The Impact of Post-Covid-19 Container Shortage Crisis on Global Supply Chains

Mohamed Salah El Din, Dr. Masengu Reason, Melisa Ncube
Lecturers
Department of Management Studies
Middle East College
Muscat, Sultanate of Oman
msalah@mec.edu.om; melisa@mec.edu.om; masengu@mec.edu.om

Sultan Al Kaabi
Operation Manager
Khazzan Logistics Management Service
Lawrence Technological University
Muscat, Sultanate of Oman
kaabisultan@hotmail.com

Abstract

Due to the Covid-19 pandemic, there has been disruption in international trade affecting many areas one of the sectors being the supply chain on products in different countries. Now most countries are back to manufacturing though an anomaly is evident on quantity produced resulting in a bullwhip effect on the fleet of the containers supply chain. There is incapacitation of production in some countries as the virus ravages the globe. This has led to an inverse balance in the quantity of container fleet flow in international trade. This has led to the research to delve into the container shortage globally which is now a crisis. Identification of the nature of the crisis, the analysis of the impact this has propelled to has been discussed. Post-Covid strategies to mitigate this effect are presented. Thematic analysis has been used in this juncture due to limitations and delimitations of geographical location and Covid-19 restrictions.

Keywords (12 font)
Shipping Container, Container Crisis, Shipping and Global Supply Chain.

1. Introduction

Globalization has been the way of life nowadays as trade crosses beyond the borders. There are about 170 million shipping container moving around the world to transport approximately 90% of the world trade (Shin 2021).This shows that there is a need for the supply chain to continue regardless of the locally produced inputs. The normalcy of trade includes the vessels and containers to transport the goods ordered to the destination of consumption and then distributed to the globe to meet the consumer demand. Practical examples include well renowned products such as mobile phones (Apple, VIVO, HUAWEI, Samsung); food products (coffee, rice, beans, meat); metals (gold, diamonds, iron, copper, uranium, titanium) and many more which require the usage of transportation units. There are numerous transportation units which include wagons, cartons, pallets, and containers (DeVogelaere & Frey 2014). The history in America shows that the cost of freight was reduced from $5.86 per ton for loose cargo to $$0.16 per ton when cargo was containerized in 1956 (ISBU 2010). The logical explanation of this phenomenon is the introduction of consolidation as the container was a breakthrough in carrying numerous tonnes in unit. Containers can be carried in plentiful ways which gives birth to TEU's. TEU is used as a measurement of twenty - foot equivalent unit. There has been a global index which will be explained in two sections. In 2000 -2008 the TEU increased from 214,274,536 TEU to 473,821,055 TEU (Worldbank, 2009). In 2009 -2017 there has been a substantial increase to approximately 750 million containers being transported world-wide (Rodrigue, 2020). American shipper (Miller, 2021) concurs with this adding the statistics from 2018 as there was a slight increase then a demise in 2019 from 60%-

58%. In China alone, the throughput has increased from 2009- 108,799,933.725 TEU; to 242,030,000.000 TEU in 2019 (CEIC 2019). This shows that China has been in an ever-increasing performance regardless of the COVID 19. This shows that the production and container movement never receded. In China there are a total of 3 container producers accounting for 85% production of the world (Shah, 2021).

The container movement statistics are reviewed in this paper to understand the shortage crisis and develop strategies to mitigate the impact it has caused in the COVID 19 Pandemic. Rodrigue (2021) analyzed the container's development and usage history using the S-curve as per follows.

- Introduction stage was in the 1950's, the evolution of containers began with high risk from investors as in a normal product introduction stage. This trend continued until the 1970's.
- Adoption was during the early 1970's to 1980's, when containerization became worldwide known as an efficient way to transport products. Investments in these areas became prevalent with players in the industry buying into this idea. There was further investment in intermodal transportation systems to facilitate the adoption of this phenomena.
- The growth stage occurred in the period between 1990-2008. Containerization had a strong print on global trade which began to seriously impact global trade patterns and manufacturing strategies, especially with the entry of China in international trade. There was the emancipation of novel manufacturing clusters which could cut across borders and seas, namely the transatlantic and transpacific. In the same time frame, a new section of Post Panamax containerships which became prevalent in maritime shipping. Moreover, containerization opened new avenues in inland with rail and barge services.
- In Maturity stage thus 2008, there was maturation in 2008 though there was a recession in the economy, recovery happened.

Using this data, it is evident that containerization has facilitated international trade. Most countries have been aided by this development to move products from one country to the other.

When there are containers involved there is demand and supply of these containers. The container transport chain adopted from Song and Dong (2015) is shown in figure 1 below. Shippers are considered customers who require empty containers to transport their cargoes. These shippers have companies which then are responsible for the provision of empty containers to their customers. Usually, these containers can be kept on an inland depot or seaport. Consignment is consolidated into the containers at the customer's Ex- works, which is the port/premise/depot. The laden containers are then moved to the ports/depots awaiting the vessels which upon arrival and after all the necessary procedures, are loaded onboard the vessel which will have been pre-booked.

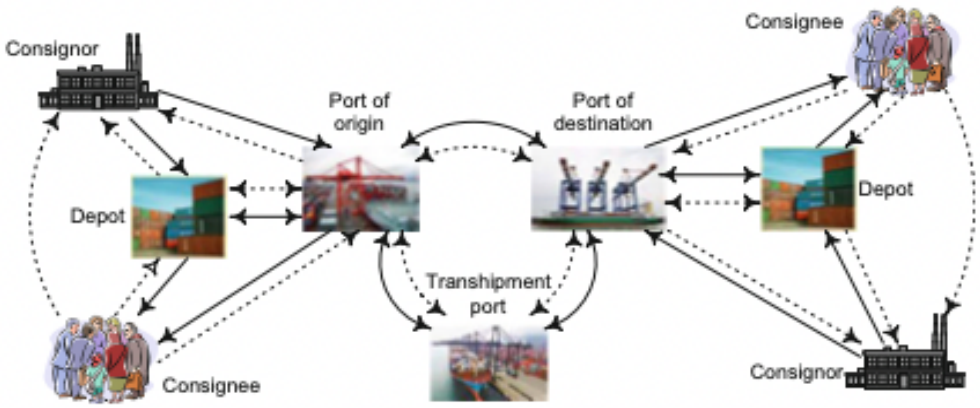

Figure 1. The container transport chain. (Note: solid lines indicate laden container flows and dashed lines indicate empty container flows). Adopted from Song and Dong (2015)

The vessel will then transport these containers to be port of the destination. Then after all the necessary procedures of clearances and tax payments if applicable and all port procedures have been done, the containers are then discharged from the vessel and are then transported to the cargo receivers or a particular depot for off-loading/ unpacking. Following this process, the empty container can either be moved/ stored in an inland port/ depot for examination and

recycling/ reuse in the future. These can also be repositioned to other ports in the shipping networks to meet the demand of the customers.

In essence, it involves two supply chains, that is the forward supply which is laden containers drawn by customer demand to transport the goods to their customers and the reverse supply chain; the empty container flow, which is strategically positioned by the shippers in order to find a market in the process of returning the containers to the container companies acquired before. This is the thrust of this research as shipping containers now are mainly going forward supply chain and the backward is not positioned for customers demand but is required to be sent empty back to the manufacturers in various destinations (China, India, Singapore etc.). When these containers are transported empty, they use the same transportation resources which include trains, vessels, trucks and facilities. It is costly to manage container fleet annually as is averages around USD$110 billion (Rodrigue, et al. 2013). These costs are inclusive of purchase, maintenance and repairs. Following the Covid-19 era, this has even increased. The manufacturing had been halted from China due to the pandemic. All across the globe, manufacturing slowed down. Now most countries are back to manufacturing though not all are going at the same rate. There is incapacitation in some factories and the production levels are not at the same level. This has led to an inverse balance in the quantity of container fleet flow in international trade. This has led to the research to delve into the container shortage globally which is now a crisis.

1.1 Problem statement

There is a global container shortage due to the imbalances of the production and consumption. This has been caused by numerous reasons as employed by COVID-19 pandemic. Some reasons look at the incapacitation of the workforce in international trade, lack of adequate numbers in the containers as there are monopoly markets, sustainability issues amongst the many reasons. This research seeks to ascertain the nature and impact of the container crisis shortage during the Covid-19 and the strategies to mitigate this effect Post Covid-19.

1.2 Objectives

1. To identify the nature of global container shortage crisis after Covid-19 outbreak.
2. To analyze the impact of post Covid-19 container shortage crisis on global supply chain
3. To provide strategies to mitigate the effect of the container crisis after Covid-19 outbreak.

2. Literature Review

The literature review section is divided into the main section name: The nature of the container crisis after Covid-19, the impact of container shortage crisis on global supply chain and Strategies to Mitigate the Effect of the Container Crisis.

2.1 The nature of the container crisis after Covid-19

The container shipping industry is depending heavily on high capital investments. The service is characterized with fixed schedule which justifies the high costs of operations. Container ships are increasing in their size and capacity, and more demand is created for equipping those vessels with shipping containers. Container shipping lines can own or lease the containers to satisfy their customers' needs. Sometimes imbalances in demand creates equipment shortages due to unavailability of shipping containers in short term. This requires careful estimation and management of empty containers' movements (Notteboom et al 2021).

Relocating empty containers has always been a major cost element for shipping lines. It represents from 5 to 8% from the cost of operations. If we added the cost of storing and maintaining the empty containers, the final percentage of managing the empty containers from total operating cost will reach 12%. (transmetrics 2019). According to Song and Dong (2015), Empty Container Repositioning also has a major impact on the environment. The movement for these

containers have to be optimized to sustain the environment by reducing fuel consumption and omissions as well as reducing bottlenecks in ports and depots.

The main reason behind the need for empty container management is trade imbalances. Far East countries export more than what western countries export to them. The trade balance is in their favor, which implies that shipping lines has to ship the empty containers back to Asian countries to be used for exports. (transmetrics 2019)

Song and Dong identified 3 other reasons for the need of efficient empty container repositioning (ECR) in addition to trade imbalances which are; Dynamic Operations, Uncertainty, container size and type, lack of visibility and collaboration within the transport chain, and Shipping lines' operational and strategic practices .

Dynamic Operation is simply how the transport system functions affects the availability of empty containers. The voyage duration (Transit Time) can be in weeks or months according to the distance of the voyage, nature, whether it is direct or has to reach destination via a transshipment port. The result is having more supply of empty containers in destination ports of import, which in most cases will be more than the demand needed for export containers. Moreover, the need for containers is also triggered by seasonal trade demand of certain products like agriculture products and fruits which are difficult to estimate in the long-run. The comeback voyage for the empty containers to demand points takes time as shipping lines can either ship them as soon as possible areas of urgent demand or accumulate them to be shipped when there is available space in upcoming ships. This usually takes time.

Uncertainty is identified as any unusual or unexpected event the resulted in empty containers piled up in ports without being transported to demand locations or empty containers not delivered to shippers in origin points. Examples can be port strike, bad weather, political unrests, wars...etc. In addition to that, in the normal cases, shippers don't tell exactly the dates of containers' pick-up. The demand is not easily predicted.

Container Size and Type also justifies the need for empty container repositioning. Shippers usually need container types and seizes that match with their cargo requirements. A shipper that needs 40-feet refrigerated container can't use other types if it is not available.

The transport chain is being processed by different participators. The container can be loaded on a vessel, train, barge or a truck. Lack of visibility and collaboration between the transport chain participators is increasing the demand for ECR. This is currently solved by using control towers and RFID technologies.

The movement of empty containers is lastly a decision taken by the shipping lines. Shipping lines' operational and strategic practices is the last cause for the need for ECR. The priority comes first for shipping loaded containers which results in problems in empty containers' supply especially with vessels' capacities constraints. Some container lines are part of alliances that allow them to have vessels' space sharing agreements. This helps in relocating the empty containers and gives advantage over competitors who are not part of similar alliances (Song and Dong 2015)

The relocation process is not only costly but also time consuming. It can be done within weeks or months. Shipping lines usually try to carefully forecast their demand in advance to avoid piling up stock of unneeded empty container in some locations and to keep their safety stock in the right locations before seasonal demand. (transmetrics 2019)

Covid-19 pandemic had a significant impact on the global container trade. The initial effect after the global lockdowns, production stoppages, demand shifts on the container lines was the increasing rate of blank sailings. About 40% of container ports have faced weekly blank sailings. Usually container vessels' blank sailing indicates to changes in consumers' demand and have serious effects on the shipping industry. Ultra large container carriers (ULCC) had to cancel port calls due to overcapacity. In some countries, container terminals faced operational issues due to the congestion and uneven work schedules. (UNCTAD 2021)

Managing capacity is very crucial to the sustainability of container lines. They have to make sure that exporters will find available equipment to accommodate their products. The main trade flow from China to USA and Europe affected the availability of containers globally. At the peak of Covid-19 spread in 2020, China shut down factories indirectly by stopping traffic to control the pandemic. After the containers which were loaded by Chinese manufactured products were unloaded in USA ports, they waited at the ports causing congestions and imbalances in global containers' capacity. (Forbes 2020)

After the first wave of corona virus pandemic passed, the demand for goods increased rapidly which added to the existing issue of empty containers' piling up globally. The shipping lines had to carry the empty containers to demand spots, especially China, which ultimately resulted in a huge increase in container freight rates, which is still escalating till the moment of writing this paper (Colijn and Konings 2021).

2.2 The impact of container shortage crisis on global supply chain

The increase of demand to the container around the world affects the supply of it which cause the increase of the price and this the economy cycle (Knowler, 2021). Asia Region faces a shortage of containers that mostly went to the US and Europe and never come back. As you can see in the below figure the delays of exporting goods from Asia due to the shortage of containers there. All of that happens due to the sharp rise in US imports (Knowler, 2021).

TEXPROCIL, (2021) mentions on the report that container shortage is hitting the schedule of the shipments which affect the fulfillment of terms and conditions of overseas buyers.

Rajesh Menon, director general at SIAM mentions the automakers are preparing for a shortage of spare parts due to the shortage of containers and the increase of shipping prices globally and that cannot be manageable for the regular trading are impossible (Shah 2020). China Faces a shortage of containers since July 2020 due to high demand for Chinese products comparing with the imported materials to China that cause a delay in exporting and increase in exporting prices (Bhaduri 2021). As you can see in the below figure created by the global maritime hub, the increase of the price of shipping containers raises up from June onwards.

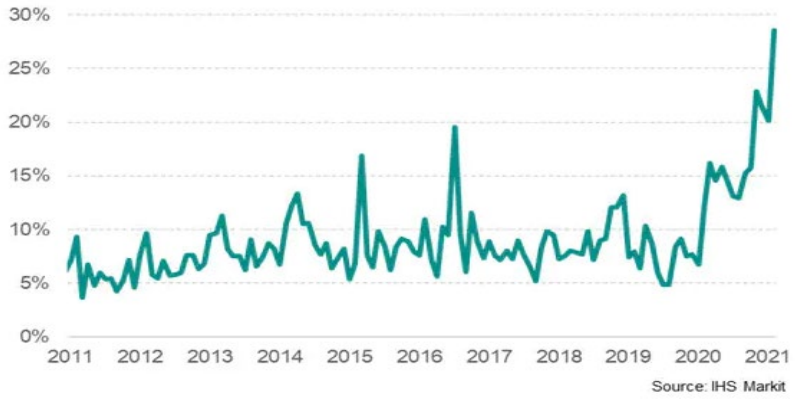

Figure 2. Global Manufacturers reporting of port or shipping delays (as % of all companies reporting loner supplier delivery times)

Drewry's world container index as of 1st of July 2021 (Drewry 2021) in the below figure shows the great escalation of freight rates after Coivd-19 pandemic outbreak. The world container index is an independent source of container freight rates calculated by a group of traders, freight forwarding companies and NVOCCs (freightwaves 2020)

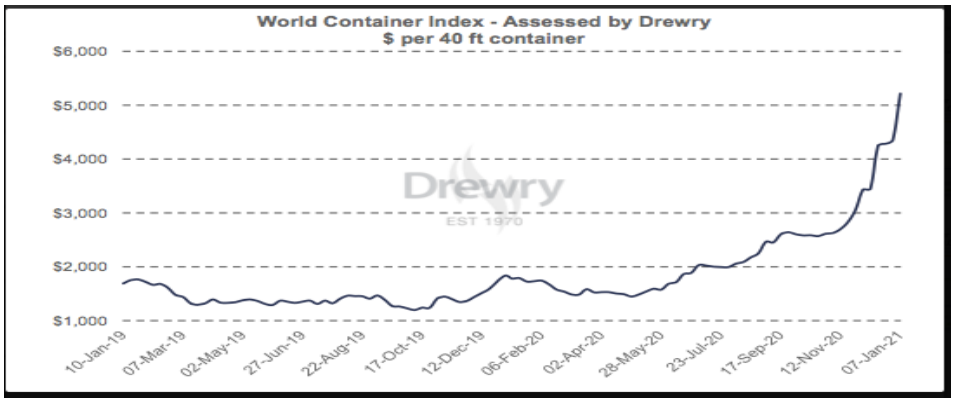

Figure 3. World Container Index – Assessed by Drewry $ per 40 ft container

One of the consequences of having high cost of container transportation is that traders are cancelling their purchases. The high pressure of competition and container freight rates makes it less profitable for them. (Shin 2021)
Jílková1 and Králová1 (2021) found that one of the results that came with the Covid-19 pandemic is the noticeable increase in global e-commerce sales accompanied with changes in the demand patterns. The frequency of sales has also increased. Consumers' priorities changes to buy physical and basic products while they are staying at home, with less focus on buying unnecessary products. For example, consumers focused on buying food products instead of buying theatre tickets and other entertainment purchases. Consumers shifted their expenditure on items that they can use at their homes during the pandemic. The increase of demand was confronted by the shortage of containers which made it worse for retailers.

The effect of the container crisis led to shortage of different products worldwide and the near future may not be very different especially with the fact the freight rates are not going to decrease with the current situation unchanged (Almeida et al. 2021)

2.3 Strategies to Mitigate the Effect of the Container Crisis

"The subsequent shortage of empty containers in unprecedented" (United Nations Conference and Trade Development, 2019). The coming in of Covid 19 brought economic shocks that tested the resilience and adaptability of the global shipping industry (Notteboom, et al., (2021; Brooks, et al., 2020). The world has been experiencing an increased container movement of approximately 4.6%. This was due to the ballooning global population and industrialization (United Nations Conference and Trade Development, 2019). Given the drastic closure of all economic activities during the announcement of the first lockdown the shipping industry was shocked and woke in the morning to have container shortage (Baschuk, 2020). This ripple effect would mean a decline in revenue and sustainability of the industry. The Covid 19 pandemic reminded the logistics and supply chain researchers, academics, and captains of the industry to recall the effects of the financial crisis in 2009. Each crisis call for innovative ideas that can keep containers afloat (Brooks, et al., 2020).

United Nations Conference on Trade Development, (2021) has associated the unprecedented container shortage to the too drastic changes in consumption and shopping patterns, increase in e-commerce, and the lockdown measures. This has resulted in increased demand for manufactured goods which are mainly shipped in containers specifically from China and India (Shah, 2021). Most of the global players were having their economic growth and projections. India projected exports of seven percent in service export by 2025 (Notteboom, et al., 2021). The pandemic struck of these ambitions exports in April 2020 and January 2021 fell by 13.58% in India. Given this scenario and knowing that India is a global player in logistics and supply chain the container crisis emerged. Containers are the lifeline to exports and trade and it remains pertinent to note that containers move goods from one port to the other (Brooks, et al., 2020; Fusillo & Haralambides, 2020; Maliszewska, et al., 2021).

Due to the Covid, 19 pandemic freight rates have doubled and exporters are willing to pay higher for available containers. A practical example of the Mumbai-Dubai- Mumbai container vessel used to take a month to avail container but of late it is now taking three months or more. Signaling the emerging container crisis and its effect on the global shipping industry the Federation of India Exporters Organization (FIEO) has called individual governments to direct shipping lines to get back empties to reduce the crisis (Haralambides, 2020)

The crisis will affect economies the freight charges continue to surge the freight rate from Chennai to Hamburg has for a 20-footer risen to $ 1800 from $ 500; to Felixstowe to $ 1800 from $ 400; to New York to $ 4800 from $ 2200.China and India as the global players need to come in to manufacture containers. It is important to note that China remains the key player in the container industry accounting for 85% of the world's container production (Shah, 2021; Bhaskar et al., 2020).

As a long-term strategy, India also needs to manufacture containers. Typically, this is a segment dominated by the Chinese-more than 85 percent of the world's total container production happens there (Brooks, et al., 2020). United Nations Conference on Trade Development, (2021), has tried to examine and understand the complexity of the unprecedented container shortages with the view of countering such shortages in the future. The changing trade patterns and imbalance, capacity management by carriers, and ongoing delays at ports are also assumed to be the major cause of the container crisis.

Shin, (2021), alludes that the container crisis has caused China to pay premium rates for importers to return containers. This is a business strategy since it is now profitable to return empty containers boxes rather than refilling. This scenario demonstrates the shipping industry fragility. CMC, DFIC, and CXIC the containers global producers of at least 80% have increased to meet the increase in demand (Shah, 2021; Miller, 2021). The production figures are not promising to suit the crisis as the boxes are no longer being built faster. For Miller (2021), citing John O Callaghan, the Global Head of Marketing and Operations at Triton "Despite the factories ramping up container production activity at the end of last year (2020) and beginning of this year (2021) inventions of new containers remains very low".

Conversing for the above literature discussions, the shipping industry remains fragile and vulnerable to shock from the macro environment. Each global crisis is a wakeup call for the shipping practitioners. The volatility of the industry needs to be operationalized to suite the market mechanism at every moment (Haralambides & Thanopoulou, 2014). Capacity and production management are fundamental in stream lining container demand and supply (Haralambides, 2020). The key to sustainability of the industry is appreciate and understand the macro environment in order to create safety nets that are essential in the event of a industry shock.

Hipping companies need to engage in future proofing in order to curb the ongoing supply chain disruptions. Broadening the supply chain bases remain the best option of the shipping industry sustainability. The current container

crisis shows that the Just-In-Time (JIT) approach of manufacturing and inventory system are becoming less effective given the uncertainty in the industry.
The shipping companies needs to build supply have supply chain agility through investment in people, processes and technology that is sustainable. The availability od processes and technology would facilitate effective communication amongst the shippers, drayage providers and terminal operator who are essential in container movement. Most of the global ports are operating with limited manpower due to lock down measures. Given this unprecedented scenario governments needs to ensure rapid and effective vaccination of people so that logistics labor capacity can be restored to the pre-pandemic levels. Integration of technology and manpower are critical in enhancing container movements. (Kohn, et al., 2021)

3. Methods

This study adopted the Liberati, et al., (2009 and Wong, et al., (2013) framework which uses the literature based methodology as another dimension in the creation on knowledge. For Wong et.al, the literature based methodology should constitute three main parameters namely design the literature review, conducting the review and lastly contextual analysis and writing up. This study adopted the same methodology. This study literature review is three main research objectives namely

- To identify the nature and characteristics of global container shortage after Covid 19 outbreak.
- To analyze the post Covid 19 impact of container shortage crisis on global supply chain
- To provide strategies to mitigate the effect of container crisis after Covid 19 outbreak.

Themes (results) were then identified from the different literature discussion to come up with conclusion of the study. This study used from research articles, specialized online publication as the sample for the study. Data was obtained and collated in the form authors, areas study, findings and scope.

4. Data Collection

The literature based discussion cover a period between 2020 to 2021 focusing on the container how the different scholars views understood the crisis which is affecting the shipping industry. The most common theme appearing in the different literature was collated to come up with the theme. The themes were discussed and aligned to represent the literature based finding of the study.
In the next section these areas will be discussed in detail showing the findings as per content analysis employed.

5. Results and Discussion

5.1 Nature of global container shortage after Covid 19 outbreak

The shipping business is a capital intensive industry. The nature of container lines depends on expensive assets like ships and containers which can be either owned or hired by time charter contracts (Notteboom et al 2021). The capital constraints makes it inevitable for shipping lines to manage the process of empty containers' relocations efficiently. According to Transmetrics (2019), the cost of empty containers' repositioning can reach 12% of the shipping lines' operations cost. This study recommends that repositioning should be optimized and done as efficient as possible.
Song and Dong (2015) stated that the process itself existed since the invention of shipping containers. This study points out that, the main reasons for the need for empty container repositioning are trade imbalances, Dynamic Operations, Uncertainty, container size and type, lack of visibility and collaboration within the transport chain, and Shipping lines' operational and strategic practices. The containers' relocation process is a time consuming process that depends on forecasting the demand of shippers in advance to provide sufficient stock of empty containers ready to be loaded (Transmetrics 2019).

5.2 Impact of container shortage crisis on global supply chain

Literature discussion from UNCTAD (2021), indicates that after the covid 19 countries took measures to protect their citizens. Lockdowns and movement restriction affected production operations. Shipping lines suffered from low demand levels which meant that ships were sailing without loaded containers and port calls were cancelled. This caused a global supply chain disruption in. Ports suffered congestions and operational difficulties. The capacity imbalance became more challenging for container lines.
This study reflects that,After the first wave of Covid-19, shipping lines had to act and reposition the empty containers in locations of high demand, especially China. The direct result for this was the very high increase in the container freight rates (Colijn and Konings 2021, Knowler 2021). Traders faced difficulties in fulfilling their terms of contract due to unavailability of containers (Knowler 2021, TEXPROCIL 2021). Some of them are cancelling their transactions

due to unprofitability (Forbes 2021). Some industries suffers more than other like automobile, which are preparing for shortages in spare parts (Auto 2021). At the same time, Jílková1 and Králová1 (2021) argues that the swift shift to online commerce with new consumer behavior in terms of products' priorities and frequency of purchases during Scholars concur that Coivd-19 had made things worse as they resulted in unanticipated demand spikes added more pressure on supply chains while traders and manufacturers couldn't ship all the quantities needed from products and components due to the unavailability of shipping containers. The ripple effect of the containers crisis has a possible negative impact on profitability and sustainability of industries
(Brooks, et al. 2020).

5.3 Strategies to mitigate the effect of the container crisis

This study established that the unprecedented container shortage was due too drastic changes in consumption and shopping patterns, increase in e-commerce, and the lockdown measures. For (Baschuk, 2020) the drastic closure of all economic activities during the announcement of the first lockdown the shipping industry was shocked and woke in the morning to have container shortage. In Shin, (2021), shin literature discussion that the container crisis has caused China to pay premium rates for importers to return containers in order to cater for the crisis. Based on the above literature discussion it is clear that the shipping industry lack the ability to quickly adapt to the changing environment. Therefore, there is need to have a global shipping framework to cater for such pandemic like bottlenecks in the near future. The literature is also bringing to the afore the fact the shipping industry still have monopolies who are not to some extent are creating a critical shortage of containers for profitability margin which are beyond the reach of the small players in developing countries. The different scholars concurred that the volatility of the industry needs to be operationalized to suite the market mechanism at every moment (Haralambides & Thanopoulou, 2014; Baschuk, 2020; Miller (2021)). Capacity and production management are fundamental in stream lining container demand and supply (Haralambides, 2020).

6. Conclusion

The shipping industry is vulnerable from a lot of macro-economic threats. Taking insight from the global financial crisis of 2009 and the Covid 19 container crisis it is clear that they no consensus amongst the global in addressing container shortages. It remains vital for the governments and other trade facilitating institution and the academic framework to foster a sustainable shipping framework to curb the recurring shock. The global shipping framework need to integrate pragmatic researchers, specialist and government representative to look into liner shipping connectives and to monitor the changing terrain of e-commerce which is resulting in the demand for more containers. Much predictive statistical approaches are also needed to have a clear for focus on dealing with crisis in the near future.

References

Almeida, I., Koh, A., and Hirtzer, M., 'It's a perfect storm': A shipping container crisis has upended the global food trade, Available: https://financialpost.com/commodities/agriculture/the-global-food-trade-has-been-upended-by-a-container-crisis, July 3, 2021

Available: https://transportgeography.org/contents/chapter5/intermodal-transportation-containerization/world-container-throughput/, July 2, 2021

Baschuk, B., World Trade Hit by Virus Sees Worst Collapse in a Generation, Available: https://www.bloomberg.com/news/articles/2020-03-26/world-trade-rocked-by-virus-sees-worst-collapse-in-a-generation, July 3, 2021

Bhaduri, A., Demand for Chinese goods is so strong there's a container shortage, output, Available: https://www.hindustantimes.com/business-news/demand-for-chinese-goods-is-so-strong-there-s-a-container-shortage/story-InOd4NFd1Khojbta49KNVL.html, July 2, 2021

Bhaskar, P., Cahoon, S. and Chen, S., Shipping companies' resilience: the influence of modularity. s.l., In: *Proceedings of the 4th Belt and Road Initiative Conference 2019*, 2020

Brooks, k., Cullinane, A. & Pallis, A., 2020. Revisiting Port Governance and Port Reform, *A Research in Transportation Business & Management*, vol.22, no.100, pp. 1-10, 2017

CEIC, China Container Port Throughput, Available: https://www.ceicdata.com/en/indicator/china/container-port-throughput, July 1, 2021

Colijn, B., and Konings, J., Container and shipping shortage piles pressure on prices, Available: https://think.ing.com/articles/container-and-shipping-shortage-piles-pressure-on-prices, June 30, 2021.

Drewry, World Container Index - 01 Jul, Available: https://www.drewry.co.uk/supply-chain-advisors/supply-chain-expertise/world-container-index-assessed-by-drewry, July 2, 2021

Freightwaves, What is the global container index?, Available: https://www.freightwaves.com/news/what-is-the-global-container-index, July 5, 2021

Frey, O., DeVogelaere, A., The containerized shipping industry and the phenomenon of containers lost at sea, Marine Sanctuaries Conservation Series ONMS, vol. 14, no.7, pp 51.

Fusillo, M. and Haralambides, H., 2020. Do carrier expectations indicate industry structure in container?, *Journal of Shipping and Trade*, vol. 5, no.2, 2020.

Haralambides, H. and Thanopoulou, H., The Economic Crisis of 2008 and World Shipping, *SPOUDAI Journal of Economics and Business*, vol. 64, no.2, pp. 5-13, 2014

Haralambides, H. and Thanopoulou, H., The Economic Crisis of 2008 and World Shipping, *SPOUDAI Journal of Economics and Business*, vol. 64, no.2, pp. 5-13, 2014

Haralambides, H.,. Gigantism in container shipping, ports and global logistics: A time-lapse into the, *Maritime Economics and Logistics*, vol. 21, no.1, pp. 1-60., 2021.

Jílková1,P., and Králová1,P., Digital Consumer Behaviour and eCommerce Trends during the COVID-19 Crisis, *International Advances in Economic Research*, vol. 27, pp. 83–85, 2021

Knowler, G., Demand surge intensifies container shortages in Asia, Available: https://www.joc.com/maritime-news/demand-surge-intensifies-container-shortages-asia_20200915.html, June 30, 2021

Liberati, A., Altman, D., Tetzlaff, J. M. and Gøtzsche6, P., The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration, *BMJ Journals*, vol. 339, 2009

Maliszewska, M., Mattoo, V., and van Der Mensbrugghe, D., The Potential Impact of COVID-19 on GDP and Trade: *A Preliminary, Washington: World Bank*, 2021.

Miller, G., No relief: Global container shortage likely to last until 2022, Available: https://www.freightwaves.com/news/no-relief-global-container-shortage-likely-to-last-until-2022 , July 4, 2021

Nduka, D., Mosaku, T., Omosa, O, James, O., The Use Of Intermodal Unit (ISBU) Habitable Homes: Enablers and Challenges, *International Journal of Mechanical Engineering and Technology (IJMET)*, vol. 9, no. 13, 2018

Notteboom, T., Pallis, T. & Rodrigue, JP. Disruptions and resilience in global container shipping and ports: the COVID-19 pandemic versus the 2008–2009 financial crisis. *Maritime Economics Logistics*, vol. 23, pp. 179–210, 2021.

Rodrigue,J., World Container Throughput, 1980-2017 (millions of TEU), *The Geography of Transport Systems,*

Shah, A, Indian automakers fear container shortage to hit parts supply, output, Available: https://www.reuters.com/article/india-autos-shipping-idINKBN28Y10A, July 2, 2021

Shah, A, The container Crisis, Available: https://www.cnbctv18.com/views/the-container-shortage-crisis-8378571.htm, July 2, 2021

Shih, W., COVID-19 and global supply chains: Watch out for bullwhip effects, Available: https://www.forbes.com/sites/willyshih/2020/02/21/covid-19-and-global-supply-chains-watch-out-for-bullwhip-effects/#6928db537195, Accessed on June 30, 2021.

Shin, G., How the Shipping Container Crisis Demonstrates the Risk of Imbalance in Global Trade, Available: https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2021/05/25/how-the-shipping-container-crisis-demonstrates-the-risk-of-imbalance-in-global-trade/?sh=7867b27c1090, July 3, 2021

Shin, H., How the Shipping Container Crisis Demonstrates the Risk of Imbalance in Global Trade, Available: https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2021/05/25/how-the-shipping-container-crisis-demonstrates-the-risk-of-imbalance-in-global-trade/?sh=2587103e1090, June 3, 2021

Song, D. and Dong, J., *Empty Container Repositioning, Handbook of Ocean Container Transport Logistics*, International Series in Operations Research, vol. 220, Springer, 2015

The Hindu Business Line, Container shortage hitting shipment schedule, Available: https://www.thehindubusinessline.com/economy/logistics/container-shortage-hits-export-shipment-schedules-texprocil/article33443728.ece, July 2, 2021

Transmetrics, Solving Empty Container Repositioning Problem with AI, Available: https://www.transmetrics.ai/blog/empty-container-repositioning/, June 1, 2021

United Nations Conference and Trade Development, Maritime Economics and Logistics, New York: United Nations Conference and Trade development, 2019.

United Nations Conference on Trade and Development UNCTAD. COVID-19 and Maritime Transport: Impact and Responses. *Transport and Trade Facilitation*, 2021.

United Nations Conference on Trade Development, Shipping during COVID-19: Why container freight rates have surged, *Geneva: United Nations Conference on Trade Development*, 2021.

Wong, Greenhalgh, T., Westhorp, Westhorp, G, Buckingham, J., and Pawson R., RAMESES publication standards: Meta-narrative reviews. *BMC Medicine*, vol. 11, no.12, 2013.

World Bank, Container port traffic (TEU: 20 foot equivalent units), Available: https://data.worldbank.org/indicator/IS.SHP.GOOD.TU, July 3, 2021

World Bank, Port Sector Development: Possibility for Accelerating Growth, *India: World Bank*, 2006

Biographies

Mohamed Salah El Din is a senior lecturer in the department of management studies in Middles East College in the Sultanate of Oman. He has a master's degree in International Transport and Logistics from Arab Academy of Science, Technology and Maritime Transport. Mohamed has been working in the industry as an operations manager in shipping agency, a branch manager in freight forwarding company and other positions in logistics and shipping industry for 12 years. At the same time he worked as a part time lecturer in some colleges and institutes. Mohamed is also a member in the Chartered Institute of Logistics and Transport besides. His research interest is in management, logistics and shipping.

Dr. Reason Masengu received PhD from North West University in 2020, Mafikeng South Africa and Master of Marketing Strategy from Midlands State University in Zimbabwe in 2014. I am a senior lecturer at Middle East College, department of Management Studies, Sultanate of Oman. I am a researcher in Business Management and I am currently interested in doing research in Logistics and Digital Marketing.

Melisa Zibusiso Lydia Ncube is a Ph.D. candidate in University of Lusaka and Lecturer at Middle East College in the Sultanate of Oman. He earned a master's degree in Procurement, Logistics and Supply Chain Management in Zambia at UNILUS. Numerous researches have been conducted in the Supply chain field as a whole. Special interest on sustainability related issue, green procurement, and logistics field. Experience counts to 10 years to date.

Sultan Alkaabi is a Ph.D. candidate in Tenga Nasional University and operation manager at KLMS in the Sultanate of Oman. Also, he is a Logistics consultant for Skyfarer LLC Coventry UK. He earned a master's degree in business administration from Mazoon University college. Sultan completed research projects in Supply Chain, Logistics, Blockchain, Green procurement, Last-mile delivery, and Fleet management. He is in the field of logistics for more than Eighteen years.