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Strategic Crisis Response of Shipping Industry in the Post COVID-19 Era: A Case of the Top 10 Shipping Lines

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Abstract: Shipping has played a pivotal role during the epidemic, ensuring that the global logistics functions without disruption. COVID-19 hit various industries around the world, and shipping was no exception. How the shipping industry responds to the crisis and simultaneously shoulders its respective responsibility in the world's battling the crisis is thus worth exploring in depth. This study takes the top 10 global container shipping capacity liners, which account for 84.7% of the worldwide capacity, as research objects. A corpus for text analysis was constructed collecting press releases and advisories issued on official websites of these 10 container shipping companies from January 2020 to July 2021. Comparison studies were made horizontally among ten shipping companies and longitudinally for crisis evolution patterns into three sub-corpora of Pre/early-Crisis, Crisis-in-Progression, and Post-COVID-19-Era. Quantitative findings were explored and elaborated further under a comprehensive theoretical framework integrating crisis management and communication, corporate social responsibility (CSR), and maritime management (MM). The extracted positive and negative keywords revealed textual characteristics and emergency response strategies on the part of shipping lines in the Pre/early-Crisis, Crisis-in-Progression, and Post-COVID-19-Era. The inclusion of the themes of pursuing sustainability in the shipping lines' responses to such worldwide crisis as COVID-19 is out of the common knowledge of crisis management but reveals the commitment and strategies on the part of the industry. The findings provide a reasonably comprehensive picture of the efforts made by large container shipping companies to respond to COVID-19 and the measures taken to soothe stakeholders. This paper extends and relearns crisis management, CSR, and MM theories through integrating the fulfilling of cooperate social responsibilities in maritime management as the cooperate crisis responses, thus proposing the integrity of the three topics. Moreover, management recommendations are provided for shipping company management, IMO, and port authorities.

Keywords: crisis response; corporate social responsibility; container shipping; text analysis; COVID-19

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1. Introduction

The shipping industry is an essential link in the global transportation of goods and is at the heart of the logistics supply chain, transporting more than 80% of the world's goods [1]. However, the sudden outbreak of COVID-19 has brought uncertainty into the shipping industry and has had severe repercussions such as reduced pilotage safety [2], cruise ship suspensions [3], ports closure [4] and crew change crisis [5]. UNCTAD estimated that the shipping trade contracted by 3.8% in the first half of 2020. However, maritime trade grew by 4.3% [6]. The shipping industry also showed some resilience in responding to the crisis caused by the epidemic, with no significant disruptions to the logistics supply chain.

Ships transport goods to every part of the world, especially to secure the transportation of essential goods such as sanitary equipment, electronic components, food, and fruits during epidemics. Ships' routes have woven international shipping into a network and simultaneously connected every stakeholder [7]. Compared with other shipping markets, container shipping lines are more closely linked to supply chain customers and are an integral part of the global supply chain. Furthermore, large logistics service providers, international retailers, and globally distributed production networks embed in the liner service. Shipping carriers set quality, speed, reliability, flexibility, and cost as their performance goals to improve competition [8]. Container shipping companies also take on social media engagements [9]. Maritime transportation is primarily a B2B industry and is recognized as the backbone of international trade [10]. Container shipping is essential to maritime transportation because it transports semi-manufactured and manufactured goods closely related to people's daily lives. Therefore, the container shipping industry must disclose its sustainability conditions precisely and correctly [11]. Meanwhile, shipping companies regularly release news and advisories on their websites to highlight their strengths in the shipping market and thus attract the attention of stakeholders. Press releases are easily accessible to the public and are a vital tool for leaders to communicate company performance and company measures [12]. The importance of press releases as part of a company's disclosure strategy has been widely acknowledged [13–15]. Alphaliner's statistics show that the top 10 container shipping companies account for approximately 84.7% of the global container capacity (see Table 1) [16]. Due to this particular market structure, the CSR activities of the top carriers can easily influence the industry in general and can be emulated by smaller shipping companies [17].

Table 1. Top 10 shipping lines (market share and total operated TEU capacity) as per.

Rank	Operator	Market Share (%)	TEU
1	Maersk	16.90%	4249659
2	Mediterranean Shg Co	16.90%	4238730
3	CMA CGM Group	12.50%	3146843
4	COSCO Group	11.70%	2944673
5	Hapag-Lloyd	7.00%	1758188
6	ONE (Ocean Network Express)	6.30%	1572329
7	Evergreen Line	5.80%	1449424
8	HMM Co Ltd.	3.30%	823408
9	Yang Ming Marine Transport	2.60%	662047
10	Wan Hai Lines	1.70%	423429
	Total	84.70%	21268730

Source: Alphaliner (https://alphaliner.axsmarine.com/PublicTop100/ (accessed on 3 December 2021)).

This pandemic has highlighted the advantages of container shipping and the significance of cooperation between shipping companies. Some studies have been carried out on CSR in shipping logistics [18,19], the competitiveness of container ports [20], container sustainability [21], service characteristics of container liner shipping [22,23], as well as environment pollution [24]. During the epidemic, Xu, et al. [25] employed a dynamic panel data model to analyze the trade data of the European Union, North America, and Southeast Asia released by the National Bureau of Statistics and found that government control measures had a negative impact on export trade. In contrast, import trade increased accordingly. Verschuur, et al. [26] investigated the impact of the epidemic on global trade based on Automatic Identification System (AIS) data. Notteboom, et al. [27] compared the epidemic and the financial crisis to study the demand shocks to containers and ports. From a logistics triad perspective, Russell, et al. [28] investigated four dimensions of port logistics capacity: seaside interface, platform, landside interface, and system-wide [28].

However, few scholars have examined the shipping industry's crisis response strategies in light of CSR, and MM through text mining of industry discourses.

Shipping companies have disclosed their corporate strategies and emergency management measures during the epidemic, leaving three critical issues worthy of in-depth examination: (1) What measures have the companies taken to respond to this crisis? (2) Are the press releases and advisories issued by the companies in line with CSR? (3) What lessons and implications can we learn from the dynamic crisis responses of the industry?

To address these 3 research questions, a large-scale corpus was built comprised of press releases and advisories from January 2020 to July 2021 on the websites of the top 10 shipping companies worldwide. This paper integrates the theories of crisis management and communication, CSR, MM in the exploration of quantitative results from a computerized semi-automated analysis of textual features in corpus. Through text mining, the crisis strategies adopted by shipping companies in different stages including stakeholder communication and the company's sustainability commitment are explored. Therefore, this study contributes to the sustainable development of the shipping industry post-epidemic, both from academic research and practitioners' practice.

2. Theoretical Framework

2.1. Crisis Management and Communication

A crisis can be defined as "an unpredictable event that threatens important expectancies of stakeholders related to health, safety, environmental, and economic issues, which can seriously impact an organization's performance and generate negative comments" [29]. Many scholars have studied crisis management given crises' sudden, uncertain, and hazardous nature. The scope of crisis management includes crisis prevention, crisis preparation, crisis response, and crisis correction [30]. There are 2 research paradigms in crisis management: (1) a static perspective that examines the crisis as an event and focuses on the results caused by the crisis, and (2) a dynamic perspective that conceptualizes the crisis as a process. In this situation, a "crisis was perceived as a long incubation process that suddenly manifests itself under the influence of a 'precipitating' event" [31]. According to Zhang and Sun [32], the crisis caused by the epidemic in the shipping industry can be viewed as a process. This study adopts the crisis-as-process perspective to examine the crisis response of shipping firms pre-, during and post-epidemic crisis. In this view, crisis management is considered as "managing attention to 'weak signals' of crises-in process, in-event organizing, and post-event actions to protect a system and (when necessary) bring it back into alignment" [33].

Based on a process perspective, two essential attributes affect the effectiveness of crisis management. Firstly, in light of different stages of a crisis, the impact on the organizational system is analyzed, and thereby adversity responses of the organization are carried out. This can help the business have a clear understanding of the complexity of crisis management [34]. Secondly, crises can influence stakeholders at different levels, so the organization must continuously adapt its business model and mode to allow the organization to gain resilience and strengthen its crisis response capabilities [33].

Corporate communication can be effective in helping companies with crisis management [35]. Communication plays an essential role in instilling confidence and gaining trust from stakeholders by developing strategic initiatives to enhance the company's reputation. Therefore, companies can communicate corporately through the media and other communication modes (for example, press releases), which are strategic ways to enhance corporate image building.

2.2. Corporate Social Responsibility (CSR)

Pawlik, Gaffron and Drewes [18] firstly presented a definition of CSR for the container shipping industry: "the integration of social and environmental concerns in the business operations of shipping firms and the interaction with stakeholders voluntarily"

[18]. The main issues related to CSR in the shipping sector are the safety, welfare, and health of seafarers, human rights, ethical considerations, and stakeholder participation, focusing on marine environmental protection [36]. Most shipping companies have practiced CSR and integrated it into their business at a strategic and visionary level [37,38]. CSR in the shipping framework includes four key impact areas: CSR governance, social responsibility, environmental responsibility, and ocean responsibility [39]. The shipping industry primarily commits to the Sustainable Development Goals (SDGs) by promoting sustainable economic, environmental, and social development [40]. However, in recent years, shipping companies have focused on environmental protection, such as the sulfur content cap implemented by the International Maritime Organization in 2020, limiting the sulfur content of fuel oil to 0.5% (by mass) [41]. In addition, during this crisis, crew members are on the front lines of the logistics supply chain, and their health is a significant concern [5]. In other words, the issues mentioned above are the focus of CSR, and they are also the contents that need to be analyzed in-depth in this study.

2.3. Maritime Management (MM)

MM involves utilizing and manipulating human, financial, technical, and natural resources related to the sea, maritime navigation, shipping, port development, and coastal protection. MM promotes economic growth, price stability, cargo and passenger transport, and the commercial activities of shipping organizations [42]. Strategic maritime management deals with the major intended and emergent initiatives taken by general managers on behalf of both ship owners and other stakeholders, involving the utilization of resources, to enhance the performance of maritime organizations in the global marine environment [43]. The shipping industry is a vast network system, which involves stakeholders such as IMO, shipping companies, ship owners, crew members, ship agents, consignees, etc. [44]. Maritime management ensures the orderly operation of the shipping industry and plays a vital role in the healthy development of the shipping industry [45]. During the epidemic, IMO, as the organization manager of the shipping industry, has called on member states and international organizations to take MM measures in the form of maritime proposals to reduce the epidemic's impact [32]. Shipping companies have been publishing on their official websites company news and, in particular, measures taken to preserve their image, protect their employees' interests, and attract investors' attention. In addition, sustainability in shipping is one of the most critical issues, and shipping companies have integrated social and environmental issues into their business operations and interactions with stakeholders [46].

Due to the international nature of the shipping industry, the impact of the crisis on shipping stakeholders is also global. The shipping lines communicate with the outside world through press releases, showing that they are actively fulfilling CSR. In other words, they are performing crisis management and MM to guarantee sustainability. Therefore, this study integrates a theoretical research framework, as shown in Figure 1, to lay the foundation for subsequent analysis of the data.

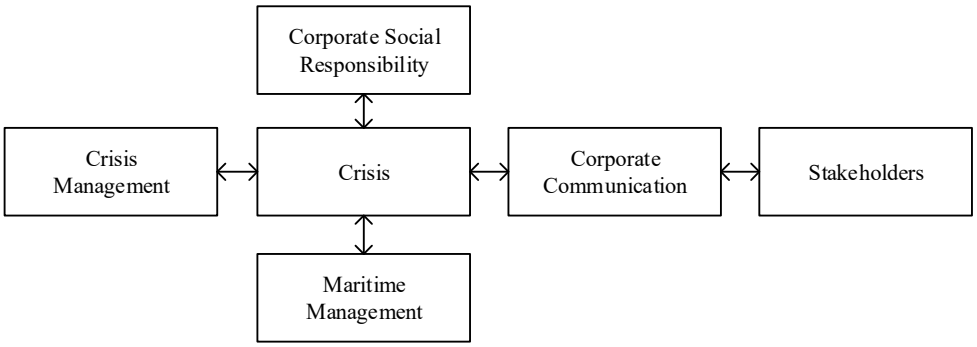

Figure 1. Integrated theoretical framework.

3. Methodology

The study collected the press releases and advisories list on these companies' websites from January 2020 to July 2021. It should be noted here that COVID-19 began to emerge in January 2020 and has continued to impact the shipping industry as time has progressed. In addition, in 2018, COSCO Shipping acquired OOCL, so COSCO Group news includes those of COSCO shipping line and OOCL. To compare the news of ten shipping companies horizontally, this research establishes ten sub-corpora, as shown in Table 2. In Section 4.1, the word cloud analysis can analyze the lexical features of corporate discourse at a macro level, drawing similarities and differences.

Simultaneously, based on the crisis process view, this study de-constructed the corpus into three sub-corpora in chronological order. Stage 1 ran from January 2020 to February 2020 at the beginning of the crisis, the dawn phase. In March 2021, the vaccine was developed and IMO called on member states to prioritize vaccination of seafarers. For this reason, March 2020 to February 2021 is considered as the crisis in progress, during which the crisis peaked. We thus established March 2020 to February 2021 as Stage 2. After March 2021, when the world entered the post-epidemic era and the shipping industry entered the late stage of the crisis, we set up March 2021 to July 2021 as Stage 3. The specific information of the three corpora is shown in Table 3.

Table 2. The specific descriptions of the ten corpora.

Operator	Files	Tokens	Types	Lemmas
Maersk	213	139,980	10,071	8867
Mediterranean Shg Co	91	34,108	4576	4091
CMA CGM Group	107	61,096	6315	5487
COSCO Group	131	39,615	4683	4055
Hapag-Lloyd	42	25,569	2804	2255
ONE (Ocean Network Express)	182	48,533	4697	4172
Evergreen Line	23	10,440	2138	1890
HMM Co Ltd.	18	6338	1689	1560
Yang Ming Marine Transport	92	25,375	3274	2830
Wan Hai Lines	27	4652	927	858
Total	926	395,596	19,716	17,143

Source: Top 10 container shipping companies.

Table 3. The specific descriptions of the three corpora.

Phase	Files	Tokens	Types	Lemmas
Stage 1	82	32,689	5062	4510
Stage 2	498	199,896	13,630	11,610
Stage 3	346	162,576	11,767	10,304
Total	926	395,161	19,716	17,143

In recent years, text analysis has proven to be a practical paradigm for qualitative and quantitative scientific research. One or more methods can be applied to draw statistical inferences from the textual aggregate [47,48]. Several scholars have used text analysis methods for interdisciplinary research, such as management [49], shipping CSR [32], sociology [50], and engineering [40], suggesting that text analysis has a wide range of application scenarios. This study employs word clouds for qualitative analysis and corpus linguistics for quantitative research, which complement each other. Word cloud has become a straightforward and visually attractive text visualization method. The word cloud generated for the text body can be used as a starting point for in-depth analysis [51]. For example, they help determine whether a given text is relevant to a specific information need. Word cloud, as one of the methods of text analysis, has been applied in patent analysis [52], opinion mining [53], risk assessment [54], maritime accident analysis [55]. However,

word cloud only provides isolated word statistics without considering words' linguistic aspects and relations. Corpus linguistics exactly compensates for the drawbacks of word clouds by allowing a greater focus on specific words and the relationships between words. Corpus linguistics is perhaps best described for the moment in simple terms as the study of language based on examples of "real life" language use [56]. The corpus referred to "a collection of texts (a 'body' of language) stored in an electronic database" [57].

The research objects of this paper are news and announcements, which are naturally occurring language uses and fit right into the corpus. Keywords and concordance analyses are two core and practical research methods in corpus linguistics. A keyword is a word that "appear(ed) in corpus statistically significantly and more frequently than expected by chance compared to a larger or equal-sized corpus" [57]. In other words, keyword analysis identifies words that are statistically more frequent in a particular corpus or text when compared against another corpus [58]. After extracting keywords, a more in-depth study is carried out through concordance analysis, which identifies critical textual themes. Concordance analysis of keywords in context reflects that the immediate context of keywords could be explored through the set of consistency lines of keywords, and the pattern of each focus word can be observed [59]. Keyword analysis and concordance analysis are conducted through LancsBox software, equipped with a powerful corpus processing function [60,61]. It is essential to emphasize that the three stages have different corpus sizes, and the authors have applied relative frequencies to the corpus for standardization with a 99.99% confidence ($p < 0.001$). The keywords are obtained by comparing two corpora based on maximum likelihood estimation, one of which is the reference corpus. The keywords in this paper are divided into positive keywords, which belong to the reference corpus, and negative keywords, which belong to the other. The keywords are obtained by comparing two corpora based on the Log-Likelihood significance test. In addition, stop words and company names are removed from further analysis to focus on lexical patterns and reduce bias in the sampled data.

4. Results

4.1. Word Cloud Analysis

A "word cloud" is a visual portrayal of word frequency in the composed text. The more often the word is contained within the article being analyzed, the larger it appears in the created image. Infrequent and grammatical terms are removed so that the resulting pictorial representation illustrates the most common words of significance. Figures 2 and 3 visualize the word cloud of the ten companies. "*customer*", "*customers*", "*service*", and "*services*" appear in the word cloud of each company, illustrating the customer-first and service-first philosophy of shipping liners. "*Global*" and "*world*" reflect the global trade attributes of the shipping industry. "*Port*", "*ports*", the names of ports (for example, "*Ningbo*", "*Yantian*", "*Qingdao*", "*Pusan*", "*Kaohsiung*", "*Taibei*", "*Shanghai*") and Suez Canal, on the one hand, underline the importance of shipping infrastructure development. On the other hand, they respond to the timely dissemination of port and canal information to provide quality services to cargo owners, freight forwarders, and other stakeholders. "*Technology*", "*digital*", "*solution*", "*solutions*" all occur in MAERSK and MSC, demonstrating their focus on using digital technology to solve current problems in the logistics supply chain. "*Emissions*", "*carbon*", "*gas*" and "*air*" are more frequently found in MSC and CCG, indicating that they pay more attention to environment protection. "*Time*", "*times*" emerge more frequently in MAERSK, MSC, COSCO, HL, ONE, EVERGREEN, and YMM, embodying that these companies attach great significance to the timeliness of container ships. Therefore, based on the overall and individual analysis, the focus and tendency of corporate communication can be derived.

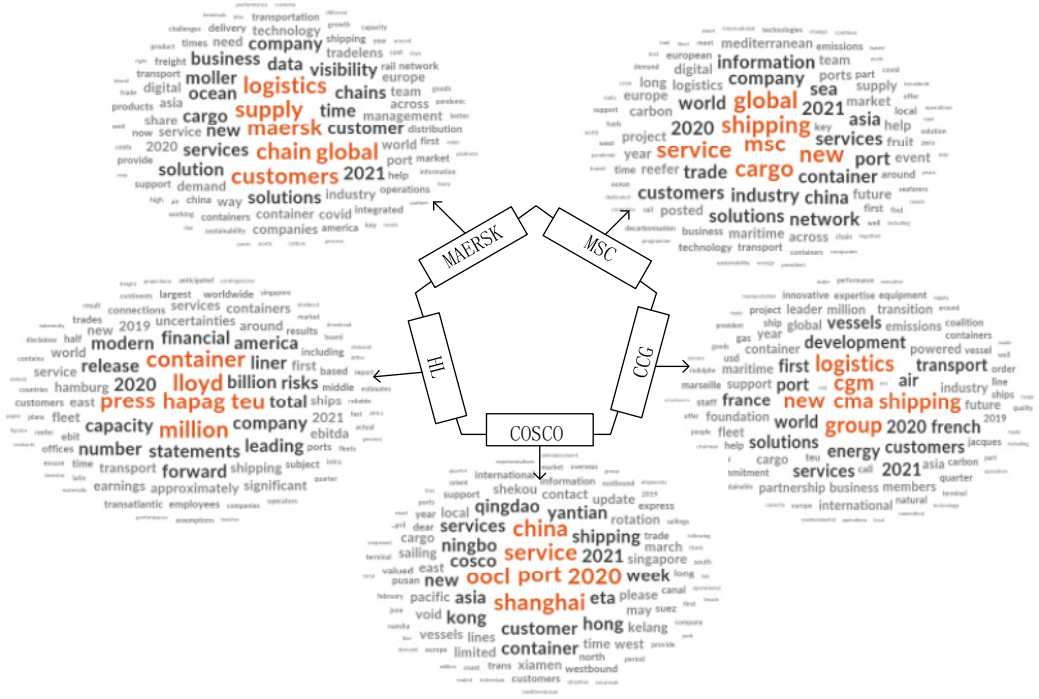

Figure 2. Word cloud of MAERSK, MSC, CCG, COSCO and HL.

Figure 3. Word cloud of ONE, EVERGREEN, HMM, YMM and WH.

4.2. Keyword Analysis

Firstly, taking Stage 1 as the reference corpus and comparing Stage 1 with Stage 2, positive and negative keywords can be derived, as shown in Tables 4 and 5. Table 4 reflects the overused words in corporate communication at the beginning of the Stage 1

crisis. "*Novel*" indicated that companies have realized the novel coronavirus, which might affect enterprise operation, for example, "*securities*", "*detention*", "*difficulties*" and "*crises*". "*Reopen*", "*fee*", "*passion*", "*blockchain*", "*training*" and "*alliance*" were the keywords that guaranteed the company's proper functioning. Although shipping companies were aware of the possible impact of the epidemic on their business, companies were still active in shipping cargoes such as "*breakbulk*", "*fruit*", "*vegetable*". This, in turn, indicates that containers play an essential role in the supply of daily necessities. "*Reopened*" was for "*port reopened*", which facilitated the loading and unloading of goods at the port. Table 5 list the overused words in Stage 2 relative to Stage 1. Novel coronavirus was identified as "*COVID-19*", and for the first time in Stage 2, "*pandemic*" appeared at a high frequency and with a relative frequency of 10.31. This shows that in Stage 2, the crisis began to intensify. "*Medical*" and "*vaccine*" revealed the measures taken in response to COVID-19. The crisis significantly impacted the shipping industry, mainly in "*home*", "*lockdown*", "*delays*", "*inventory*". While companies responded to the crisis, they actively focused on key populations, including "*seafarers*" and "*children*". The sustainability of the shipping industry was emphasized through "*sustainability*" and the company's focus on environment protection, such as "*fuels*".

Secondly, we took Stage 2 as the reference corpus and compared Stage 2 and Stage 3 in order to obtain positive and negative keywords, as shown in Tables 6 and 7. Table 6 lists the overused words for Stage 2 relative to Stage 3. Compared with Table 5, the words "*blank*", "*health*", "*crew*", "*outbreak*", "*masks*", "*weather*", "*recycling*", "*recovery*", "*eco-friendly*", and "*restructuring*" have been added in Table 6. "*Blank*" is for "*blank sailing*", indicating the impact of the outbreak on shipping lines. "*Fashion*" appears in Tables 5 and 6, which can be analyzed by viewing the specific context through KWIC (keyword in context) in Section 4.3. Besides, Table 6 also pays attention to environmental protection (for example, "*recycling*", "*eco-friendly*"). With the development of the COVID-19 vaccine and the gradual vaccination of crew members, Stage 3 entered the post-epidemic era. The keywords listed in Table 7 highlight the critical elements of Stage 3 corporate communications. The potential impact of COVID-19 on the shipping industry was becoming more and more significant, such as "*insufficient*", "*delays*", "*shortages*", "*patients*", "*congestions*". While responding to the crisis, companies were also actively concerned with environment protection (for example, "*decarbonization*", "*carbon-neutral*", "*fuels*"). "*Women*" and "*truck*" are also of interest, which will be analyzed in the Concordance analysis section.

Thirdly, two researchers read the relevant concordance of all the keywords listed in Tables 4–7 from the actual data sources (press releases and advisories). The themes appearing in the three corpora were validated by a data triangulation process, in which external sources, such as Maritime Reporter and Engineering News, Marine Technology Report, Marine News, Maritime Logistics Professional, as well as the extant literature[18,32,41,62], were acquired to justify the coding of these themes. Based on triangulation, on the one hand, the thematic coding can be justified, and on the other hand, it helps the researchers to interpret the data. The three corpora then reflected the evolution of the COVID-19 pandemic (see Table 8).

The crisis evolved from "*delays*" and "*detention*" in Stage 1 to "*blank sailing*" and "*lockdown*" in Stage 2, finally to material "*shortage*" and port '*congestion*' in Stage 3. In Stage 1, the CSR focused on the corporate regular business operations, involving "*fee*", "*breakbulk*", "*fruit*", and "*vegetables*". In Stage 2, CSR focused more on "*sustainability*", "*eco-friendly*". In the post-epidemic era, CSR of Stage 3 focused more on "*innovation*" and "*carbon-neutral*". MM has played an irreplaceable role in this crisis. "*Alliance*" appeared in Stage 1 and Stage 2 of MM. This indicates that shipping companies have proactively adopted strategic alliances during the epidemic to improve their competitive advantage. MM focused on the investment in technology, which appeared in Stage 1 and Stage 3 of "*blockchain*" and "*investment*" in Stage 2. Seafarers are the frontline workers who sail the ships to transport containers, and shipping companies paid more attention to "*crew*" and "*seafarers*" during Stage 2 when the epidemic was most severe. From Stage 2 to Stage 3, shipping companies

were actively concerned about carbon and sulfur emissions, despite the adverse effects of port closures, cargo delays, blank sailing, and port congestion.

Table 4. Positive keywords for Stage 1 to Stage 2.

Type	Stage 1		Stage 2		Statistic
	Frequency1	Dispersion1	Frequency2	Dispersion2	
Reopened	18.05	6.33	0.10	17.55	17.32
Fee	4.28	5.32	0.05	22.29	5.03
Securities	4.28	5.26	0.10	22.29	4.80
Breakbulk	3.98	5.87	0.45	15.35	3.43
Passion	2.75	5.26	0.10	15.96	3.41
Novel	3.67	3.58	0.40	10.64	3.34
Fruit	9.79	3.53	2.30	8.63	3.27
Mainland	3.06	5.79	0.25	15.15	3.25
Detention	2.75	5.52	0.20	19.69	3.13
Extension	3.06	5.35	0.30	11.89	3.12
Blockchain	3.37	8.80	0.55	9.05	2.82
Vegetables	3.06	4.75	0.65	10.44	2.46
Training	2.75	6.98	0.55	10.17	2.42
Difficulties	1.53	4.68	0.15	14.75	2.20
Alliance	19.58	3.34	8.50	3.92	2.17
Crises	1.22	9.00	0.05	22.29	2.12

Note: The positive keywords are arranged from large to small by the statistic.

Table 5. Negative keywords for Stage 1 to Stage 2.

Type	Stage 1		Stage 2		Statistic
	Frequency1	Dispersion1	Frequency2	Dispersion2	
Pandemic	0	0	10.31	2.77	0.09
Home	0.31	9.00	9.40	7.88	0.13
COVID-19	1.53	6.22	14.81	2.76	0.16
Crisis	0	0	3.90	4.79	0.20
Sustainability	0.61	6.63	6.25	5.07	0.22
Inventory	0	0	2.85	5.46	0.26
Medical	0	0	2.50	7.42	0.29
Fashion	0	0	2.50	10.80	0.29
Vaccine	0	0	2.30	13.70	0.30
Origin	0	0	2.15	4.50	0.32
Lockdown	0	0	1.90	7.70	0.34
Seafarers	0	0	1.85	9.24	0.35
Fuels	0	0	1.85	6.66	0.35
Children	0	0	1.80	9.14	0.36
Resilience	0	0	1.45	7.78	0.41
Delays	0	0	1.30	5.50	0.43

Note: The negative keywords are arranged from small to large by the statistic.

Table 6. Positive keywords for Stage 2 to Stage 3.

Type	Stage 2		Stage 3		Statistic
	Frequency1	Dispersion1	Frequency2	Dispersion2	
Alliance	8.50	3.92	0.55	8.54	6.12
Home	9.40	7.88	2.34	6.42	3.12
Blank	1.90	7.56	0	0	2.90
Health	3.95	4.96	1.17	5.34	2.28
Crisis	3.90	4.79	1.17	5.79	2.26
Crew	4.35	5.09	1.60	5.05	2.06
Outbreak	1.45	6.72	0.25	9.90	1.97
Masks	1.10	11.26	0.12	15.63	1.87
Lockdown	1.90	7.70	0.55	7.79	1.87
Weather	2.00	4.43	0.62	6.73	1.86
Recycling	1.15	15.20	0.18	10.88	1.82
Vaccine	2.30	13.70	0.92	13.63	1.72
Recovery	2.40	4.45	1.11	6.18	1.61
Eco-friendly	0.55	8.16	0	0	1.55
Restructuring	0.50	8.73	0	0	1.50
Fashion	2.50	10.80	1.41	8.31	1.45

Note: The positive keywords are arranged from large to small by the statistic.

Table 7. Negative keywords for Stage 2 to Stage 3.

Type	Stage 2		Stage 3		Statistic
	Frequency1	Dispersion1	Frequency2	Dispersion2	
Insufficient	0.05	22.29	2.46	10.98	0.30
Security	1.05	7.93	4.67	3.63	0.36
Decarbonization	0.75	8.42	3.44	4.55	0.39
Delays	1.30	5.50	4.80	3.17	0.40
Block	0.75	15.48	3.26	6.18	0.41
Women	0.10	15.98	1.35	9.13	0.47
Innovation	2.00	5.13	5.35	3.36	0.47
Blockchain	0.55	9.05	2.03	5.87	0.51
Truck	1.00	6.93	2.89	5.11	0.51
Vaccinations	0	0	0.86	14.36	0.54
Shortages	0.30	11.35	1.35	6.55	0.55
Patients	0	0	0.74	7.47	0.58
Carbon-neutral	0.55	6.98	1.60	7.00	0.60
Fuels	1.85	6.66	3.44	5.03	0.64
Congestions	0.15	17.84	0.84	7.23	0.66
Last-mile	0.10	16.58	0.55	10.27	0.71

Note: The negative keywords are arranged from small to large by the statistic.

Table 8. Major themes.

Corpora	Themes	Keywords Used
Stage 1	Crisis	Novel, Detention, Extension, Difficulties, Crises
	CSR	Fee, Breakbulk, Passion, Fruit, Mainland, Vegetables
	MM	Reopened, Securities, Blockchain, Training, Alliance
Stage 2	Crisis	Pandemic, Home, COVID-19, Crisis, Medical, Vaccine, Lockdown, Delays, Blank, Health, Outbreak, Masks,
	CSR	Sustainability, Inventory, Fashion, Origin, Children, Eco-friendly
	MM	Seafarers, Crew, Fuels, Resilience, Alliance, Weather, Recycling, Recovery, Restructuring
Stage 3	Crisis	Insufficient, Delays, Vaccinations, Shortages, Patients, Congestions
	CSR	Women, Innovation, Truck, Decarbonization, Carbon-neutral
	MM	Security, Blockchain, Block, Fuels, Last-mile

4.3. Concordance Analysis

To further understand the meaning of keywords, concordance analysis can derive the actual context of keywords, shown in Appendix A. Next, the three stages of concordance analysis were conducted to conclude shipping enterprises' crisis response and evolution pattern.

Stage 1: Pre-/early-Crisis. "*Novel*" appears in the form of "*Novel coronaviruses*", a sign of the coming crisis. In the early stages of the outbreak, some port offices in mainland China were closed. However, to ensure the regular operation of the logistics, more OOCL offices in China were reopened and published on the official website, see the concordance of "*reopened*" (for example, "*Shanghai Already Reopened*", "*Tianjin Already Reopened*"). "*Fee*" includes "*B/L Release Elsewhere Fee*", "*Amendment Fee in case of changing Original Bill to Seaway Bill*", "*Amendment Fee in case of changing Payment location*", and "*Late fee of delayed payment*", which belong to the "*fee waiver*". "*Securities*" involves General Average of MV Northern Jupiter of ONE. "*Alliance*" as an effective form of cooperation, the shipping companies were making alliances, as usual, to bring innovative product solutions. TradeLens, a digital platform jointly developed by IBM and Maersk, is based on blockchain technology, permitting increased transaction volumes and efficient information exchange. MSC shipping line has piloted the use of blockchain technology on more than 200 routes worldwide, calling more than 200 ports, to improve supply chain speed, efficiency, transparency, security, and quality of service. CMA CGM Foundation and OM Foundation launched the MouvTaVie project, committing to promoting and "*training*" young people between the ages of 18 and 25 who are "*not in education, employment or training*". The CCG was remarkably prescient in anticipating possible humanitarian "*crises*" from the outbreak, preparing unique supplies, and providing maritime and logistical support. Collectively, in Stage 1, shipping lines were aware of "*Novel coronaviruses*", but still developed blockchain technology, alliances, and social training.

Stage 2: Crisis-in-Progression. COVID-19 was identified as a pandemic, indicating the epidemic entered the stage of development. "*Home*" included "*place of delivery*", "*consumer stay home*", "*crew return home*", and "*office-based employees work from home*". Political pressures, shareholder intentions, and changing consumer behavior have pushed "*sustainability*" front and center. A key component of sustainability was digitalization and making green gains, such as fashion supply chains. The roots of sustainability were primarily supply chain efficiency and investment choices made by companies. Collaboration was the only way for the shipping industry to move to a sustainable platform. Besides, companies also disclosed sustainability in terms of environmental protection, human rights protection, increasing trade benefits, and improving ship recycling (for example,

"*restructuring*", "*eco-friendly*"). "*Fashion*" stood for "*fashion supply chain*", which grew increasingly complex and needed resilience and flexibility due to the COVID-19 pandemic. Moreover, as fashion retailing is about speed and the ability to meet insatiable consumer demand, the fashion supply chain must react quickly. The pandemic has upended supply chains. As a result of the global lockdown, demand for commodities such as apparel has plummeted. In contrast, demand for other products—from personal protection (for example, "*masks*") to flour and toilet paper—has peaked. This shift has challenged the visibility, timeliness, and flexibility of the company's supply chain. The global lockdown, causing crews to work onboard beyond their contracted period, has triggered a crew change crisis that has severely damaged crews, physical and mental health. With IMO setting a 0.5% cap on the sulfur content of the fuel, MAERSK was aggressively preparing to ensure that ships switched from heavy oil to low sulfur fuels. At the same time, the companies were actively exploring and experimenting with a range of alternative energy sources and technologies to accelerate decarbonization. During the epidemic, children were also one of the main concerns of the shipping company, mainly among the "*cargo users*", "*recipients of donations*", and, not least, children's education. The pandemic presented the need for flexibility and "*resilience*". "*Delays*" represented "*delayed delivery of goods*". Due to port "*congestion*" and sanitary and phytosanitary (SPS) requirements, companies and customers were eager to build "*resilience*" and stability. In light of the extraordinary impact of the COVID-19 pandemic, some shipping lines launched "*blank sailing*" program to match market demand. The above scenario illustrated the direction of the company's restructuring operations and stakeholder investments.

Stage 3: Post-COVID-19-Era. Following the development of the vaccine, most seafarers were vaccinated and entered the post-epidemic era. Container equipment (in the Asia Pacific), "*truck*" and "*truck*" driver were "*insufficient*", an industry-wide challenge. Supply chain security, cyber security, patient safety, drug safety, vaccine safety, and food safety were issues requiring high priority at this stage. "*Delays*" in the delivery of goods remained commonplace. MAERSK and MSC increased technological innovation (for example, Supply Chain Management Digital "*innovation*"), digital and cultural transformation, and upgrading to enhance the company's competitiveness. "*Blockchain*" as a superior technology can overcome IT roadblocks and lack of resources, offering access to new visibility and optimization technologies to foster greater collaboration and trust across the global supply chain. To reflect diversity and inclusion, companies encouraged more women (for example, company employees, truck drivers) to participate in the transportation and logistics field. Responding to customer demand, companies needed to transport medicines, PPE, vaccines to "*patients*", which were extra inputs for companies. The shortage of containers and congestion at ports pressured companies to conduct business. Methanol-fueled, low sulfur oil-powered vessels were a crucial pathway for decarbonization logistics to achieve carbon neutrality goals. Handling last-mile shipments to end-consumers were significant during the epidemic. Based on the epidemic considerations, multimodal transport has become more common, especially block trains to provide an economical, efficient, fast, and fixed timetable sustainable solution for cargo transportation. The call for cooperation among all supply chain players and the strengthening of ongoing cooperation with partners, suppliers, and customers remained an intrinsic requirement of the industry. "*Recovery*" of Suez Canal (Ever Given), "*recovery*" service, the coronavirus "*recovery*" curve, and the post-pandemic "*recovery*" demonstrated the expectation of crisis recovery.

5. Discussion

5.1. Theoretical Implications

The COVID-19 pandemic posed an unprecedented threat to the shipping industry. If not properly handled, it could affect the movement of goods in the global logistics supply chain and jeopardize an organization's image [63]. The central contribution of this study

is to provide an in-depth analysis of the container shipping industry's strategic response to the pandemic crisis by integrating theories of crisis management, CSR, and MM.

First, from the perspective of the crisis process [33], COVID-19 has had a more severe impact on the shipping industry than both the financial crisis and the SARS virus [64]. In Stage 1, the shipping industry characterized the virus as Novel coronaviruses, and container shipping companies disclosed the scope of the crisis, including "*detention*", "*extension*", "*difficulties*". Entering Stage 2, a pandemic outbroke, in which global "*lockdown*" was seen everywhere in the context of a pandemic, leading to "*work from home*", "*cargo delays*", and "*blank sailing*". In Stage 3, due to the port congestion, goods could not be loaded or unloaded in time and postponed, which led to the logistics equipment being "*insufficient*", such as container "*shortage*". Based on the view of the crisis process, it is proposed that the crisis response is an evolutionary process as the crisis develops and that the evolutionary crisis response theory can provide theoretical reference for future studies of the shipping industry. The lexical patterns evolving from shipping lines public discourse from January 2020 to July 2021 illustrate the changes in crisis response of container shipping companies, elucidate an evolutionary process, and convey a positive corporate image to stakeholders.

Second, as for CSR, in Stage 1, shipping lines were rich in enthusiasm (for example, "*passion*"), securing cargo supply (for example, "*breakbulk*", "*fruit*", "*vegetables*"). In Stage 2, in addition to responding to the crisis, companies were also paying more attention to "*sustainability*". "*digitalization*", "*green gains*", "*collaboration*", "*environmental protection*", "*human rights protection*", "*ship recycling*", and "*fashion supply chain*" were all fundamental ways to achieve sustainable development in the shipping industry. Supporting "*children*", especially in education, can effectively reflect CSR of shipping lines[65]. In Stage 3, companies encouraged more "*women*" to participate in company production and create jobs for women. "*Innovation*" was one of the aspects of CSR in this period, such as "*digitalization*", "*big data*", "*end-to-end integrated supply chain*", "*alternative fuels*", "*real-time end-to-end supply chain visibility*". In addition to Stage 2, Stage 3 focused on environmental protection (for example, "*decarbonization*", "*carbon-neutral*"). Therefore, the CSR analysis of the above three stages shows that the business behavior of shipping lines is in line with the inherent requirements of CSR, which lays the theoretical foundation for the subsequent study of CSR in the shipping industry [66].

Third, MM continued to function in the three stages, and the evolution of MM was as follows. In Stage 1, MM focused on "*security*", "*blockchain*", "*training*", and "*alliances*". In Stage 2, travel restriction, "*lockdown*", and the constant change in local regulations and requirements brought about a crew change crisis. Based on this, shipping lines recognized seafarers as key workers, established gold standard health protocols, enhanced communication between ship operators and charterers, and strengthened the safety of seafarers. The alliance emerged in Stage 1 and Stage 2, with the Maersk and MSC Alliance, Global Industry Alliance (GIA), Ocean Alliance being the manifestations of the alliance. In response to the epidemic, alliance members were constantly aligning their resources to match the moving demand of the global shipping market. In Stage 3, there was a renewed emphasis on "*blockchain*" and "*security*", which appeared in Stage 1. In other words, MM presents "*alliance*" liaison and human factors as the key crisis responses, which centralizes the industry nature in the very industry's crisis responses.

Moreover, there is no strict boundary between crisis management, CSR, and MM, and they can complement and transform each other [32]. In this paper, the theories of crisis management, CSR, and MM are deeply explored and relearned in the context of cooperation and institution discourses.

5.2. Practical Implications

The findings highlight the significance that the container shipping companies instill in their public discourses information and emotions for projecting an excellent corporate image [63]. Both the continuation of the epidemic and the rebound in seaborne trade posed challenges to the container shipping industry, including equipment and container

shortages, less reliable service, crowded stalls, longer delays and hold-ups, crew change crisis [20]. Moreover, the significance in shipping lines' public discourse about fulfilling corporate social responsibility as crisis responses is worth of great attention, for instance, in this study, the shipping industry positively responded to the IMO's call for efforts to adapt to climate change and the urgent need to decarbonize and find alternative fuels to reduce emissions.

Container shipping companies have learned a lot from and responded to the COVID-19 crisis; this has been revealed from the corporate discourse. Crew management, company operations, and market operations should develop contingency plans and provide institutional safeguards. Companies can explore long-term mechanisms that allow employees to work from home and on-site and conduct performance evaluations to reduce the risk of employees being infected and travel costs. Companies could establish a psychological assistance platform to provide psychological assistance, such as psychological counseling, to crew members and company employees to relieve tension [2]. The shipping industry, governments, and international organizations are called upon to ensure seafarers are key workers and create favorable conditions for prioritizing the vaccination of seafarers. The epidemic has changed consumers' shopping habits, strengthening investment in electronics, digitalization, and automation to increase efficiency and cost savings [65].

As proposed by Chris Trelawny, Chief, Sub-Division for Maritime Development, Technical Cooperation Division, IMO, "Shipping truly is the most international of industries and the need for dialogue and liaison—cooperation if you will—between all those countries is vital to ensure that standards are set, regulations are enforced and that a level playing field is maintained." [67]. It is more vital in worldwide crises for the industry to strengthen the cooperation between international organizations (for example, The Baltic and International Maritime Council, International chamber of shipping), national governments, and port authorities. As the epidemic accelerated, there were port congestion and equipment shortages [68]. The grounding of Ever Given led to congestion in the Suez Canal. IMO, as an organizer, need to enhance communication and cooperation between member states and port authorities. In response to port congestion, port authorities can explore different modes of ship access and cargo handling to ease port congestion. Besides, to achieve Sustainable Development Goal 5.5: "Achieve gender equality and empower all women and girls", IMO can call on international organizations, shipping companies, port authorities, cargo handling, and port operations to create more employment opportunities for women.

Climate change and the implementation of environmental protections can be the threading themes of crisis responses on the part of shipping lines, which help build up the CSR image of the companies [69]. The contingencies and emergencies posed by such world crises as COVID-19 have not compromised the CSR awareness of the shipping lines, rather they can be the chances for further research on sustainability as a way out of crisis. On 1 January 2020, the global sulfur regulations came into force. For ship exhaust emissions, maritime authorities strengthen the inspection and monitoring mechanism and impose penalties for non-compliance with the requirements. MAERSK announced their desire to achieve carbon neutrality by 2050. IMO should set specific emission reduction routes rather than leaving them to large shipping companies alone to decide. Simultaneously, large shipping companies can actively research and develop low-carbon emission ship main engines and low-carbon and low-sulfur fuels following IMO greenhouse gas emission requirements and the Paris Agreement [70].

5.3. Limitations and Future Research Directions

Horizontally and longitudinally, as this study examined textual data collected from large global shipping companies, some limitations should be acknowledged. Only the top 10 global container shipping companies were studied in this survey. Although the sample was well representative of interested researchers, smaller shipping companies were excluded from the study. Due to space limitations, we only tested data from January 2020 to

July 2021. Perhaps the results would be more interesting if data for each month were extracted for comparative analysis. In addition, there may be cultural differences in response strategies to crises in different countries and sectors.

Despite these limitations, this study constructed a research framework of crisis management, CSR, and MM through the lens of textual analysis of press releases and advisories issued by companies in the Pre/early-Crisis, Crisis-in-Progression, and Post-COVID-19-Era. The study results depicted the evolutionary process of emergency response strategies and crises. We encourage future research conducted across industries to derive crisis response strategies. This study can conclude that crew change crisis, ship fuel, environmental protection, organizational resilience, and international maritime cooperation are research hotspots and point to future research.

6. Conclusions

COVID-19 will not end in the short term and will affect the international shipping industry in the long term; moreover, COVID-19 is not the last worldwide crisis the international shipping industry has to face. This study proves that the research method and the theoretical framework constructed by text analysis are valid and can elucidate how the shipping industry responds to the outrageous crises such as the epidemic in discourse. The extracted positive and negative keywords revealed textual characteristics and emergency response strategies on the part of shipping lines in the Pre/early-Crisis, Crisis-in-Progression, and Post-COVID-19-Era. The inclusion of the themes of pursuing sustainability in the shipping lines' responses to such worldwide crisis as COVID-19 is out of the common knowledge of crisis management but reveals the commitment and strategies on the part of the industry. The findings provide a reasonably comprehensive picture of the efforts made by large container shipping companies to respond to COVID-19 and the measures taken to soothe stakeholders. This paper extends and relearns crisis management, CSR, and MM theories through integrating the fulfilling of cooperate social responsibilities in maritime management as the cooperate crisis responses, thus proposing the integrity of the three topics of crisis management, CSR, and MM. In addition, management recommendations are provided for shipping company management, IMO, and port authorities. This paper also explored the future research hotspots and research methods.

The shipping industry is complex, and there is still uncertainty due to the epidemic. However, the shipping industry has proven its resilience and indispensability in the global economic recovery. This study provides an initial attempt to explore the crisis response strategies of the container shipping industry as the invitation to further and wider studies of the international shipping dynamics and mechanics in dealing with the world rife with crises and adversities.

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Appendix A

Table A. Keyword-in-context: exemplary statements for the themes.

Corpora	Themes	Concordance Lines
Stage 1	Crisis	1. In order to facilitate the prevention and control of **novel** coronaviruses and better accommodate the customers' needs in cargo arrangement during this period, we hereby announce specific policy on container free use in **mainland** China: All Extra DND amount incurred during 24 January 2020 to 9 February 2020 will be waived. (COSCO)
		2. OOCL operational update: Extended free time period in **detention** calculation. (COSCO)
		3. Can we apply for **extension** of container free time or cost reduction in ports outside China? (COSCO)
	CSR	1. During this special time, is there any policy regarding fee waiver? (COSCO)
		2. Come and speak to our experts and find out more about how we can meet your **breakbulk** needs. MSC will be at Stand C61 at **Breakbulk** Mumbai, held 27–28bFebruary. (MSC)
		3. At MSC we think big and with great **passion** for our work we manage the whole process. (MSC)
		4. Today, **fruits** and **vegetables** make up a high percentage of goods carried in refrigerated containers ("reefers") by CMA CGM. (CCG)
	MM	1. While the **reopening** of some offices is still pending for approval by local authorities, please see below the latest status of our offices in China: Beijing Already **Reopened**. (COSCO)
		2. The owners have appointed Stichling Hahn Hilbrich (Hamburg & London) as Average Adjusters. They will be arranging for the collection of General Average **securities** from parties concerned in cargo, containers and bunkers. (ONE)
		3. Sailing on more than 200 trade routes, calling at over 500 ports, MSC's shipping line is pioneering the use of **blockchain** to further increase speed, efficiency, transparency, **security** and service across the supply chain, both through its pilot initiatives and in technology projects sponsored by multiple carriers. (MSC)
		4. By launching the #MouvTaVie project, the CMA CGM Foundation and OM Foundation commit to promoting and supporting the integration and **training** of around thirty young people between the ages of 18 and 25 who are "not in education, employment or training" (NEET). (CCG)
Stage 2	Crisis	1. In addition to this, the **COVID-19 pandemic** has further amplified the vulnerabilities of **fashion** brands, making it imperative for them to incorporate **resilience** and flexibility within their supply chains. (Maersk)
		2. Our office-based colleagues have shown their **resilience** by adapting to working from **home** to the extent possible, and we have tried our best to support this change, mentally and physically. (Maersk)

		3. The **lockdown** in Europe and the US caused a sudden drop in consumer spending in many sectors. (CCG)
		4. To cope with the challenge of **COVID-19 pandemic**, COSCO SHIPPING Lines have implemented **blank** sailings program of OCEAN Alliance services for June to July 2020. (COSCO)
	CSR	1. We are delighted to welcome UNICEF as one of our partners and to be able to play our part in supporting UNICEF's efforts to help **children** worldwide. (CCG)
		2. It will also free up space at **origin** factories and warehouses and avoid excess **inventory** at site, bringing cargo closer to destination markets and alleviating the risk of **congestion** or closure at ports of discharge. (MSC)
		3. With the deployment of these modern, **eco-friendly** and highly efficient new vessels, Yang Ming will be able greatly enhance its service quality and deliver more excellent service to global customers. (YM)
	MM	1. Our single biggest challenge has been to relieve our **seafarers** after their tour has ended, due to travel restrictions, closed borders and the constant change in local regulations and requirements. (Maersk)
		2. In addition, the company is engaging with potential vendors to investigate new solutions such as alternative **fuels** that would help to minimize and one day eradicate CO2 and other greenhouse gas (GHG) emissions from shipping fleets. (MSC)
		3. Our situation within the Ocean **Alliance** continues to provide us significant advantage, and ensures that we are able to offer a broad, high-quality service network to our customers. (COSCO)
		4. In addition, we remain committed to our broader **sustainability** agenda, including our role in multiplying the benefits of trade, contributing to halving food loss and improving the ship **recycling** industry. (Maersk)
		5. Kaplan, Goldman and Kellan all agree that the **recovery** from the coronavirus will be a time of significant change for supply chains globally with customers keen to build both **resilience** and stability. (Maersk)
		6. THE **Alliance** will continue to closely monitor the market situation and respond efficiently by **restructuring** their service scheme to meet market demand. (ONE)
Stage 3	Crisis	1. Equipment **shortages** remain an industry-wide challenge in Asia Pacific. 20-foot dry containers are sufficient, but 40-foot and 45-foot- dry containers are short. 40-foot non-operating reefer is also **insufficient**. (Maersk)
		2. Further expansion in shipping powered by **innovation** for higher levels of **security**, operational efficiency and greater customer satisfaction through the introduction of more sustainable transport solutions as well as through the Group's commercial offer. (CCG)
		3. The pandemic-induced **lockdown**, dynamic geopolitics and economic conditions have led to shipping **delays** and port **congestion**, leading to an escalation of D&D costs for importers. (Maersk)

CSR	4. ICS also pointed out that shipowners could face liabilities and costs if **vaccinations** are not delivered and highlighted, as it has happened before, the serious consequences for **seafarers'** physical and mental well-being. (MSC)
	5. The supply chains for pharmaceutical customers include high levels of complexity and we understand the need for reliability as well as the importance of products getting to the **patients**. (Maersk)
	1. The carbon footprint per vessel also can be reduced by 52% with greater energy efficiency, enabling HMM to accelerate the pathway towards **decarbonization**. (HMM)
	2. The Transport and logistics industry has traditionally been male dominated. Due to this, we're increasing the representation of **women** in Maersk at all levels. (Maersk)
	3. The CMA CGM Group is contributing to international solidarity efforts by delivering oxygen production units, containers of liquefied oxygen and specialist medical equipment by **truck**, plane and ship. (CCG)
MM	1. This intercontinental **block** train has been able to stand by its schedule, delivery times and swift transit clearance on time, creating firm ground for further expansion of transcontinental transit. (Maersk)
	2. TradeLens is an open and neutral industry platform underpinned by **blockchain** technology, supported by major players across the global shipping industry. (HL)
	3. By achieving this, Maersk will be able to pilot a scalable, **carbon-neutral** solution to customers and incentivise manufacturers to scale the production of new, sustainable **fuels**. In other words, create a market that does not exist yet. (Maersk)
	4. Handle **last-mile** deliveries to the end consumer. (Maersk)

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