

*State University of New York Maritime College*

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## COVID-19 and the Fate of the Cruise Industry

A Holistic Answer to Regaining the Public's Trust

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## ABSTRACT

The cruise industry is facing a challenge that has never been seen before. The COVID-19 Pandemic has crippled a market that has been steadily growing for decades and, before this, showed no end in sight. As cruise lines halt operations, hemorrhage money, and call for loans just to stay in business, there also must be a complete shift in how these companies operate and vessels run in order to ensure viability. The general public has understood the risks of cruising since its inception, but this new era of uncommon hazards is changing their view to second guess safety and practicability of a vacation at sea. Patterns have begun to emerge where ship size, itinerary, common areas, and space ratios have all played an integral role in the spread of this pandemic onboard ships. Indications from the public have shown that they have little knowledge of how ships work and focus more on assumptions and grouping companies as a collective when assessing how safe the cruise market is. Since cruise companies tend to be merged together in the public's mind due to lack of understanding, the market as a whole needs to implement new strategies that are clearly visible to the public now and hidden from public view later on in order to create and maintain consumer confidence. The companies need to form a holistic approach to combat this spread and regain control of their industry. Presented in this thesis is evidence of a changing cruise industry landscape and strategies to better safeguard the market from the likelihood of this happening in the future. Additional research after implementation of the industry's new operating structures would be beneficial to improve on these findings.

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Finally, I'd like to thank the combined 550 individuals of both the maritime sector and general public who took both surveys and answered the questions to the best of their ability. Their responses helped form the backbone of this thesis and shed light on the full spectrum of how the industry needs to change in order to once again be successful.

## *I. Introduction*

The passenger vessel industry has grown from a means of necessary transport to over-indulgence and adventure in the form of lavish cruise vessels seen today. The industry that started in the late 1960's and early 1970's has had growth spurts and stalls periodically over the decades. One thing it did not have, however, was a sharp immediate decline that brought into question the very future of the entire market, until now. The culprit, known as the Coronavirus, changed the entire face of the cruise industry within a few months.

This paper will begin to discuss what the pandemic is, how the cruise industry can be affected more than others, the volatility of this specific market, the vessels' themselves being unknowing accomplices to the spread, the public's view and overall confidence, and the way that the industry can rebound and come out of this period stronger and more resilient than ever. The purpose of this research is to find out the best way to re-start operations and how to prevent something of this magnitude from happening again in the future. No transportation mode, whether it be ships, airplanes, or other means of mass transit, had anything in place to combat the repercussions of this virus. This became apparent quickly in the eyes of the public.

The problem was that there were no procedures to fix the compounding issues that were plaguing the cruise industry as the weeks went on. Entire operational shutdowns were the only way that any of the companies knew how to stop the onboard spread. With the help of a cruise risk survey, interview with a leading voice in the industry, and countless amounts of personal research, one will begin to understand the shape of this problem and how best to tackle it. My investigation into this matter will gauge the public's perception of the industry and show that through both major and minor changes along with the controlled dissemination of new policies, we will once again have cruise ships travelling the seas full of healthy paying passengers. Due to

the general populations lack of understanding and the very nature of how passenger vessels operate, companies comprising the cruise market must act in a single holistic effort to increase health and safety standards for the industry and change the public's perception.

## *II. Methodology*

Since the virus began in late-2019, no fervent research has been done on the subject. In a way of conducting initial research, 350 people were sampled to take the Cruise Ship Risk Familiarity Survey and their responses were recorded. The respondents were broken down into two categories to test whether knowledge of the cruise industry played a factor in overall opinion. Of the 350 people who took the survey, 182 persons, or 52%, were of the general public with no background in the maritime field and did not have any known formal maritime training. The remaining 168, or 48% were from a maritime background; either having worked or currently working in the maritime industry with most having formal education in the field. The survey was shown to the public via links on social media. These links, when clicked, would bring the person to a survey questionnaire of 17 questions, 3 of which were compulsory and the remaining 14 answered voluntarily. The 3 required responses were:

- a. Are you a maritime professional?
- b. What is your age?
- c. Have you ever been on a cruise?

These 3 mandatory questions in the beginning of the survey were to gauge the respondent's answers and classify them into designated categories to find the pattern, if any, in their remaining voluntary responses. Questions about the coronavirus, then still mostly prevalent in China, were not included due to a fear of one-sided responses and tainting of the rest of the

questions based on the pandemic. General knowledge and opinion of the cruise industry in its healthy state was the point of the survey. The survey was concluded after roughly 5 days of being open to answers once a rounded number was reached. There were no obvious outliers and all responses were recorded, however, not all were used in the following research.

The sampling was done at random and though the directions asked the respondents to answer as many as they could, there was no obligation outside of the first 3 baseline questions. Calculations and counting methods were done using a plug-in method on Microsoft Excel and double checked with a handheld calculator. The ensuing graphs were formed from the same template. To conduct the survey again, one would need the ability to reach a broad audience of randomized people as well as find maritime sector individuals to either label them as the baseline constant or simply compare. One specific group or setting is not adequate to replicate this survey.

Further research was conducted via skype interview with Cruise and Ferries Director of Wartsila, Mr. Vesa Martinnen. The interview detailed types of ship design, vessel machinery, and passenger patterns and observations based on factors such as culture and onboard expectations. Since the topic of this paper was still ongoing during the phases of research, representatives within the cruise industry who were contacted did not wish to be reached for further discussion. Thirty-one public relations departments of major cruise lines were contacted to answer a few questions and help with the research, none of which responded to the inquiries.

A second 2-question survey was conducted in mid-August, 6 months after the first COVID-19 cases were discovered on cruise ships. The survey contained the same baseline question as the previous survey of “Are you a maritime professional?” Due to all persons having the same ability to remember an incident from months prior whether in the maritime field or not,

that baseline question was not included in the supplementary conclusion of the survey. The point of the survey was to gauge if the public could remember the Diamond Princess cruise ship quarantined in Yokohama Japan with hundreds of positive Coronavirus cases onboard that garnered worldwide media attention in Mid-February. Was it still fresh in their minds or did they forgot about it entirely 6 months after it being out of the spotlight? Results from this would better help understand the method of public attention, if any, given to the cruise industry and whether or not they can delineate between companies. To not give away the answer, the survey was fill in the blank rather than multiple choice and social media was once again the method of dispersion. A 24-hour window was given for survey responses. Once the time was up, exactly 200 individual responses were recorded.

### *III. Background*

The cruise industry has seen an exponential growth from its humble beginnings of re-fit ocean liners and rusted immigrant steamers to the multi-billion-dollar vacation sector we see today. The transition from using ships for immigration and business and turning them into strictly leisure-craft rebirthed the industry into something never before seen. The thought of the journey becoming the destination itself has manifested more in the cruise industry than any other vacation sector on Earth. As companies began to see the potential for profits from this new area, the necessity of growth and innovation grew with every new ship. What was once impossible is now mainstream. What took so long to adopt is now the norm.

The decade of the 1960's saw the biggest shift from how people traveled. Once the tide shifted away from ocean travel, passenger count quadrupled for air travel. (Smithsonian, n.d.) Ocean liners proved too slow for a world that was speeding up. What normally took a week to transit now could be done in a few hours. It was almost unfathomable that you could have

breakfast in New York and dinner in London, but the emerging aircraft industry made that into a reality. As time went on, mergers and cheaper tickets tried to keep the ocean liner industry afloat, but all efforts fell short. The industry was dead and no one could right that ship. With increasing numbers of ships laid up and others headed to the scrapyard, a new market was on the horizon. (Smithsonian, n.d.)

As ships became larger and amenities grew in abundance, so did the passenger count. Every single year, cruise lines are going further into areas once thought untouchable. While at one time it was astounding that a ship could have multiple pools on one deck, the imagination now has no bounds as ships are being equipped with ice rinks, rock climbing walls, bumper cars, and even rollercoasters. The competition in the market has meant more and more companies are reaching out for new ideas and untapped experiences. In a metaphorical sense of “climbing on top of one another”, each new vessel is putting the previous into the proverbial stone age. With this unchecked yearning for growth in an industry that is reaching new heights year after year, there tends to be a mindsight of lasting forever. The industry has seen close to 30 years of uninterrupted growth, but everything has now changed. (Pallis, 2020b)

Beginning in late 2019 and exponentially growing in 2020, the Novel Coronavirus, also known by its more specific name COVID-19, has stopped the industry in its tracks and led many to believe that the once untouchable cruise industry will never be the same. Health concerns such as norovirus and seasickness are nothing new to the industry, with every single company having safety measures to treat and prevent such occurrences onboard their vessels. But COVID-19 is something completely different. This is not just a passenger or two quarantined to a single cabin on a single ship vomiting with a fever; this is a global health concern that has led to millions of people infected and hundreds of thousands dead.

In response to this, evidence has shown the general public has viewed the cruise industry as a collective when speaking about the industry. (Petrizzo, Cruise Risk Familiarity Survey, 2019) Though some lines have been severely damaged and others not even touched, the public cannot visualize the difference. This can be, in part, due to lack of knowledge and understanding for an industry that is looked as nothing more than a whimsical vacation for millions of Americans. (Petrizzo, Cruise Risk Familiarity Survey, 2019)

With the previous exponential growth of the cruise industry a thing of the past, drastic short- and long-term measures need to be implemented to ensure survival in the new post-pandemic world. If these new procedures are done correctly, there's no telling what the future of the industry could hold. Over 86% of the population has either taken a cruise or would want to, but that does not mean things will stay that way forever. (Petrizzo, Cruise Risk Familiarity Survey, 2019) Since human transportation by ship is an indulgence and not anywhere near the necessity it once was, cruise lines do not have the luxury of assuming that the market will return. An extra effort, greater than those of mass transit and air travel, needs to be applied in order to move the entire industry into this uncertain future and regain the public trust. What will arise from this season of hardship will be a sharper revitalized cruise industry that will be much more immune to negative external factors.

#### *IV. COVID-19 Pandemic and Onboard Spread*

Cruise ships have been at the forefront of the global pandemic known as COVID-19 ever since the beginning. The name derives from the Corona Virus Disease which started in 2019, but this is actually just the name of the disease itself. SARS-Cov-2 is the actual novel coronavirus. Much to the confusion of the public, SARS-CoV-2 is this year's strand that leads to the disease COVID-19, also delineating the year of commencement. (Harvard Health Publishing, 2020)

With cruise ships sailing all around the world filled with passengers in much closer proximity to one another compared to on land, this was a very habitable environment for the virus to multiply and spread. (CDC, 2020b) By the time most cruise lines ceased vessel sailings around April 9<sup>th</sup> 2020, thirty-four ocean-going cruise vessels have had passengers or crew test positive for COVID-19, amounting to exactly 1,900 people in total. (Business Insider, 2020) Some argue, however, that a cruise ship is worse than being on land– with one respondent of the survey stating: “They [cruise ships] are like billion-dollar floating petri dishes.” (Cruise Risk Familiarity Survey, 2019) But has the very nature of the cruise ship environment and design been at fault or were they merely welcoming the wrong passengers at the wrong time?

Over a hundred years prior in 1918, a pandemic infected over 500 million and killed between 10% and 20% of those infected, 675,000 of those being in the United States. Known as the “Spanish Flu”, the timing of the 1918 influenza strain could not have arguably been worse. World War I was still being fought with close-quarters contact and deplorable sanitary conditions. By the time it was over, the victors wanted nothing less but to celebrate in large crowds and hold parades while the losing side had no infrastructure or capital to fight the sickness. This strain wreaked havoc all across the world from January 1918 until December 1920. Though the sickness was a different type and occurred in a much different world than today, the public’s reaction over time tends to mimic what is happening with COVID-19. (FullFact.org, 2020)

Most American cities in 1918 followed the rest of the world by imposing restrictions and quarantines for their populations, much like today. To shadow 2020 again, many cities like St. Louis, Missouri and Omaha, Nebraska were pressured by their citizens to end the quarantines and lift restrictions as cases began to lessen. As per the United Kingdom’s independent fact

checking charity, Fullfact.org, there is no true link between the restrictions being lifted and the second, more deadly, wave of the Spanish Flu a short while after, however, it shows that, much like now, a large portion of the population grew tired of being told to stay in isolation. Whether the blame is put on economic factors or something else, the patterns of yesteryear and today show that people don't like straying too far away from normalcy for any large period of time. (FullFact.org, 2020)

This strain of the Coronavirus can live on surfaces between hours and days. (Nazario, 2020) What can affect that timeline is the type of surface and ambient heat. Exposure to the sun and warmer temperatures can drastically reduce the amount of time the virus can live on a specific surface. (CDC, 2020a) Sadly, for these vessels, their top decks may be exposed to sunlight, but the rest of ship's passenger areas are indoors in comfortably-lit air-conditioned spaces. The United States National Institute of Health has studied the virus on various objects and have found the lifespan to be incredibly different. According to WebMD, the virus can live on surfaces anywhere from 4 hours all the way up to five days. (Nazario, 2020)

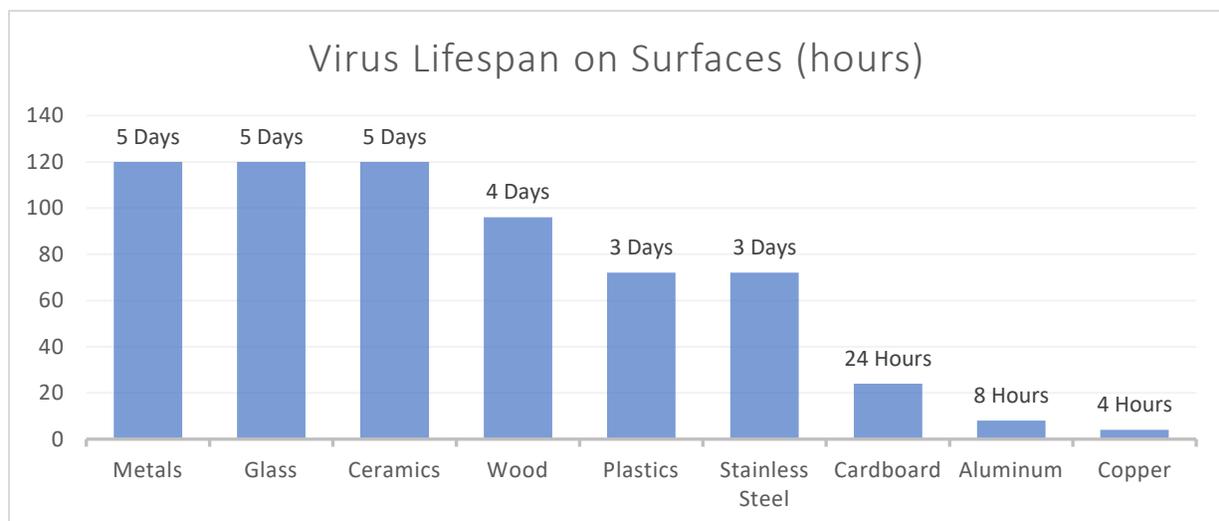


Figure 1 – Source: WebMD

Copper gives the virus around 4 hours to live while metal surfaces increase that lifespan by 2,900%. (Nazario, 2020) Some of these surfaces may seem out of the way from what a passenger normally sees on a cruise, but nothing could be further from the truth. If someone with COVID-19 coughs onto a window and that window is not properly cleaned, another unsuspecting human could contract the virus five days later by merely touching that spot. (National Institutes of Health, 2020) If an asymptomatic person uses a ceramic mug or stainless-steel utensil, someone else using the same eating instrument could catch it days later. (CDC, 2020b)

But these objects are the same ones used in homes, so why are they looked at as more of a culprit on cruise ships? The answer lies in one word: scale. The scale of people that use these utensils or touch the windows or drag their hands along wooden railings is much higher than those in practically every other environment. Employees don't walk around entire office buildings every day of the week touching everything. They sit at their desks, walk the same hallways, occupy the same bathrooms, and use the elevator a few times, if they even need to. Often times, they're also not walking around 2-6,000 people day after day in heavily crowded settings. Vacationers have that sense of wonder and exploration that grips each individual every time they board a new ship. Passengers want to eat at every restaurant, traverse every deck, and visit every lounge when onboard. Germs and particles have hundreds of thousands of cubic feet more to attach to on a cruise ship in comparison to a landside venue. (CDC, 2020b)

In homes, the silverware, furniture, and windows are all touched by the same individuals. Yes, inhabitants of a home could acquire the virus from an outside source, but there's no initial contraction and major spread from within the confines of the house itself. Cruise ships, on the other hand, don't have that assurance. Vessels are primarily made of steel or aluminum

depending on their onboard location. Steel is more prevalent lower down in the construction while the lightweight features of aluminum are better higher up in the superstructure to prevent top-heaviness. The ventilation ducts that arguably became the main culprit of spread onboard cruise ships are made of galvanized steel. These particles could have very possibly made their way into the ventilation intakes and attached to the inner steel of the duct and lived for days unnoticed as the ship's inhabitants became sick. (CDC, 2020b)

This led to the more common method of transmission— by air. According to the CDC, COVID-19 spreads much easier than influenza, but not as efficiently as measles. Evidence indicates that the virus spreads more from person-to-person rather than indirectly when someone touches an object or surface that an infected person previously touched. Respiratory droplets are produced when an infected person breathes, coughs, sneezes, or talks. These droplets can disperse into the air and land in the mouth or nose of someone who is standing nearby. (CDC, 2020b)

Another name for the air particles an infected individual emits into the surrounding area is called aerosols. These aerosols can be discharged into the air by someone who shows symptoms or is asymptomatic; or not exhibiting any symptoms. (FDA, 2020) The Harvard Medical School (2020) states that aerosols from an infected individual can remain in the air for up to three hours after release. For cruise ships with their mix of wide-open common areas and narrow hallways, passengers and crewmembers have the chance of walking right into a plume of aerosols without even knowing it. As they walk away, some would later become symptomatic while others showed no signs. The aerosols would continue to stay in the air for a few hours until the particles later died or were cleaned using a filtration system. (FDA, 2020) But if the virus staying in the air for unknowing passengers to walk through wasn't bad enough, the

beforementioned onboard ventilations systems which generally recycled the air and kept the vessel smelling fresh and clean, became the leading culprits in the spread of the virus.

## V. *Operational Problems Facing the Industry*

### a) *Industry-Wide Ventilation Systems*

These ventilation systems being the main cause of this spread onboard cruise vessels is a complete understatement. The ventilation systems onboard these ships took the airborne particles from the specific hallways and common spaces and transferred them around the ship at random. No one onboard could confidently say: “I cleaned myself with hand sanitizer” or “I didn’t get close to anybody” and consider themselves clear from contracting it. Regardless of stateroom or any other location visited onboard, if the vent ducts could reach you, you were in the line of fire of this virus.

The systems themselves comprise of components such as fans, motors, dampers, coils, filters, intakes, exhausts, and miles of ductwork; all of which are to ensure that the inside air is just as breathable and comfortable as the fresh air outside. In order to cut down on operating costs, ships have used a process known as “fresh air mix” for onboard spaces such as common areas and staterooms. This idea would mix fresh air with recirculated air and would rarely even be noticeable. (SanAir, 2017) Researchers from Purdue University stated in February that this exact procedure could be what was spreading viruses onboard cruise ships.

Not only did recirculated air pose a risk to the passengers if there were droplets floating in that air, but the ventilation systems aren’t able to filter out these virus particles. (Wiles, 2020)

Qingyan Chen, Professor of Mechanical Engineering at Purdue University explained (2020):

*"The problem is that these systems can't filter out particles smaller than 5,000 nanometers. If the coronavirus is about the same size as SARS, which is 120 nanometers in diameter, then the air conditioning system would be carrying the virus to every cabin."*

Studies of the ventilation systems concluded that not only were they transferring air from cabin to cabin, albeit through a central vent system, but there was no way the equipment could filter out the microparticles prior to dispersal back into the ships living spaces. (Wiles, 2020) Until the passengers were quarantined to their cabins and ventilation turned off, all persons onboard were susceptible to acquiring the virus anywhere they were. Even if the contagious individual was quarantined to their own cabin, the ventilation could spread it to hundreds and even thousands of people over a matter of time. Once the ventilation and air conditioning units *were* turned off, however, a new problem arose. There was no recirculation of air. This led to heat building up and the contaminated air becoming more stuffy, uncomfortable, and dangerous. Neither method was sufficient and both were leading to further spread. (Wiles, 2020) (CDC, 2020b)

*b) Scale, Vessel Design, and Space Ratios*

Though ventilation, surface contamination, and lack of hygienic practices were the leading causes of COVID-19 spread, the design of the ships themselves also played a role. Cruise ship companies have mastered the art of economies of scale onboard their vessels. For one to understand the impact economies of scale have on an industry, they must first understand what it is and why it's done. When a company starts production at an economy of scale, they are essentially decreasing their per unit costs as they spend more overall for an increased level of production. Their manufacturing of operating machinery, in this case ships and their engines,

grows in size while their cost per unit, i.e. passengers, goes down. The end product, once delivered and sailed, has the opportunity to hold an incredible number of passengers for a lower than usual amount of expenses. (Stieghorst, 2017)

This is showing to be the case in most cruise lines, though the scale of which are drastically different. “*Cruise ships squeeze hundreds or thousands of guests into a relatively small space, and megaships play a prominent role in the industry.*” (Hines, 2020) Currently, Royal Caribbean’s Oasis class of ships are the largest cruise ships in the world at a staggering 228,081 gross registered tons. In comparison, that is almost 5 times the internal volume of the Titanic— the largest ship in the world in 1912. With the Oasis class’s monumental size comes its equally impressive \$1.35 Billion USD price tag and maximum passenger capacity of 6,680. To say maximum, this is when every single stateroom is fully booked with every pullman bed, pull-out couch, and bed utilized to capacity. By simple math using the above figures, Royal Caribbean spent around \$203,000 per passenger space to build this ship.

Almost 20 years earlier in 1998, Royal Caribbean took the coveted title of *largest passenger liner afloat* away from Princess Cruises with the first Voyager-Class vessel: Voyager of the Seas. She came in at 137,276 gross registered tons and had a max passenger capacity of 3,938. When she was built, she costed the company \$650 Million USD. When you adjust for inflation using Real Cost and the GDP Deflator to the year 2017, when the Symphony of the Seas was built, she would cost a staggering \$926 Million USD. For that amount of paying passengers, she costed over \$235,000 per passenger space to construct.

So how is it that a cruise ship could be built 100,000 tons larger, with a larger engine, and more amenities, and cost \$32,000 less per passenger? The answer is what is growing the cruise industry so exponentially; economy of scale. Examples of this could be seen in companies from

the contemporary and contemporary-plus categories. The premium and luxury brands tend to focus more on lower passenger counts and higher space per passenger due to the increased ticket prices for these guests. (Stieghorst, 2017)

This mirrors the ocean liner accommodations of long ago— the only difference being that multiple categories were on one ship rather than different companies. First class passengers paid thousands of dollars for tickets and were given the most spacious and lavish accommodations at sea. They were often the smallest class onboard due to the high volume of space each first class passenger was afforded. For lines such as Cunard and White Star to make a profit on third class and steerage passengers a hundred years ago, however, the opposite was done. They needed to get them onboard in bulk. The ticket prices were the cheapest in order to attract the most paying passengers, but comprised of the least amount of space per person onboard. Though the ships have changed, the idea has stayed the same.

One way of determining the amount of space on each vessel is to look at the space ratios of each. Most cruise lines will give their customers information regarding how much space each passenger has onboard, with an obvious pattern in more space for more money. (Stieghorst, 2017) Luxury lines such as Seabourn and Crystal give their guests far more room than contemporary brands such as Costa or MSC, though the high-end ships are noticeably smaller in comparison. (Petrizzo, Cruise Space Ratio Chart, 2020) One thing companies don't bring up is the entire space ratio of all persons onboard. Some of the crew have jobs on decks inaccessible to passengers and may never associate with guests at all. Guests don't have access to the lowest decks, but they're still factored into the space ratio. These types of jobs include the engineering department, laundry services, and kitchens for the crew's quarters. They don't need to be

included in advertisement demos because passengers never see them, but when there's a virus outbreak onboard, they need to be accounted for. (Chanev, 2015)

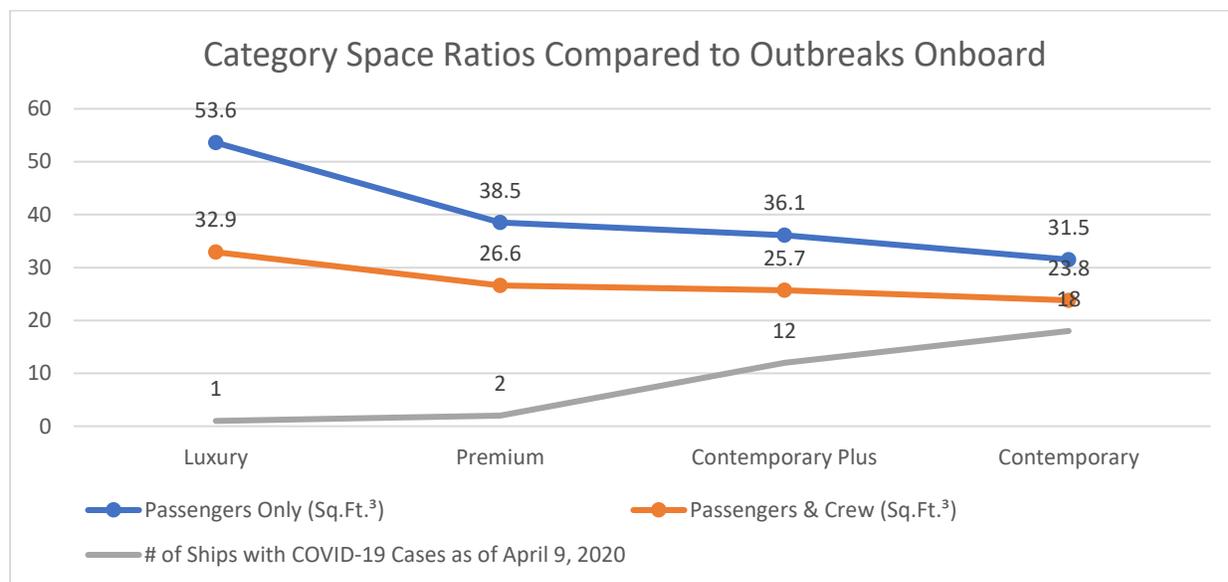


Figure 2 – Category Space Ratios Appendix III

In the Figure 2 above, space ratios are visualized for “passengers only” which are used in marketing and sales techniques for cruise lines. (Chanev, 2015) When one takes the crewmembers and staff into account, space obviously decreases due to the same amount of space being divided by a larger number of persons, but the line tends to flow in the same manner. These ratios have been averaged through four distinct cruise categories signifying their space onboard relative to category class. The bottom gray line signifies the number of COVID-19 cases reported on cruise vessels as of Mid-April. As one can see, the lines merge closer as the chart progress to the right, showing a link between vessels with lower space per person and a higher chance of being on a COVID-19 stricken ship. (Petrizzo, Cruise Space Ratio Chart, 2020)

To put it into perspective when talking about the amount of space people have onboard and their likelihood of contracting the virus, vessels with passenger space ratios of less than 36

m<sup>3</sup> of space per guest and less than 26 m<sup>3</sup> when accounting for passengers and crew combined made up 91% of all cruise ships with COVID-19 cases onboard. This bulk of positive cases came from cruise lines associated with contemporary and contemporary-plus ratings, also known as the low-end family-oriented ships. When these numbers were calculated in Mid-April 2019, the virus had already been on cruise ships for over two months. As mentioned previously, ticket prices can be directly linked to how much space an individual has onboard, with luxury lines having almost double the amount of space per passenger than contemporary lines. Whether more space and more common areas are good or bad is solely dependent on the opinion of the passengers themselves. (Stieghorst, 2017) But when safety is taken into account, the argument is more one-sided.

In an interview with the Cruise and Ferries Director from Wartsila, Mr. Vesa Martinnen (2020), an interesting topic was brought up. Cruise ships are the most popular in The Americas and Europe with an emerging market starting to take shape in parts of Asia. He explained that Americans, for example, look for open deck space and exorbitant public areas when picking a cruise ship. This is due to their desire to explore parts of the ship and interact with other people and any amenities the ship has to offer. They'd rather spend time sipping margaritas in a hot tub with other guests or spending time in one of the countless lounges or restaurants to pass the time. On the contrary, Chinese and other Asian passengers tend to spend less time in public areas onboard and enjoy staying in their cabins for longer periods of time when sailing. To account for this, cruise ship architects and designers put more focus on cabin features and stateroom space when a cruise company decides to build a ship for the Asian market.

Mr. Martinnen (2020) went into details about how onboard public spaces and common areas were the first thing looked at as the cause of the spread on cruise ships. All public and crew

spaces onboard cruise ships are cleaned as regularly and as thoroughly as possible, if not for health reasons– for the ship to look presentable. The Cruise and Ferries Director further explained that there will always be a surface not cleaned or window not wiped, however, there seems to be less of a chance of rapid spread in rooms built for 5 – 20 than those designed for a thousand. Spaces such as the main dining room, theater, and the Atrium lobby are all designed to fit massive amounts of passengers at one time. As the ships grow to hold more passengers, these spaces grow as well, only adding to the present concerns of contamination.

*c) Limited Onboard Medical Resources*

For a vessel to set sail, there is one person on staff that they are unable to sail without. No, it is not the Captain or Chief Engineer. The cruising vessel, regardless of size, is unable to sail without a licensed doctor onboard. If the Captain is unable to board before departure or becomes incapacitated, the Staff Captain has the ability to take charge of the vessel. They are required to have a master’s license for this very reason and the ship will still be able to keep its itinerary moving forward. Under dire conditions that both the Captain and Staff Captain are unable to perform their duties, the vessel’s First Officer would take command, though only under an emergency. The same chain of command applies in the engine room. But in the medical field, there is no substitute for a certified physician. The vessel will hold fast to the dock until one is onboard. (Roberts & Williamson, 2017)

When it comes to medical facilities and physicians onboard, these were also inadequate for the scope of this pandemic. Onboard facilities to treat illness are relatively small and were not capable of quelling this new virus. Seasickness, minor scrapes and bruises, and the occasional gastrointestinal illness are what preoccupied the medical staff on a typical cruise. Smaller ships tend to have one doctor and two nurses to assist with larger vessels doubling the manning

requirements to two doctors and four nurses. These medical personnel must be on call 24 hours a day while onboard and be certified in emergency medicine, family medicine, or internal medicine with a mandatory three years post graduate experience. (Roberts & Williamson, 2017)

Cruise ships, however, were not new to the term “quarantine”. As mentioned above, the occasional norovirus would happen to find its way onboard and ruin the vacations of a few passengers. Since living quarters are so confined, an influx of passengers would accommodate the same rooms and common areas every new cruise. This is why cruise ships were especially susceptible to norovirus outbreaks. Because of this, each company had procedures to contain the spread and limit the virus as best they could to only the original passengers or crew. (CDC, 2018b)

The Centers for Disease Control of the United States shows that there were roughly 74 million passengers between 2008 to 2014 that sailed on cruise ships under Vessel Sanitation Program (VSP) jurisdiction. This jurisdiction includes vessels with 13 passengers or more that have a foreign itinerary with U.S. ports. (CDC, 2018b) As

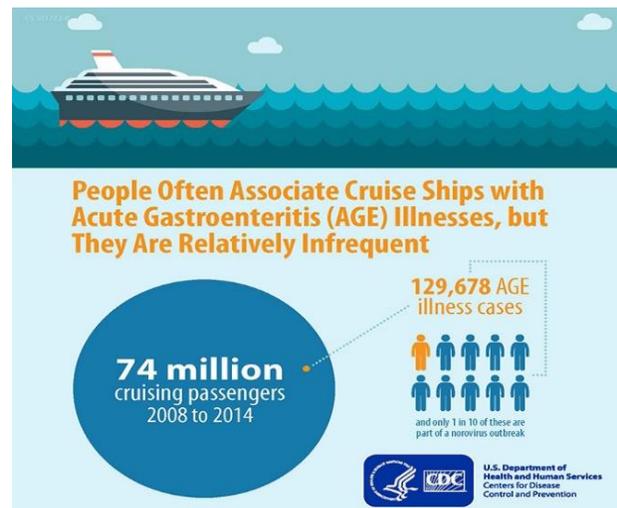


Figure 3 – Source: CDC

the infographic shows, of the 74 million passengers, 129,678 showed signs of acute gastroenteritis illnesses. This accounts for .0018% of all passengers showing signs of illness while onboard. Of those 129,678 passengers over the 6-year span, only 10% were part of a norovirus outbreak. When we compare that to the entire passenger count, only .00018% of cruise ship passengers between 2008 and 2014 were part of an onboard norovirus outbreak. With the

procedures and trained medical staff onboard, this was very manageable. Having 3-6 trained professionals onboard was more than enough to tend to the sick passengers onboard. (Roberts & Williamson, 2017)

Another problem faced from this pandemic was the procedure of medical evacuation (MEDEVAC) from the vessel. Every year, there is the slight chance that a passenger or crewmember suffers a medical emergency that cannot be fixed onboard. Examples such as heart attacks or severe allergic reactions would garner an entirely different response from the vessel. The ship turning around or speeding up to reach a port to unload the passenger so they can be treated at a hospital, helicopter evacuation, and discharging the passenger to a pilot boat or launch to transport them to shore were the methods used to ensure the person could get the best treatment as soon as possible. This was considered the failsafe, though not on paper. If the person(s) can be treated onboard, do so. If they can't, make accommodations to get them to facilities that *can* as soon as physically possible by any means. (Roberts & Williamson, 2017)

The COVID-19 pandemic completely upended this method of operation. Not only was the illness bad enough and infected enough people onboard to warrant shoreside transfer, but no country was allowing them to do so. They had to stay onboard where it was already known that facilities could not help. Evidence of this was shown in Yokohama, Japan when the Diamond Princess was put under a dockside quarantine for two weeks in February 2020 by Japanese officials. As the passengers stayed locked in their cabins without proper medical care or ventilation, the world looked on as the virus-stricken ship and her patrons lay wasting away at the pier. (Mallapaty, 2020)

## VI. Public Response Survey Data

### a) Public Opinion and Knowledge

When it comes to the public, they offer little to no help in solving any aspect of the problem. From the beforementioned survey conducted to learn the public's knowledge and view of the cruise industry, interesting responses arose.

Of the 182 persons surveyed of the general public, roughly 40% believed that larger ship size attributed to a higher safety factor, compared to only 15% of those coming from a maritime background. On the contrary, the maritime professionals outnumbered the general public in believing that smaller ships tend to be safer, with an overwhelming number concluding that ship size did not play any factor in vessel safety at all.

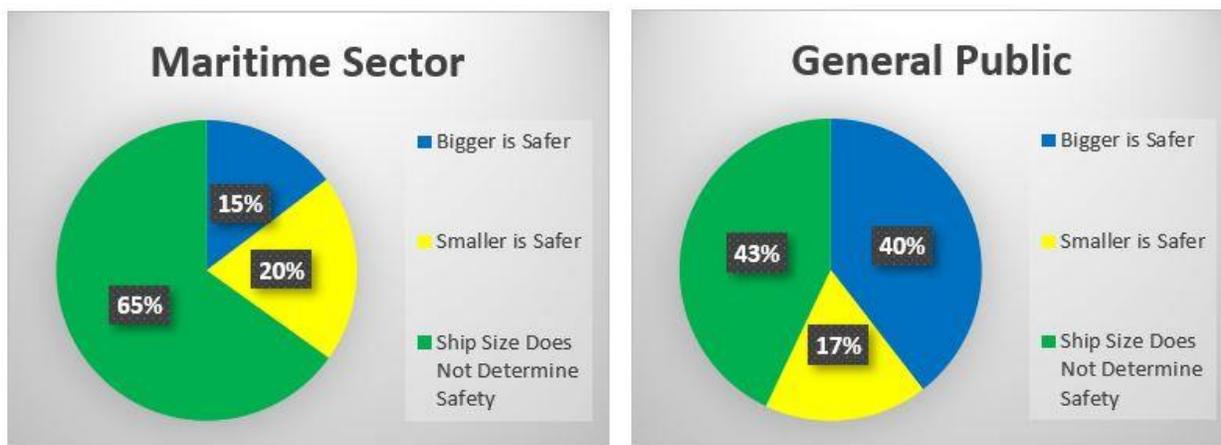


Figure 4 – Cruise Risk Familiarity Survey Appendix I

The survey continued with questions that leaned towards figuring out how long the general public could remember problems that occurred in the maritime industry. The maritime sector responses were used as the baseline for this question, with the emphasis pointed towards those without formal maritime knowledge. Though the COVID-19 Pandemic is more widespread

than one vessel incident, the question of whether or not the public tends to forget after a while needed to be determined. (Petrizzo, Cruise Risk Familiarity Survey, 2019)

When asked by means of multiple-choice responses, more than 4 in 10 respondents of the general public couldn't name the Costa Concordia as the vessel that sank off the Island of Giglio in January of 2012, with almost a tenth of respondents choosing a completely different ship that is currently still in operation. For the baseline group of maritime professionals, 98% chose the Costa Concordia correctly. The below graph is from the general public:

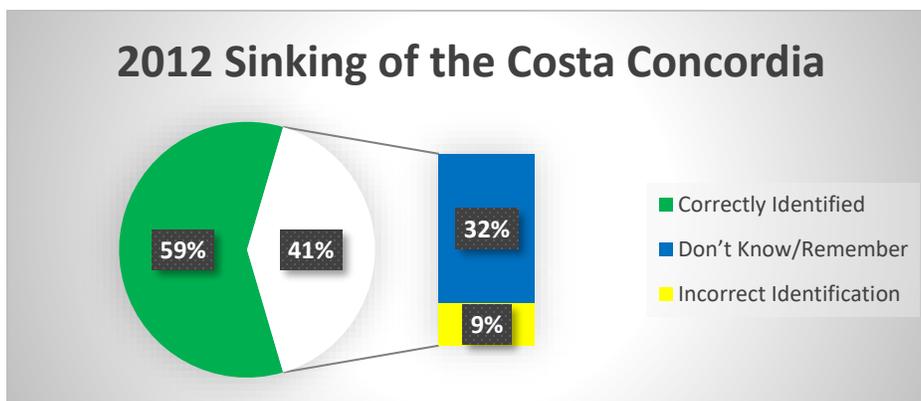


Figure 5 - Cruise Risk Familiarity Survey Appendix I

The question was asked again with a different vessel incident from a different time period. The baseline group stayed the same with the variable being the general public once more. This new question was directed towards a ship accident that occurred 107 years in the past but is arguably one of the most famous. The maritime professionals scored a perfect score of 100% identification but the general public, surprisingly, did not. From a multiple-choice bank of answers, almost 1 in 10 of the general public were unable to correctly identify the R.M.S. Titanic as the ship that struck an iceberg and sank in 1912. The below graph is from the general public:

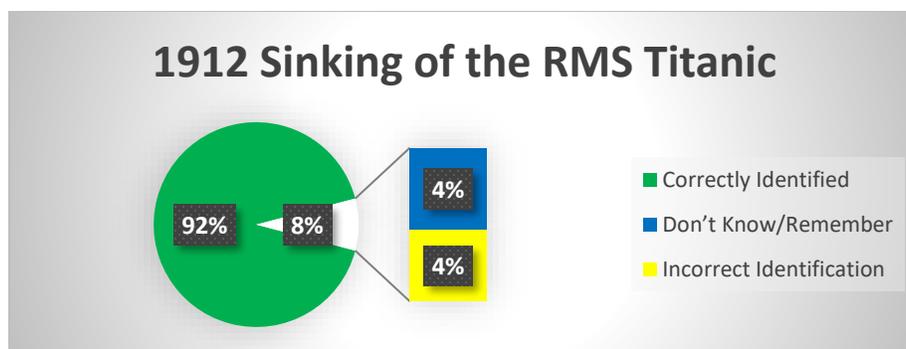


Figure 6 - Cruise Risk Familiarity Survey Appendix I

One final survey was conducted to test the memory of the public and to gauge how close they paid attention. The pandemic emerged into the industry after one COVID-19-positive Hong Kong resident stepped foot onto the Diamond Princess bound for Japan leading to a 2-week quarantine of the vessel in Yokohama. Hundreds became infected with the virus and dozens were hospitalized with seven later dying as a result. (Mallapaty, 2020) Six months later, this survey was sent out via social media and public responses were recorded. For more leniency, all answers containing some form of the word *Princess* were considered correct. All other answers involving separate cruise lines and responses of “Do not know / Do not remember” were categorized separately and recorded as such. When asked: *What was the name of the cruise ship (or cruise line) quarantined in Japan in February due to COVID-19?* The public responded with the following:

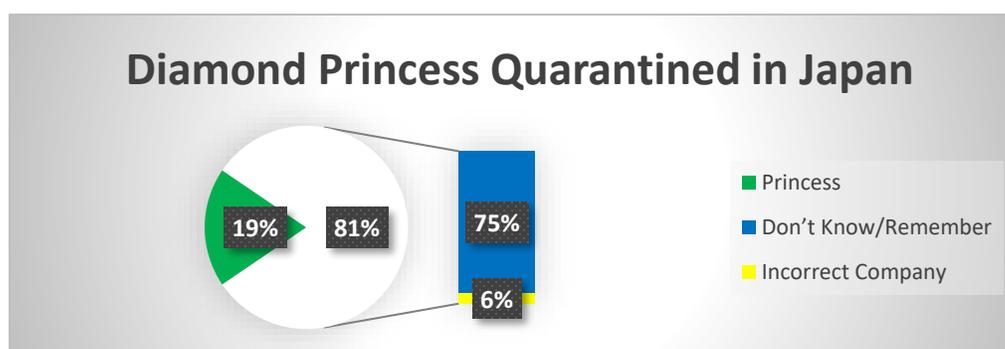


Figure 7 – Secondary Survey Appendix II

In a matter of 24 hours, exactly 200 individuals participated in the survey. The above graph signifies that over 4 of every 5 members of the public were unable to identify the cruise ship or even name the cruise line itself. 6% of the 200 respondents, or 12 participants, incorrectly named other companies as the ones associated with the quarantine. Six responded with Carnival Cruise Lines, three with Royal Caribbean, and one each for Holland America, Norwegian, and even the United States Navy. Of the survey respondents, 3 out of every 4 gave no guess and simply put “Do not remember.” (Petrizzo, Secondary Survey, 2020) Evidence from this survey as well as the previous ones have indicated two things:

- a) The general public has little knowledge of the cruise industry
- b) Over time, passenger ship incidents fade from memory

*b) Public Confidence*

The public, though willfully uneducated in matters of the cruise industry, tends to have the same perception of what transportation modes are safe with those in the maritime sector. When asked what people believed the most dangerous form of transportation was, respondents had these results:

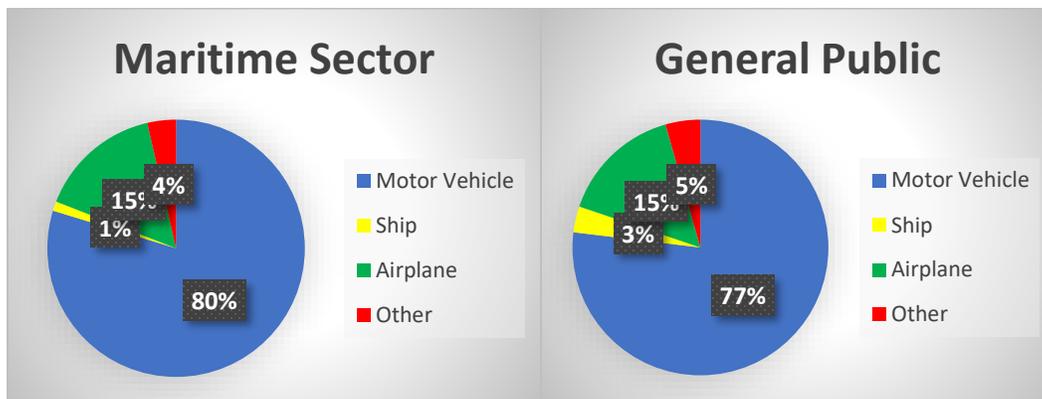


Figure 8 - Cruise Risk Familiarity Survey Appendix I

Though motor vehicles are driven practically every day by the majority of Americans, an overwhelming majority still categorizes them as the riskiest form of transportation. Coming in second was air travel with sea travel falling in behind that. The category *Other* was associated with miscellaneous forms of transportation such as trains and motorcycles.

According to ABC News (2019), the average distance from an American's home to their work is 16 miles one-way. Roundtrip, Americans average an hour of their day getting to and from their jobsite, factoring in things such as traffic and stoplights. This distance is too long to walk or bike and too short for planes, causing motor vehicles to fill this fundamental role. Planes averaged 15% between both maritime professionals and the public. Not only did this give them the title of 2<sup>nd</sup> riskiest, but they are also 2<sup>nd</sup> in necessity in regards to moving people from one point to another. Air travel has the advantage of traveling large distances in short amounts of time, which may be needed for certain business or personal occasions. (ABC, 2019)

When traveling by sea, the comparative advantage lies in the *amount* that can be carried. Cars have very little amount of space in comparison and planes have strict weight limits. Cargo vessels, on the other hand, can carry hundreds of thousands of tons worth of goods per ship and are moving close to 94% of the world economy. The only problem is, cruise ships cannot label themselves under that category. Gone are the days where hundreds of thousands of immigrants would ride the seas on old time ocean liners to make it to the United States. They are no longer considered essential, but a mere luxury.

When a form of transportation becomes a luxury and no longer necessary, the public is less likely to take the risk and companies are less inclined to provide it. Going on a cruise is a form of vacation, not viable transportation. The first things people tend to cut back on during a time of economic or social instability are overspending and excess. One needs to take into

account what transportation categories continued to run and which did not during the initial and subsequent waves of the pandemic. Motor vehicle carpools and busses are still prevalent during the COVID-19 Pandemic. Planes are still operating at a minimal capacity. Cruise companies, however, have completely halted operations entirely.

One could argue, however, that the industry would've been affected whether there were onboard cases or not. When asked of the *likelihood of negative world events effecting people's likelihood to take a cruise*, the following was observed:

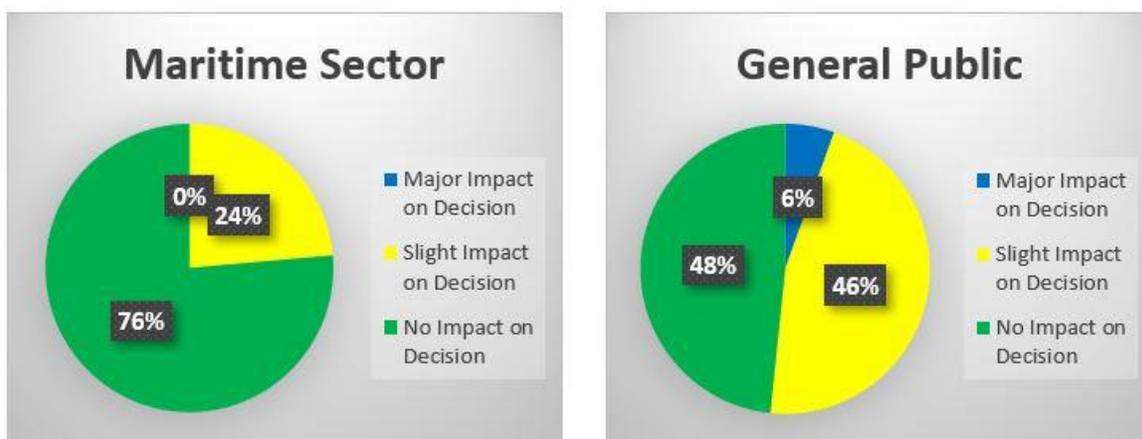


Figure 9 - Cruise Risk Familiarity Survey Appendix I

In this case, the maritime sector professionals surveyed differed greatly in their responses when compared to the general public. Not a single maritime professional of the 168 surveyed believed world events made a major decision on their cruise vacation plans, with less than a quarter stating it made even a slight influence at all. Compare this with the general public where over half stated that world events play some type of role in deciding if they want to book a cruise or not. This can be attributed to one group feeling comfortable in the industry while the other does not. Do events such as the Coronavirus and the September 11<sup>th</sup> attacks scare the public from things they aren't sure won't be hit next? The evidence shows that trend. For the Maritime

Sector, they work and live in this market. There's nothing new or major for them to be afraid of. The public, on the contrary, would seem to not want to take the risk. (Petruzzo, Cruise Risk Familiarity Survey, 2019)

Another problem that needs to be addressed and fixed is the population's perception on how the cruise lines care for them. Everyone knows businesses are there to make money, but to what extent does the public believe the cruise lines value money over them? To do this, a survey question was developed to try to see what people believed cruise companies spent their money on when updating their ships. Were they putting safety and unlavish upgrades on the backburner in place of big improvements that would *wow* their passengers, or doing their due diligence on equally distributing capital to vessel safety as well as new and improved amenities? Yes, cruise ships need to follow national and international regulations regarding vessel health and safety and often times far exceed them, but does the public think they follow them at the bare minimum or make safety a priority always?

When asked *what percentage of millions of dollars' worth of upgrades and new features installed on vessels go towards health and safety improvements that the passengers may or may not see*, they answered with the following:

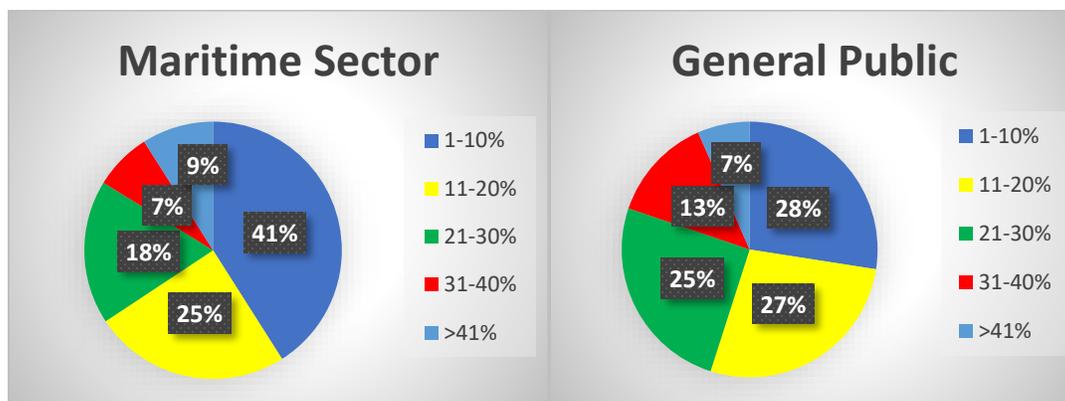


Figure 10 - Cruise Risk Familiarity Survey Appendix I

The largest chunk in both graphs is the *1-10%* group. The general public responses show that they believe more capital is spent on passenger health and safety than the maritime sector—whether that be an assumption from the maritime sector or firsthand knowledge is not known. A few comments given with the survey also addressed the lack of trust in using money towards health and safety.

Respondent #151 from the general public stated:

*“They only spend money on what will make THEM money,”*

while respondent #284, from the maritime sector, also reiterated:

*“Spending millions on safety... Yea, okay.”*

## *VII. Collective Industry Solutions*

After conducting the research to find the most likely causes of coronavirus spread and the perception of the public towards a healthy cruise market and again survey the public 6 months after the pandemic started on cruise ships, the next phase was to use the data in order to come to plausible solutions that best mitigate the problems at hand. These solutions are used directly and indirectly to meet the needs of stopping the spread and quelling fears. Nothing will be fixed by solely adding HEPA filters or re-routing ventilation on the ships that had positive-testing passengers and acting as if nothing ever happened. The vessels that had positive cases were just as prone to the virus as those who weren't. The systems and procedures that failed were not vessel, or even cruise line, specific. This is machinery that is used industry-wide. Recycled air is a normal procedure. (SanAir, 2017) Cleanliness varies by cruise line but it is very unlikely that one of the infected lines are *that* more unsanitary than those not affected. Martinnen, Interview, 2020) The vessels and owners not involved with onboard cases can chock it up to multiple

factors; whether it be itinerary, onboard space, passengers, or even luck. But that does not mean they can just sit back and watch others scramble for a solution. It must be engrained into the minds of the public that cruising is still safe by all players with a stake in the industry. Some solutions may involve capital while others involve time and patience. Both of which are essential in bringing the market back to what it once was.

With this given information, the need for a collective solution becomes more and more apparent. Much like the answers given in the Costa Concordia and Titanic survey questions, participants are thinking that companies completely unassociated with the subject vessel were the actual ones at fault. An updated response plan and perfect track record moving forward by some cruise companies will mean nothing if the others fail to meet even adequate standards. This entire industry-wide approach will deal first with the vessels themselves and slowly shift into fixing the public's negative perception by meeting an above-average level of health and safety so that all passengers will feel that regardless of line, their wellness will not be at risk. The point is to reacquire the customers trust so that they are not using health as a factor when choosing a cruise vacation.

*a) Virus Mitigation*

Not only does the question of “*what* needs to be done?” have to be answered by industry panels and experts, but “*how* does it need to be done?” as well. The *what* is much more intensive and involves far more research by the science and public relations communities. The *how*, would simply be the way in which these protocols are carried out. In some cases, cruise ships need to fix underlying issues that they were able to get away with for far too long. In other instances, they did nothing wrong; but the need to change is still there. These *fixes* can fall into two categories: problems that need a solution and procedures that need tweaking. The problems are

the “*what’s*” that need to be fixed and properly-working procedures that need updating is “*how*” they are to be fixed.

The evidence blatantly tells us that the public does not know what works and what doesn’t on cruise ships, but that doesn’t stop them from ordering them to be fixed. As previously stated, the public has no responsibility to do research into what lines are doing what to keep them safe and healthy. The onboard cleanliness of each vessel is not typically looked at as a decision maker for a cruise vacation. Carnival does not have a drop-down menu on their website of clean and dirty ships. Princess will not let you know if the cabin you booked was previously inhabited by a coronavirus-positive patient. This is why it must be industry wide; to ensure the passengers have a baseline of better health and safety standards so they may feel at ease while onboard. As the public deals in absolutes, the industry must do the same. Royal Caribbean Group Chairman and CEO said it best when interviewed by Travel + Leisure (2020):

*“While major cruise lines often compete ... there was a certain strength in collaborating.”*

Before public confidence can be returned, the first thing that needs to be dealt with is the physical virus itself. How does one keep the virus off of a vessel and if a vessel is infected, how can the spread be eliminated? This can only be done by modifying the ship itself and give the crew new regulations to follow. Evidence shows that this virus is spread more by micro-droplets in the air than by touching surfaces. (CDC, 2020b) In a sense of irony, the way passengers are getting sick onboard cruise ships is from the air circulating in and around the ship itself, not any one piece of the actual vessel or its contents. Due to this, experts agree that the part of the vessel that does need a complete overhaul is the ventilation systems. This machinery is on constantly throughout the life of the ship and provides clean air to all interior spaces of the vessel to prevent

mold and other pathogen growth as well as keeps the air smelling fresh and feeling comfortable. (SanAir, 2017)

Some companies have already taken the initiative to work together to come to a common solution. Norwegian Cruise Line has partnered with rival company Royal Caribbean to develop a new “Healthy Sail” panel consisting of sanitation, disease, public health, epidemiology and biosecurity experts in order to create safety procedures for the fleets of the industry. (Brady, 2020) Royal Caribbean expressed their understanding of fixing problems and updating current policies as well as using a holistic approach with their findings in the following statement from their website (2020):

*“... Their [Healthy Sail Panel experts] insights and recommendations are helping drive our way forward as we work to strengthen our current procedures and create new ones across the entire cruise experience ... Our collective efforts will be shared with the cruise industry and other industries that may benefit from our findings — because we’re all in this together.”*

One recommendation given from the panel as well as guidance from the European Union state that all ventilation units should be switched from recirculation to 100% fresh outside air. (Brady, 2020) Much like the same controls drivers have in their cars, this switch would allow fresh air to be admitted into the ventilation systems for further passage to the inner spaces and not simply recycled through the system and back into the vessel. If the ship was subjected to a virus or other pathogens in the air, the system would flush them out with new clean air being pumped in at a regular time interval. (Saunders, 2020)

Regular interval cleaning is already done for the ventilation systems while the ship is either not underway or in drydock for repairs. This may have been adequate in the past, but not anymore. The aerosols sucked into the ventilation intakes could live 3-5 days attached to the inner steel ducts. (FDA, 2020) In this case, it doesn't matter if the vessel uses fresh or recycled air, they'd still be pushing air through contaminated machinery and into the public spaces of the ship. Along with the new fully fresh air systems, vessels will need a way to regularly and efficiently clean these ducts of any growth or contaminants at a much quicker interval than previously done. Procedures such as Dry-Ice blasting is a quick process that instantly removes any debris or contaminants from duct walls. (SanAir, 2017)

If they cannot do regularly scheduled ventilation cleaning, which understandably could cost more time and money than what a company is willing to shell out, the use of stationary filters in specifically-designated areas could be the answer. A HEPA, or High-Efficiency Particulate Air, filter is a top-tier standard for air filtration, which have been proven to clean the air of extremely small microparticles such as COVID-19. A HEPA filter remove 99.95% of all airborne pathogens larger than .1 microns. The COVID-19 pathogen is 25% larger at 0.125 microns. (Saunders, 2020) An intake HEPA filter would keep contaminants from entering the system while one placed at the exhaust end would allow contaminants in, but ensure none are being dispersed out into the public spaces of the ship. Using one at both ends would be best but involves more capital. Cruise lines would need to decide if the benefits outweigh the costs of regular filter changing as well as modifying their current systems to fit in these filters.

Once the industry adopts a metric to meet, assuming with the help of CLIA or other nationally and internationally recognized parties, they'll have to train their crews in understanding and maintaining the systems. The procedures moving forward would need to be

strict enough to ensure proper cleanliness standards for fleet and industry-wide approval. As previously stated, the Cruise Lines International Association (CLIA) and like-minded trade organizations could spearhead these efforts to keep all companies on the same page. The very essence of these trade organizations is to focus on collaboration between companies and advance the industry as a whole. With help from International organizations such as the IMO, amendments to SOLAS could be adopted to ensure these new standards are not only ideas but studied and mandated. Others could look at updating international law entirely.

As an example, officials in Japan have taken this holistic idea one step further, looking at mandating regulations for cruise ship outbreaks. The motivation coming from the ridicule given to the Japanese government after their handling of the Diamond Princess quarantine in Yokohama, officials have cited discrepancies in Flag and Port State control inspections. Japanese officials claim that the responsibilities of authorities at destination ports are unclear. (Hutcheon, 2020) Who takes a vessel in when there is a pandemic; The origin port? The closest port? What are the responsibilities of that port? The flag state and country in question must currently compete for jurisdiction because there is no clear line where the authority of one ends and the other begins. This “back and forth” cannot take place in the future when there are lives at risk, like the occurrence in February. (Yomiuru Shimbun Newspaper, 2020) A Japanese Foreign Minister (2020) stated:

*“If the country where a port call is made is entirely responsible for a ship, no countries would allow a ship with a mass infection to call at [the] port.”*

Japan is resorting towards regulations to clean up their image, giving adequate proof that international rules are not on the books regarding what their responsibilities were. This is a clear indication that standards must be adopted, if not by cruise lines than by the countries that

associate with them. Lack of a caliber that gives companies and other governing bodies a clear-cut metric to meet will lead to more inability to act and the eventual confusion that results.

*b) Better Ship Design and Functionality*

The problem with cruise lines using these economies of scale and cramming their ships up to the brim with fare-paying passengers is a simple and forthcoming problem, but is much more capital-intensive and hurts the bottom-line way too much to fix. One cannot take a 225,000 gross registered ton ship and cut the passenger capacity from 6,000 to 3,000 in the name of safety. The ship will cost more to operate than the revenue it brings in and will hurt the company. Due to this, most lines will opt to plan to design vessels differently in the future as well as outwardly fix the current fleets. These ships have already been built at the cost of hundreds of millions, if not billions, of dollars. Altering them to meet entirely new construction specifications would bankrupt entire companies.

That does not mean, however, that some inner parts of the ships do not require overhauls. Options such as changing buffet designs, moving performances outdoors rather than in the theaters, and adding more automatic doors could be the answers to some sanitary problems onboard. Adding antimicrobial carpets and fabric around the ship and especially in the cabins could ensure the surfaces do not harbor pathogens and germs. For future cruise design, companies could go as far as limiting crew quarters to know more than 2 per room; where the norm used to be 4. Having purpose-built quarantine areas with their own ventilation would also be an added cost with plenty of benefits. (Hines, 2020) These companies need to investigate and decide what was working and what wasn't. Should they have planned better for something like this? What could they have done differently and what do they need to do for the future?

The medical facilities, though were working for the time, need to be updated for the future. These enhancements would further allow doctors and staff to take care of patients without having to worry about breathing in the same air or touching the same surfaces that landed the passenger on the operating table in the first place. *“By having medical facilities separated from the rest of the ship, security and safety for doctors, nurses and patients alike would be increased. All health emergencies could be dealt with securely in one part of the ship while the fun could remain intact on the rest of the ship.”* (Hines, 2020)

The industry has been dealt a new enemy and needs to be updated in order to deal with it. There is no fault at having medical facilities like the ones in the past; the problem would be dealing with the current state of everything that is happening and not changing for the future. To say that the hospitals onboard and, in turn, the cruise companies themselves, are at fault for being unprepared and ill-equipped would be the same as saying the small regional hospital in your hometown is unequipped to take care of the entire population of your state. The procedures were there, the facilities were adequate for the scale, and it worked. To try to prepare for a pandemic of this magnitude for every ship would have been a substantial risk and expensive undertaking. Not only that, but there'd be no way to foresee it so far in advance that it would even had made a difference. The pandemic started in late-November 2019 and the first passenger tested positive for COVID-19 after disembarking the Diamond Princess of February 1<sup>st</sup>, 2020.

c) *The Two-Fold Approach*

As mentioned in the previous example of the 1918 pandemic that swept the world, the public begins to grow tired of dealing with things after a while. Whether the message is exactly the same or even becoming more significant, the poll of public opinion will begin to get tired and annoyed with the ongoing *breaking news*. Cruise lines will need to take note of this. A two-fold

approach will be the only plausible answer to a public that switches their stance on a subject over time. Frank Del Rio, President and CEO of Norwegian Cruise Line Holdings, regarded to Travel + Leisure (2020) the way the new procedures will be implemented:

*“It's going to be layers — and some of the layers won't even be noticed by guests. [They'll] be behind the scenes, like so much of the work that we already do in the area of health and safety.”*

As cruise lines begin to start operations, they embark on the first phase. Passengers are currently expecting that visible health and cleanliness procedures are being undertaken by the crew so that they may feel a sense of protection and comfort while onboard. When those same passengers depart on their next cruise a few years later, however, evidence shows the opposite to be true. The pandemic incident on cruise ships may be so far out of their mind that they may become startled and annoyed with bartenders wearing facemasks and their room stewards in hazmat suits. As a whole, these cruise companies must overcome a highly demanding public that can change their mind in an instant.

Improvements to vessel safety, shoreside loading and unloading, and onboard cleanliness need to be improved in the short term whether there is an inherent need or not. It does not matter if the current policy of passenger loading and unloading in terminals is as efficient and safe as it could be; there needs to be a visible change in order to show the public that their concerns are being met with understanding. The only way for the public's trust to come back to the industry most affected by the pandemic is to show that steps have been taken to keep it from happening again. Most of the public doesn't know the details of how the virus spread on cruise ships. This will, in turn, lead them to label everything as being a likely association with the spread. It is only

natural for someone to be too cautious if they're scared or uncertain. They make the simple assumption that "*If COVID-19 spread onboard cruise ships, there must have been a problem.*"

In the long term, however, the opposite needs to be done. Twenty years after the pandemic has subsided, the public does not want to hear that they need to stand 6 feet away from the Shore Excursions Desk to prevent the spread of airborne pathogens. Constant reminders of the *steps being taken to ensure their health and safety* in the cruise pamphlets put in their staterooms everyday while onboard would only lead to frustration from the passengers. No one will feel obligated to wear a mask on their vacation. If these improvements are taken out of context and put in the forefront of every cruisers vacation years from now, it will cause much more harm than good. That is why the long-term improvements for the cruise industry need to be done behind the scenes to keep as much normalcy as possible for the guest.

The short-term improvements would be the current compulsory actions being taken such as facemasks and shields, social distancing, and the full transparency on how ventilation will be filtered or used with fresh air. The long-term would be the stoppage of these visual indicators and a continuation of cleanliness policies out of the view of the passengers. Since a virus like this has happened, there is no excuse for there to not be new cleanliness standards in the future for every cruise line to meet. But to dive further in-depth, each of the problems need a forthright solution.

#### *d) The Change in Public Perception*

The confidence of the population needs to return. Every passenger knows in the back of their mind that they are the ones breathing touching the same handrails and breathing the same air that hundreds of others do on a daily basis while cruising, but that does not mean they

outright blame themselves. If the cruise lines want the public's business, it is *them* who needs to change and adapt to new protocols. As seen in hotel and airline confrontations from the past months, the public has the mindset that it is up to the business to protect them, not the other way around. This goes twice as much for a luxury market such as cruising. In the case of driving or using mass transit, people may do their part in order to be able to safely get to work or other essential activities. But when paying thousands of dollars to go on vacation, there is no duty for the public to believe they have to accommodate anything. In reference to the previous survey question of how much capital and effort the cruise lines put into maintaining the best safety standards, the population has made it abundantly clear that they do not believe these companies put their health and safety at the forefront. (Petrizzo, Cruise Ship Familiarity Survey, 2020)

It is prudent to not disregard or become upset with this information, but learn from it and use it to one's advantage. The Diamond Princess was quarantined in Japan for two weeks while making headlines on a daily basis with their names and logos strewn across television screens; and the pattern has still shown that six months later while the pandemic is still going on, 81% of the public either doesn't remember Princess at all or misremembers the situation as occurring on a different company's ship. While maintaining and updating an industry-wide approach to better health and safety standards, be sure to spread the word.

The assumption that the public's perception will change and confidence will return, has the possibility to hold true. Just as the Costa Concordia disaster showed no real problem in the increased cruise market of 2012 and 2013, so could be the case here over the long run. (Pallis, 2020) In this case, ignorance is bliss. If the survey data was the opposite and responses showed the public cared and paid attention very attentively to the cruise industry, they may understand how safe it really is without labeling them as a collective failure, but the memory of this

pandemic may stay fresh in their minds for years to come. One must take this research and use it to better the industry. Figuratively speaking, the future public will do their part; but the industry has to also do theirs.

### *VIII. Conclusion*

The cruise industry has been dealt a blow the likes of which had never been seen before. This virus did not shut down a specific company or region, but the worldwide fleet of cruise ships sailing to every single continent on Earth. Companies have gone bankrupt, tens of thousands of passengers have requested refunds, and the very methods of cruising that have worked for decades have now been thrown into contention. With the entire market feeling the full force of the COVID-19 impact, a different, more in-depth solution will need to be implemented in order to put the cruise industry headed back in the right direction.

The general public has done very little to help the cruise industry; tending to make matters more difficult by not understanding the differences between that come with sea travel and speaking of the industry as a collective rather than what each company does and does not do. Especially in the early days of the pandemic, the population has been fed the bad press and thus grouped the entire industry in negative light. Not only is this unfair, but completely untrue. The cruise companies themselves do not have the ability to stand by and try to perfect their image with advertising and marketing; nor will they even try to prove to the public that they are wrong. The cruise industry must digest the fact that their customers do not have any duty to understand their business and shape their response and future based on it. As long as passengers and the general public continue to stay misinformed, the cruise industry as a whole must join together and combat the safety and trust issues in a holistic approach to fix the problems that led to this shutdown.

So long as these standards are met, whether they are highly-needed or only for show to secure trust, the public looking at cruising will no longer have to contemplate to themselves that cruising may put their families in health risks. This will take some time, but that is where customers begin to help the industry. As the public begins to forget and even downplay incidents in the industry, cruise lines hope for the future; that a new generation of cruising and confidence will soon be able to grace the seas once more. But this is all dependent on how the problems are met now. An “*every man for themselves*” approach is the last thing that will work to quell public fears.

Once these lines put rivalries aside and lift the entire industry higher, then and only then will the tide shift in their favor. Once the market begins to boom once more, competition and business may resume. But until the problems are fixed and, more importantly, confidence restored into the passengers, it does not matter what lines re-start operations on their own— there will be no cruise industry.

### *IX. Discussion*

Multiple states are already caving to public pressure, whether right or wrong, to return to a sense of normalcy. As the days go on, less and less people want to hear about it anymore. They know the severity and deadliness of the virus but after a while, it too becomes old news. But what does this mean for cruise ships? Generally speaking, it means the public *wants* normalcy in the cruise industry to return. At first, cruising was berated with exaggerated headlines and calls for immediate shutdowns. But now the headlines are coming from the countless individuals estimating when the industry will come back.

The term “time heals all” can work for the cruise industry, so long as the return to operations are not rushed and newly implemented procedures are adhered to. From the survey data of 10% of the public not knowing of the Titanic, 40% not knowing of the Concordia disaster only 8 years ago, and 80% not being able to choose the quarantined ship or cruise line from this February, public worry for things that happen in the industry tend to slowly fade from memory as time goes on. But that isn't really a shock. Cruising is not at the forefront of most Americans lives. It's an option for a vacation and a nice topic of discussion from time to time, but the majority do not think about cruising every day. This is why the industry has the ability to rebound.

As much as this is very good news for the cruise industry in the long run, they need to survive the present in order to get there. The industry will come back, but certain companies will not. The free market has already knocked off some smaller and less industry-dominating companies such as Pullmantur and Cruise & Maritime Voyages. Their aging fleets and smaller market share were okay for normal cruising operations; but once the pandemic hit, they could no longer stay afloat. One has to ask the question that if they were able to stay in business through the pandemic, how would they have been able to introduce these new measures of safety and security for their fleets? Ventilation and crew retraining would have taken much time and capital, both of which they did not have as small industry players. If there was a new standard of designing new ships to fix passenger common areas and lobbies from potential virus spread, they would not have even been in the discussion. Their business model of feeding off of the bigger more popular brands and buying their old used vessels would have kept them with these space problems for decades to come.

The surveys led to conclusions that passengers believed bigger ships were safer ships. This is in contrast, however, that these exact ships were the ones being flooded with hundreds of coronavirus-positive passengers and crew. There may still be a sense of misunderstanding and assumption that these behemoths are, in essence, “too big to fail”; much like banks or other institutions that use their size as a form of strength. If the pattern of shipbuilding shows that ships are growing, that must mean they are getting better with an added assumption of safety, right? If smaller was better, ships would’ve just stayed small. But the public forgets to account for bigger ships mean bigger profits. The maritime sector of surveyor respondents leaned more towards smaller ships being safer. Some could attribute this to smaller crowd sizes, less of a labyrinth of endless corridors and deck space to get lost in, and easier vessel maneuverability. The jury is still out since scientists are leaning more towards vessel cleanliness and air circulation rather than size, but enclosing many people in a less-than-recommended amount of space would lead to much more human interaction and chance of spread.

But none of this had any factor on the public confidence. With the bad press surrounding the industry with every new case, the seed was planted into the minds of the population. This was either proof of their subconscious thoughts that cruise ships were “petri-dishes of germs and disease” or gave them new evidence that they were unsafe. As each line suspended cruises and began to go into crisis mode, that seed grew. Companies began to learn rather quickly that they needed to prove to the public that cruising was safe. This was no longer the assumption of fare-paying passengers from the decades of cruising in the past.

But as stated earlier, the surveys also began to shed light on some other interesting things that the public does after a maritime disaster. After a cruise ship sinks or has any other operational casualty, the public obviously becomes very aware of the incident and it becomes the

mainstream topic of discussion for a while. This was shown in the cases of the Costa Concordia sinking and Carnival Conquest loss of power that left it stranded for days in the Gulf of Mexico. 21% of the public and 4% of maritime professionals answered that it would directly influence them from booking a cruise in the near future right after an incident has occurred. Over time as the story fades into memory, however, the public begins to unknowingly care less about what happened. This then leads to the constant theme reiterated again and again. The details of the incident are forgotten and the narrative changes from the accurate statement of “*The Costa Concordia struck an underwater rock formation and sank off the Italian island of Giglio*” to the much less informed: “*I think it was a Carnival ship that sank somewhere in Europe*”; which was an actual response in the original survey.

As arguably the most famous maritime disaster of all time, almost a tenth of the public was unable to correctly pick the Titanic from a multiple-choice bank of answers. The maritime sector, however, scored 100% on correctly identifying the RMS Titanic. Remember, the public does not have any sort of duty to understand anything about the maritime industry in order to give their perception on it. In one instance, the public believed the bigger the vessel was the safer the vessel. On the other, larger ships are being looked at as the cause of mounting spread of the Coronavirus.

If something is a necessity, people will take the risk. Airplanes put passengers in much more cramped conditions than on cruise ships. But not only are there no shutdowns of the entire airline industry, but people are still willfully flying. Cruise ships and vacations are not essential and thus the necessity to take the risk is not in the mind of the public. Because of this, the industry was one of the first markets hit, and arguably hit the hardest, in 2020. Since operation was halted, however, these companies have mostly been out of the limelight. The only reporting

done since the shutdown have been plans on how to re-start the industry and what each company is doing in the meantime to keep their passengers safe and healthy in the future. Public trust in cruising is nowhere near being restored, yet, there are already plans for restarting.

#### *X. Recommendations*

Any recommendations for future work would best be directed at the public, much like the two surveys done for this research, as well as looking into what specific onboard specifications and procedures were changed. Once cruise lines have come up with their plans, implemented them, and restarted cruising, it is important to measure the performance of these plans. Be sure to signify which plans were already being implemented prior to this pandemic as well as which ones were new and gauge whether these new plans worked by randomly selecting individuals from multiple subsets such as maritime professionals, avid-cruisers, non-cruisers, etc. Has there been any relaxation in procedures since COVID-19 went away? Have any cruise lines secretly, or knowingly, changed the ventilation systems back to recycled air rather than constant fresh air? How is the efficiency and cost of these new procedures affecting the industry? It is easy to cut standards when there is nothing going on, but the future measurements of this data will allow for any possible virus outbreak in the future to be met with the best response and mitigation from the industry. Since this thesis was researched and written before the cruise industry recommenced operations, it would be best to measure the cruise operations of the near or long-term future.

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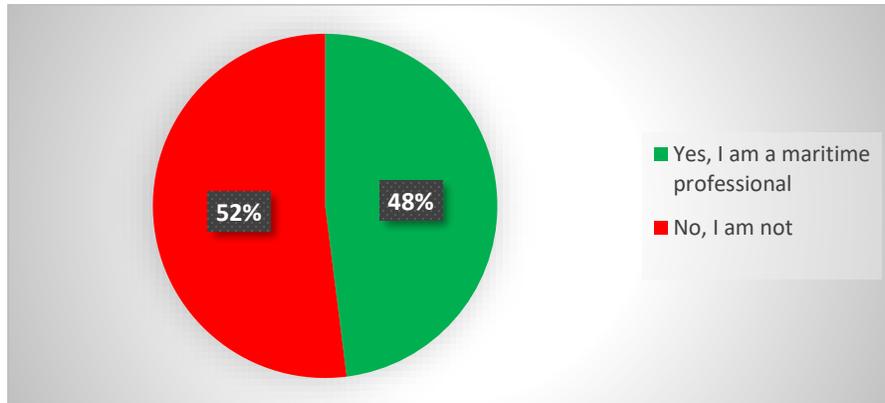
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Appendix I – Cruise Risk Familiarity Survey

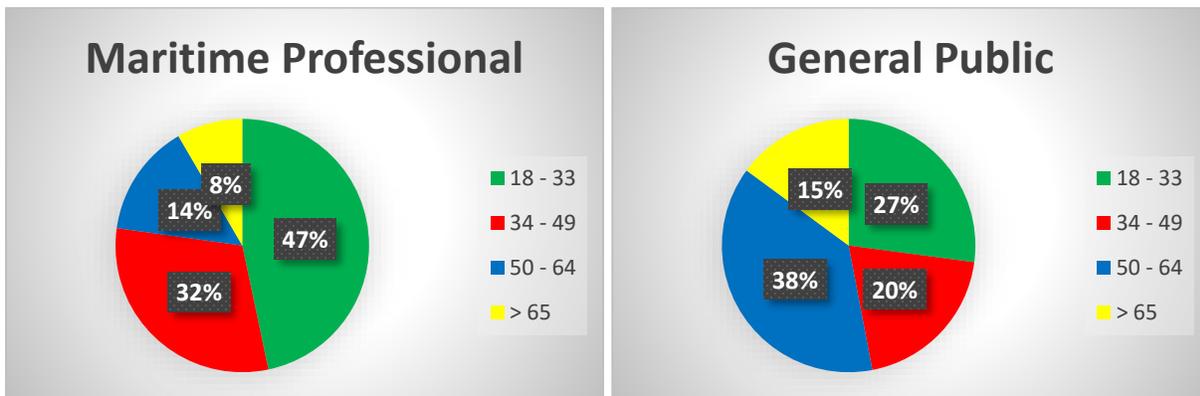
Survey Completion: December 29, 2019

Total Respondents: 350

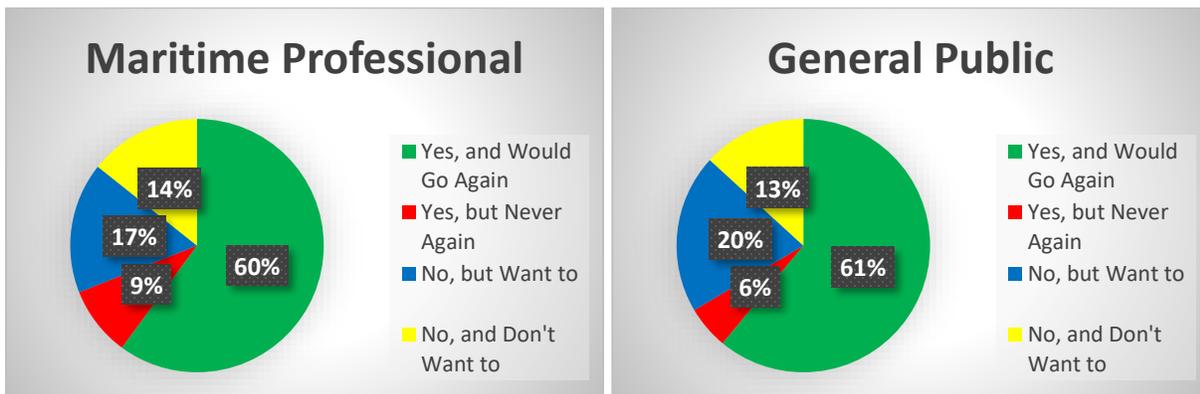
1. Are you a Maritime Professional? (Choose one) (Required Response)



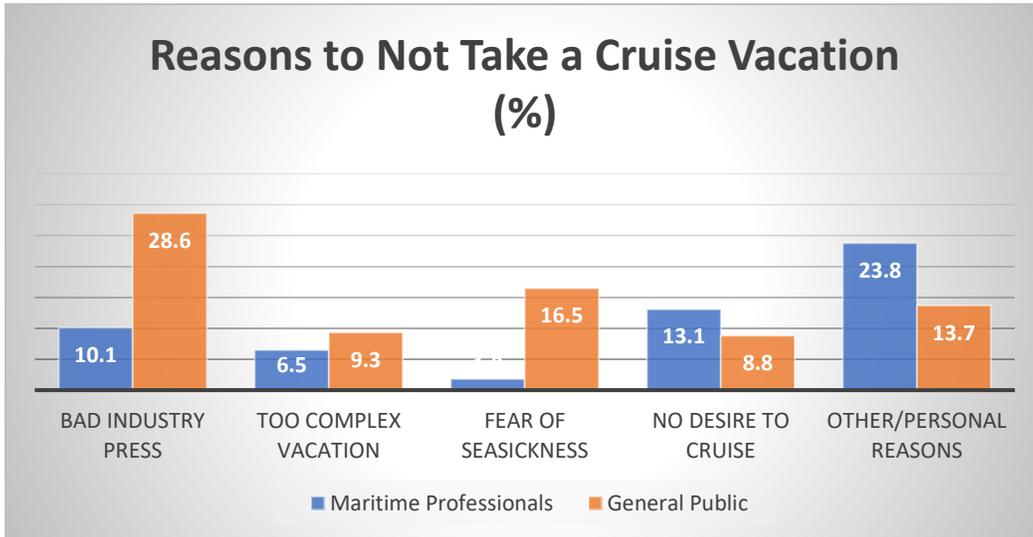
2. What is your age? (Choose one) (Required Response)



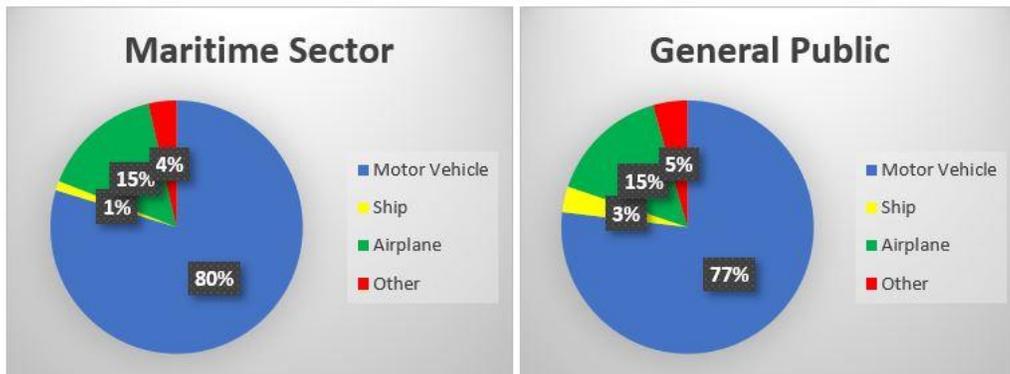
3. Have you ever been on a cruise? (Choose one) (Required Response)



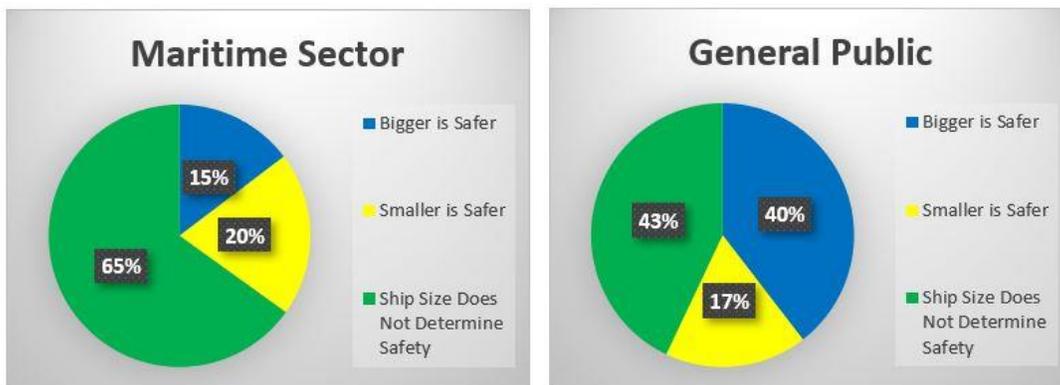
4. Besides financial reasons, select ALL reasons that would stop you from taking a cruise in the future: (Select all that apply)



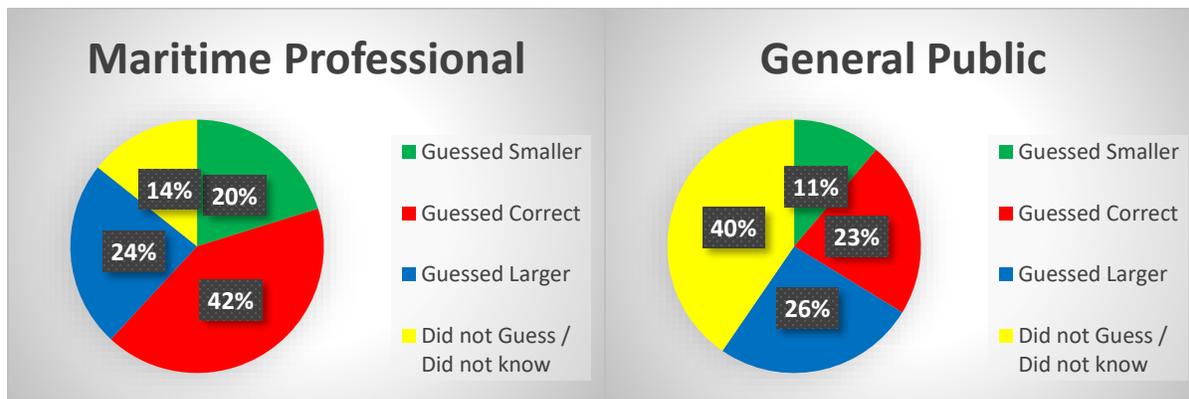
5. Disregarding analytics and studies, what is the riskiest form of travel in YOUR opinion? (Choose one)



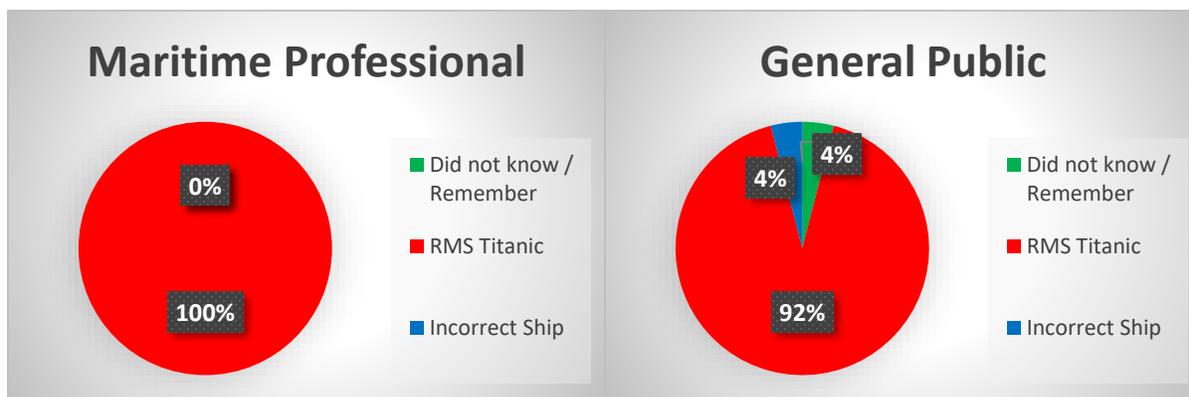
6. When you learn that ships are getting exponentially bigger and more technological, what do you think? (Choose one)



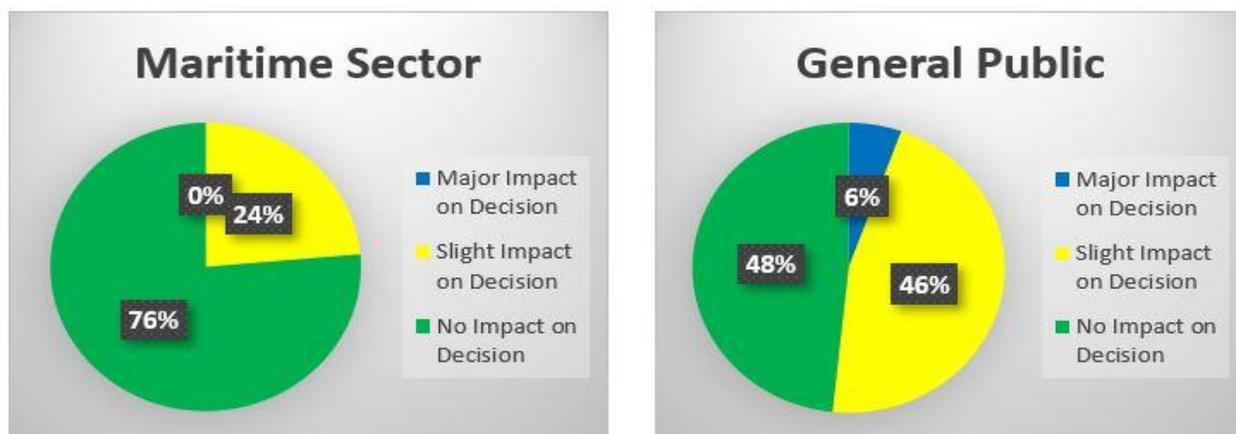
7. The largest ocean liner in 1950 was the RMS Queen Elizabeth at approx. 84,000 GRT. (Gross Registered Tons). What do you think is the approx. tonnage of the Symphony of the Seas, currently the largest cruise ship afloat in 2019? (Choose one)



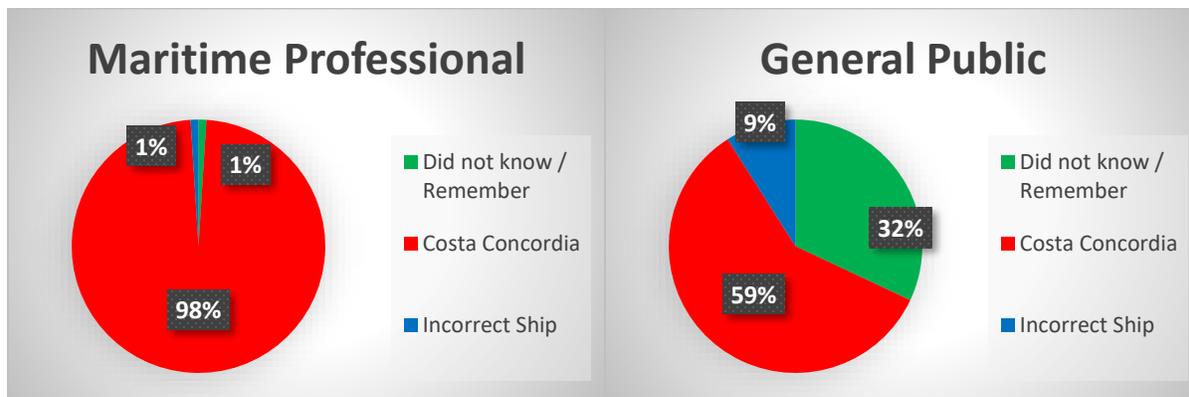
8. What is the name of vessel that collided with an iceberg and sank on its maiden voyage in 1912? (Choose one)



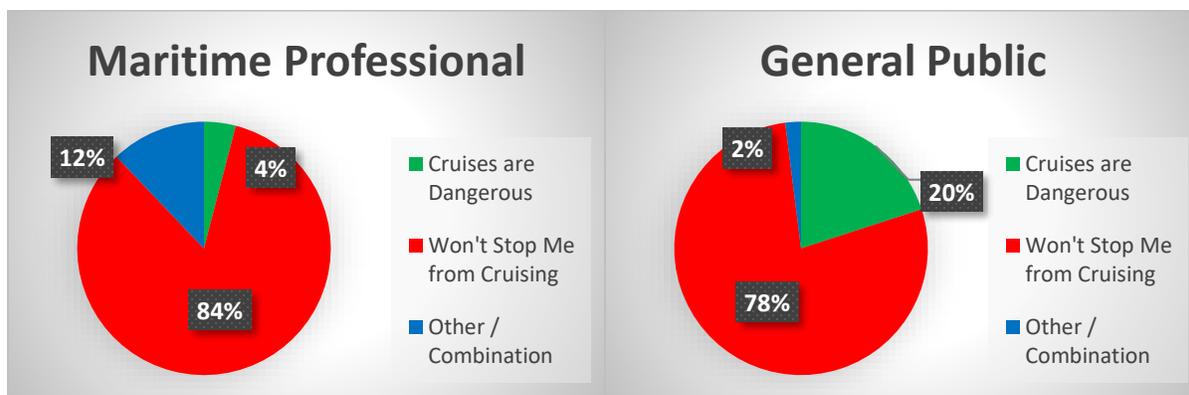
9. How do negative world events like the September 11th attacks affect your likelihood of taking a cruise? (Choose one)



10. What is the name of the vessel, pictured below, that hit an underwater rock formation and partially sank off the coast of Italy in 2012, killing 33 people? (Choose one)



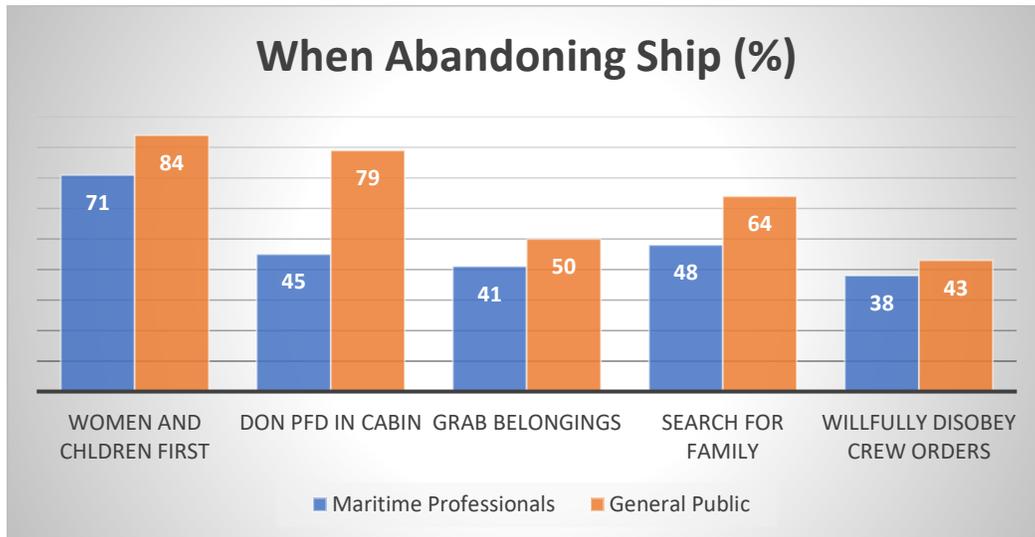
11. What was, or would've been, your personal reaction in 2012 after learning about the above shipwreck? (Choose one)



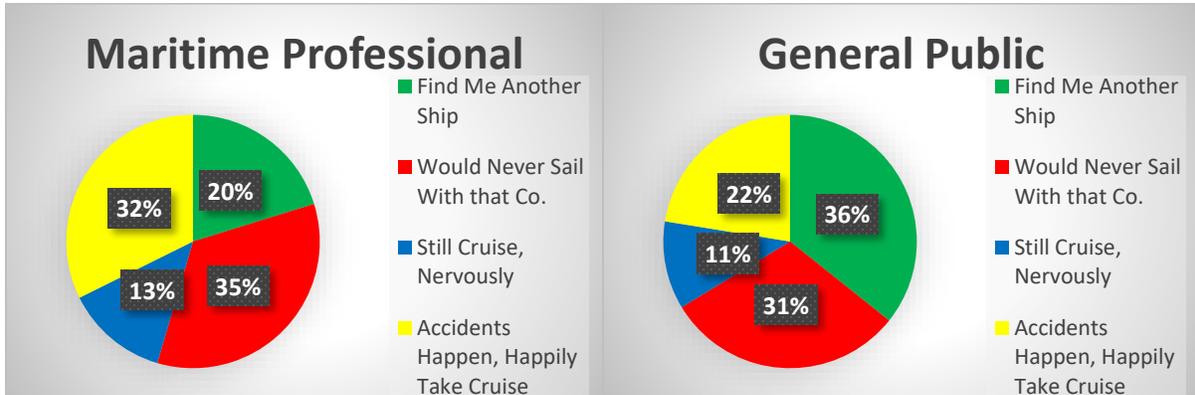
12. The MTS Oceanos, pictured below, sank in 1991. Before departure, repairs below the waterline were not completed which turned out to be the main cause of the flooding. The captain decided to take a shorter route through rough weather which led to the unrepaired systems rupturing. The crew was ill prepared and unable to stop the flooding once it began. In your opinion, who is to blame for the sinking? (Choose one)



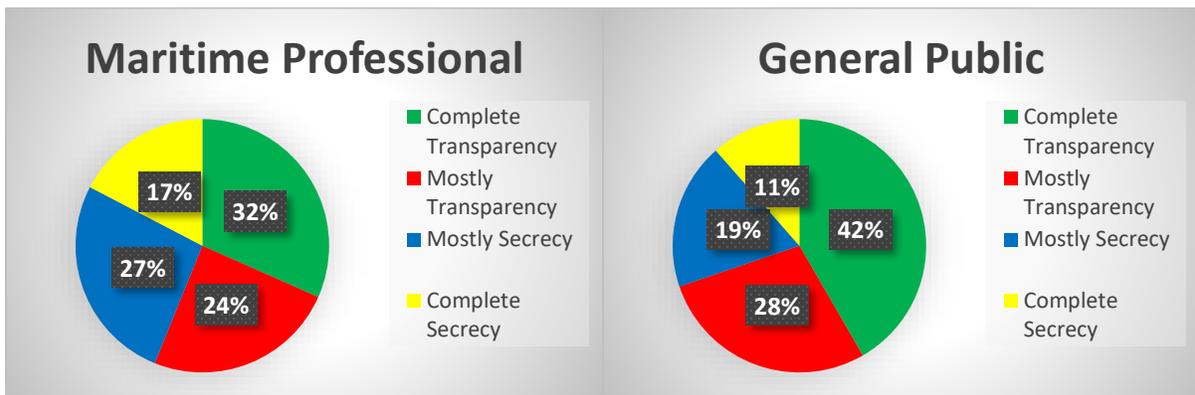
13. To the best of your knowledge, what SHOULD BE DONE when abandoning ship? (Select all that apply):



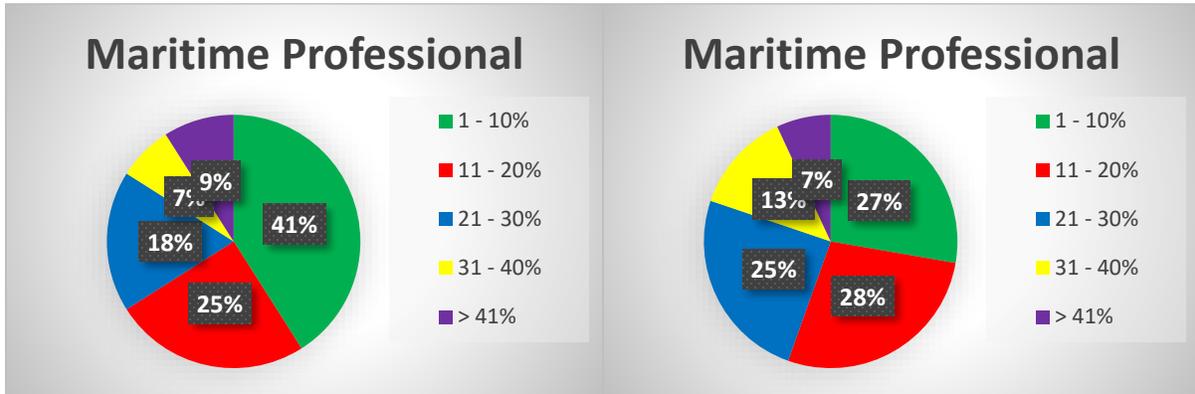
14. In February of 2013, the Carnival Triumph lost power and was left drifting in the ocean for 5 days leaving passengers without running water, waste facilities, lighting, or air conditioning. Passengers and crew were left to eat crackers, relieve themselves in plastic bags strewn around the ship, and sleep outside due to the overwhelming stench indoors. What would be your reaction if you were booked on that vessel on the first cruise after she was reportedly fixed? (Choose one)



15. You are the CEO of a major cruise line with the responsibilities of making sure your company stays profitable and at the top of the industry. With that in mind, what would be your course of action for incidents that occur onboard your vessels in regards to notifying the public? (Choose one)



16. A cruise ship built in 2000 is being refurbished at a cost of \$30 million dollars. The cruise line stated that there would be improvements to furniture, the pools, dining areas, staterooms, and safety. How much of the total \$30 million dollars would you assume went towards safety updates and other behind-the-scenes improvements that the passengers wouldn't directly see? (Choose one)



17. After taking this survey, how do you feel about the cruise industry? (Choose one)



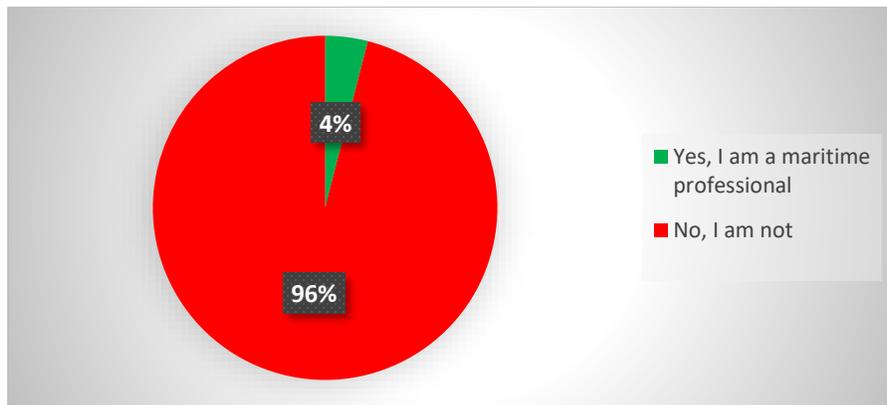
Appendix II – Secondary Survey

Survey Completed: August 21<sup>st</sup> 2020

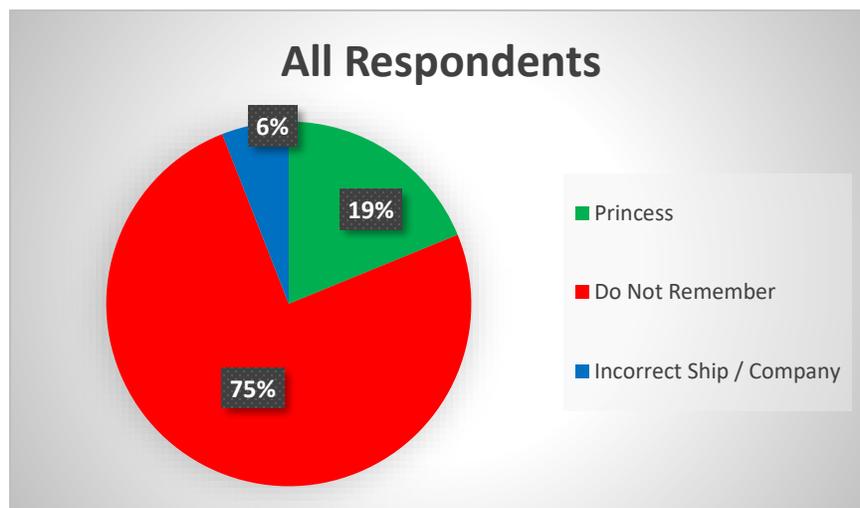
Total Respondents: 200 (in 24 hours)

Are you a Maritime Professional? (Choose one) (Required Response)

\*Responses Disregarded\*



Without researching or Googling, what was the name of the cruise ship, or associated cruise line, quarantined in Yokohama, Japan in February 2020 due to COVID-19? (Written Response) (Required Response)



<u><b>Appendix III</b></u>	<b># of Vessels</b>	<b>Passenger S.R.</b>	<b>Full S.R.</b>	<b>Passenger : Crew</b>
<b>Luxury</b>				
<i>Crystal</i>	4	68.8	37.9	1.4:1
<i>Azamara</i>	3	39.3	25.8	1.9:1
<i>Regent Seven Seas</i>	5	62.0	38.6	1.7:1
<i>Ponant</i>	9	50.6	32.5	1.8:1
<i>SeaDream</i>	2	39.0	20.6	1.1:1
<i>Seabourn</i>	5	61.2	39.0	1.8:1
<i>SilverSea</i>	10	50.3	32.5	1.7:1
<i>Viking</i>	6	52.0	34.6	2.0:1
<i>Hapag-Lloyd</i>	6	59.5	34.7	1.4:1
<b>Average</b>	<b>5.6</b>	<b>53.6</b>	<b>32.9</b>	<b>1.6:1</b>
<b>Premium</b>				
<i>Oceania</i>	6	40.7	27.2	2.0:1
<i>C&amp;M Voyages</i>	5	32.2	22.8	2.5:1
<i>Windstar</i>	6	36.7	24.2	2.0:1
<i>Cunard</i>	3	39.0	28.5	2.7:1
<i>Saga</i>	4	48.3	31.6	1.9:1
<i>P&amp;O</i>	13	34.3	25.3	2.9:1
<b>Average</b>	<b>6.2</b>	<b>38.5</b>	<b>26.6</b>	<b>2.3:1</b>
<b>Contemporary Plus</b>				
<i>Fred. Olson</i>	4	29.4	21.7	2.7:1
<i>Princess</i>	19	33.5	24.9	2.9:1
<i>Celebrity</i>	12	34.7	25.8	2.9:1
<i>Dream</i>	2	45.0	28.3	1.7:1
<i>Disney</i>	4	35.5	25.3	2.5:1
<i>TUI</i>	5	40.0	29.5	2.8:1
<i>Marella</i>	6	32.5	23.4	2.7:1
<i>Holland America</i>	15	35.1	25.7	2.8:1
<i>Phoenix Reisen</i>	4	38.8	27.1	2.3:1
<b>Average</b>	<b>7.9</b>	<b>36.1</b>	<b>25.7</b>	<b>2.6:1</b>
<b>Contemporary</b>				
<i>Carnival</i>	28	29.9	22.3	3.0:1
<i>Norwegian</i>	17	32.4	23.8	2.8:1
<i>Star</i>	5	34.0	24.9	2.7:1
<i>MSC</i>	18	30.4	23.2	3.3:1
<i>Celestyal</i>	5	25.5	19.6	3.3:1
<i>Costa</i>	15	31.3	23.7	3.2:1
<i>Pullmantur</i>	4	32.5	24.7	3.2:1
<i>Aida</i>	15	33.5	26.5	4.0:1
<i>Bahamas Paradise</i>	2	33.0	23.8	2.6:1
<i>Royal Caribbean</i>	25	32.3	25.7	3.4:1
<b>Average</b>	<b>13.4</b>	<b>31.5</b>	<b>23.8</b>	<b>3.1:1</b>

Total Vessels: 289

Total Cruise Lines: 34

S.R. = Space Ratio

Cruise Lines were grouped into 4 categories based off of the following factors:

- 1) Star Rating
- 2) Average Ticket Price for 1-week voyage (all staterooms)
- 3) Passenger Space Ratios
- 4) Passenger to Crew Ratio

**Passenger Space Ratio** =  $GRT \div \text{Max Passenger Capacity (excluding crew)}$

**Full Space Ratio** =  $GRT \div \text{Max Passenger Capacity} + \text{crew}$

**Passenger to Crew Ratio** =  $\text{Max Passenger Capacity} / \text{crew}$