port authorities in many countries have requested personnel to work from home. Remote work is supported by technologies such as virtual private networks (VPNs), virtual meetings, voice over internet protocols (VoIPs), work collaboration tool, cloud technology, and even facial realization technologies to maintain the privacy of the home (Guttman, 2020).

CONCLUSION

To conclude, the goal of the research is to find out the impact of Coronavirus/COVID-19 and on maritime supply chains sustainability. This was done through conducting the review through identification of research scope, selecting relevant studies, assessing the quality of selected studies, extracting data, synthesizing the selected relevant studies and compromising sources. Literature was gathered on the basis of selected keywords (Sustainability, Maritime Supply Chain etc.) that were identified and used to online databases search. The sources were selected to be sufficient to address the topic and provide an evaluation for staring at and predicting each non-permanent and long-term effect of epidemic outbreaks on the maritime SCs alongside with managerial insights during COVID-19 situation.

Investigating the Impact of COVID-19 on Maritime Supply Chain Sustainability and Technology: A Review

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