



- **Container Shipping Market**
- **News Highlight: China Rejects P3 Alliance**
- **Strengthening Hong Kong's Leading Position as a Logistics Hub**
- **Special Issue I: Safety in the Cruise and Ferry Industries**
- **Special Issue II: Cargo Safety and Cyber-Security**

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Maritime Education | Research | Consultancy

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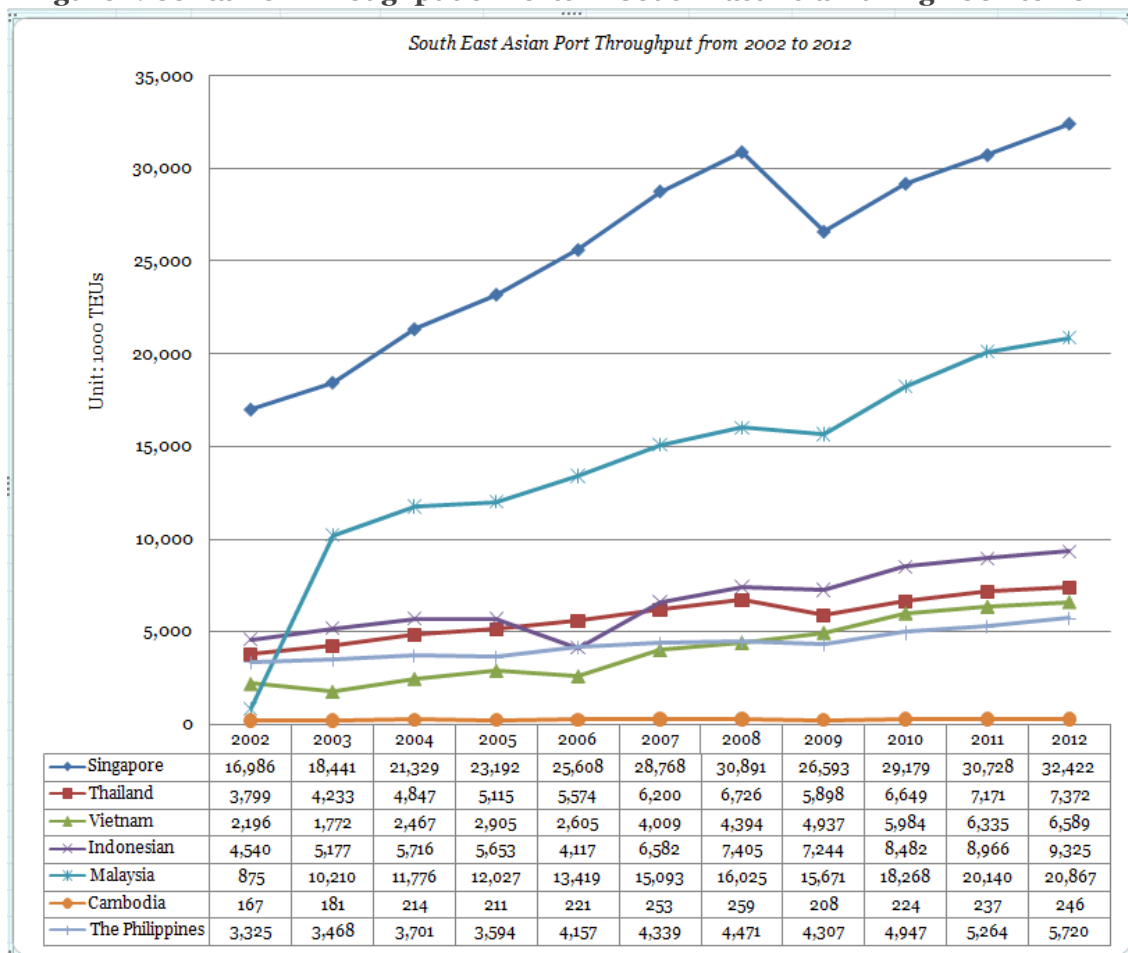
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Container Throughput and Economic Development

South East Asia has experienced rapid economic growth during recent decades, and export contributed a great deal to the region’s economic development. According to UNCTAD Maritime Transport, the total fleet in South East Asia has increased from 58,280 vessels in 2002 to 150,337 in 2014. Among all vessels, the number of container ships increased from 5,630 in 2002 to 22,069 in 2014. Located next to the two world’s biggest growth engines– China and India, countries of South East Asia have not lost out in the battle during this round either. It is safe to say that one of the highest GDP rates in the world can be found in South East Asia. Our analysis illustrates the main economic indicators of Cambodia, Indonesia and Malaysia from which readers could catch a sight of the market trend and thus get some insights for the port development and growth in container throughput.

Figure 1. Container Throughput of Ports in South East Asia During 2002 to 2012



Sources: UNCTAD Review of Maritime Transport 2005-2013
 World Bank Container Port Traffic

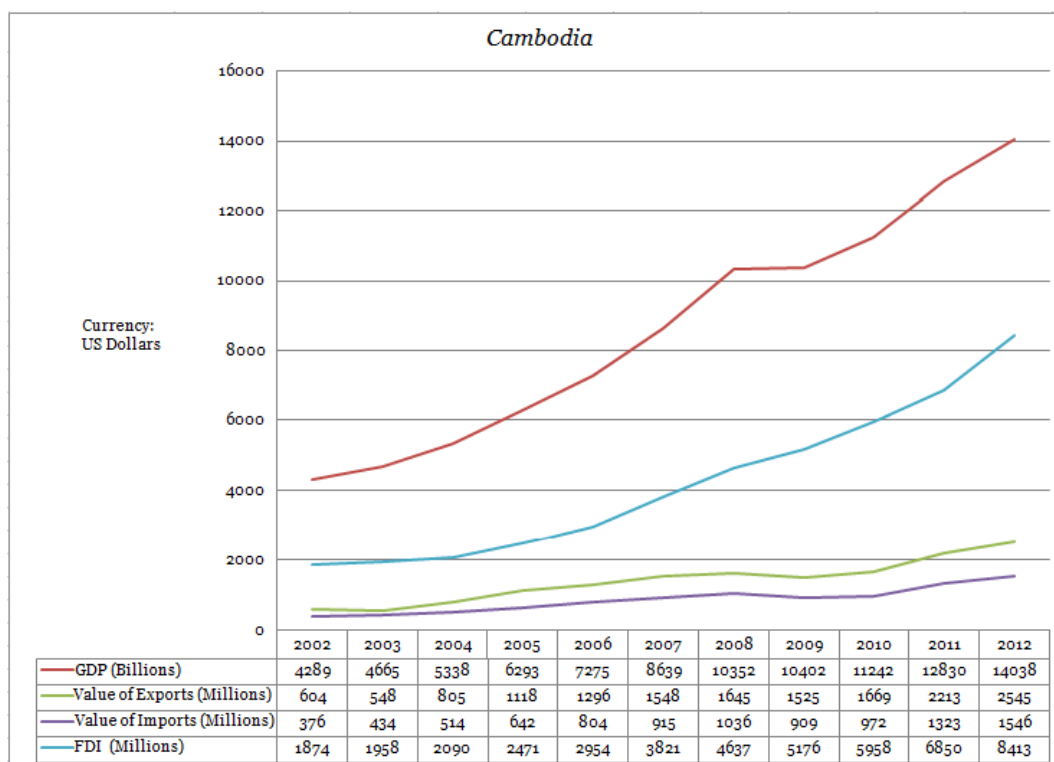
With the economic development, ports of this region have undergone some transformation and development as well, although there are some ports lagging

behind. Figure 1 illustrates container throughput of major ports in Southeast Asia. Some ports in Indonesia, Philippines, Thailand and Cambodia are obviously growing more slowly, and we will describe the key advantages and challenges that face them. According to Figure 1, Singapore and Malaysia are performing far better than the other ports. Factors that contribute to remarkable growth in container throughput should be categorized in several aspects, both in terms of “software” and “hardware”.

1. Cambodia

Among the seaports in Cambodia, Sihanoukville Port is the major port that deals with international containers. The Port of Sihanoukville is situated in Sihanoukville province, and is the principal and only deep seaport of Cambodia. Transportation traffic is estimated at around 2.4 million tonnes per year. Phnom Penh Port is the other major port in Cambodia that is used for import and export. Penh Port handles around 25% of the nation’s container throughput each year due to its advantageous geographic position. Penh Port is connected with sea lanes to China via the Mekong River.

Figure 2. Main economic indicators of Cambodia, 2002-2012



Sources: UNCTAD STAT, <http://unctadstat.unctad.org>

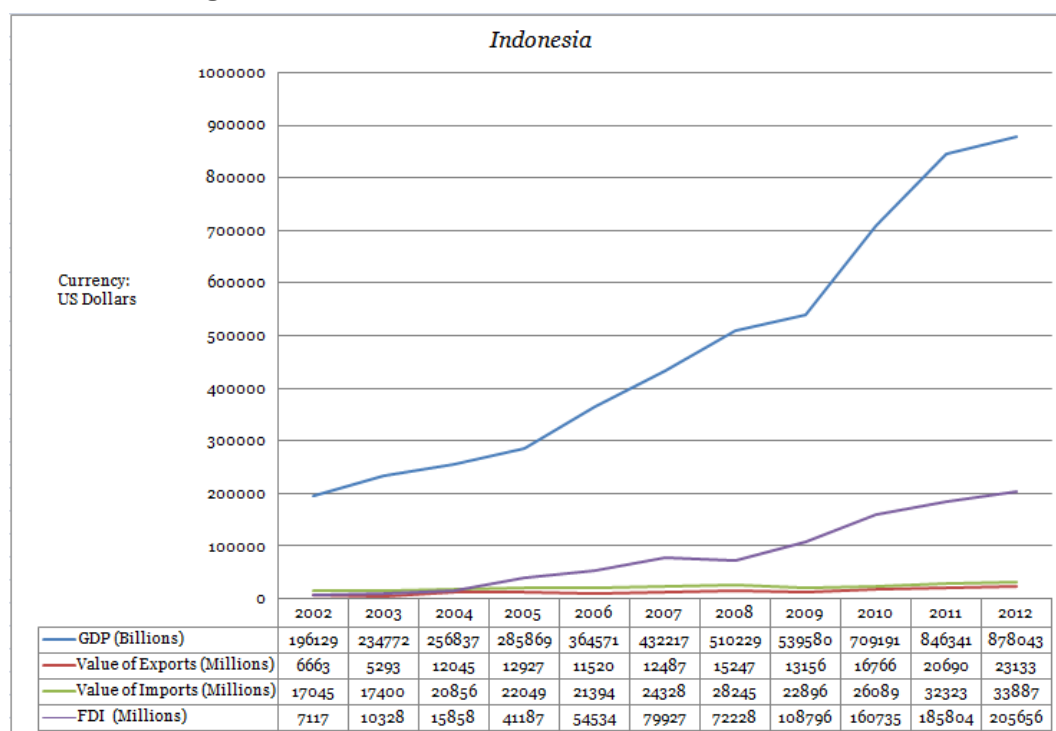
As is indicated in Figure 2, Cambodia was hit hard by the world economic recession in 2008-2009. However, the port’s business in Cambodia has seen strong economic growth by bouncing back and continuing to grow after year 2009. Cambodia’s economy relies heavily on its agricultural products rather than industries. Rice,

wheat and bean are major contributors to export. During the years 2009 to 2012, rice handling volume at Sihanoukville Port and Penh Port increased by more than 10 times.

2. Indonesia

As can be seen from Figure 3, the Indonesian economy has been growing increasingly strong over the past decade. The truth is that along with its economy development, Indonesia's trade policies and trade environment have been rather progressively opened. With headquarter of UNESCAP located in the capital city, Jakarta, many kinds of resources, and professionals having experiences and wisdom working, the region's economy has steadily improved. Evidence is shown in Figure 3 that there is a sharp increase of Foreign Direct Invest in Indonesia during recent years, too.

Figure 3. Main economic indicators of Indonesia, 2002-2012



Sources: UNCTAD STAT, <http://unctadstat.unctad.org>

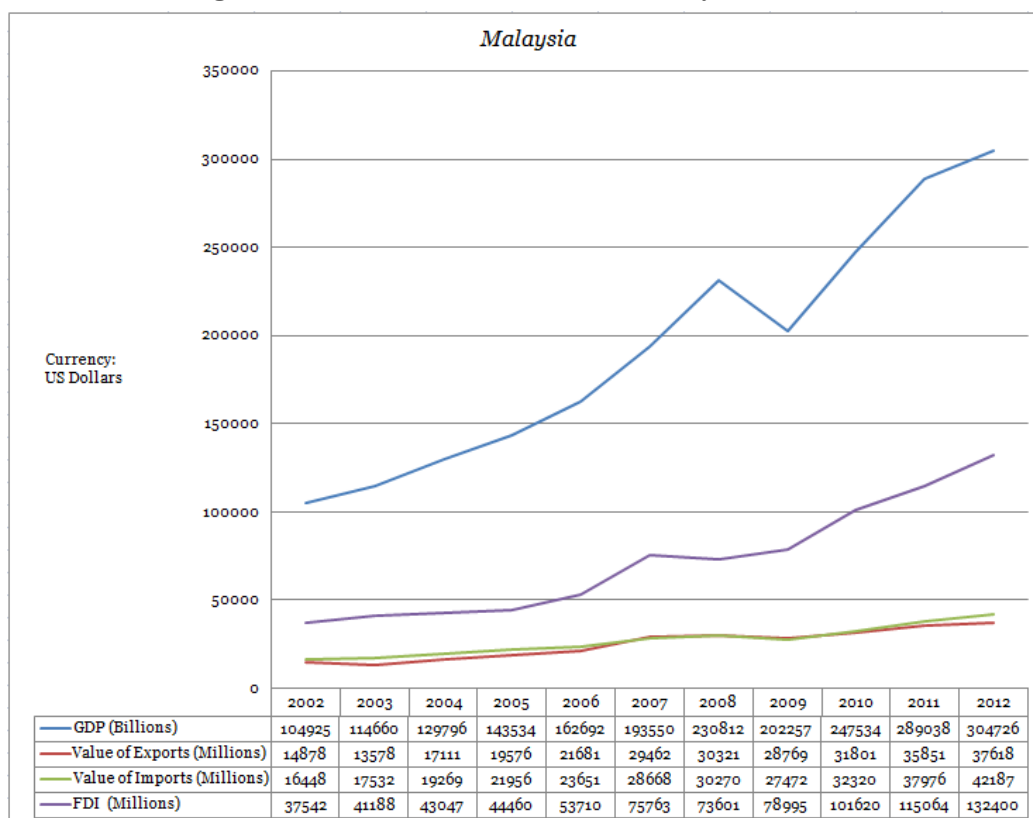
Indonesia has two principal ports, Tanjung Priok Port and Tanjung Perak Port, the former handling two-thirds of Indonesia's international trade and container traffic. To be consistent with the economic development, Indonesia has to go through infrastructure capacity-building, which is the key to sustainable port progress. According to Indonesia Port Corporation, the container traffic in Tanjung Priok port will grow more than 160 percent by 2015. The long dwell time and sophisticated payment system are the current bottle necks at both ports. Endeavors to shorten dwell time and simplify payment and customer clearance procedures are necessary. The government has signaled very positively that it plans to develop

international-standard ports.

3. Malaysia

Port Kelang and Port of Tanjung Pelepas are two major ports in Malaysia. Port Kelang is one of the most established ports in Malaysia. The port has trade connections with over 120 countries, and more than 500 ports around the world. It also serves as the nation’s load centre and regional transshipment centre, and is called upon by 17,000 vessels annually. Port Kelang has been developed in line with the economic growth of the country, and it has been positioned as a regional transshipment hub. Compared with the ports of the two previously mentioned countries, port efficiency in Malaysia greatly benefits due to its modern infrastructure, information systems, professionals, customs clearance efficiency and advanced management skills especially in logistics and maritime industries. Apart from those advantages, policies and regulations drive global supply chain forward so as to fully support international trade to the largest extent. According to Figure 4, Malaysia has expanded its economy and Foreign Direct Investment rapid over the last five years. Except for the economic downturn during the financial crisis, GDP in Malaysia has demonstrated strong upward trend, and it seems like the trend is ongoing.

Figure 4. Main economic indicators of Malaysia, 2002-2012



Sources: UNCTAD STAT, <http://unctadstat.unctad.org>

CHINA REJECTS P3 ALLIANCE

In 2013, Maersk Line, CMA CGM and MSC agreed to establish an operation pact named the P3 Network so as to solve industry overcapacity issues. The Network was later approved by the regulators in EU and the U.S. in 2014. After EU and the U.S. have cleared the alliance, the P3 Network has only been waiting for China to approve it in June, 2014. However, the Chinese Ministry of Commerce (MOFCOM) announced that it has decided not to approve the planned large-scale alliance between the three largest carriers in the world, Maersk Line, CMA CGM, and MSC. The decision was made and P3 will not be realized.

According to Maersk, the decision follows a review under China's merger control rules. "The Partners respect MOFCOM's decision. Subsequently, the Partners have agreed to stop the preparatory work on the P3 Network and the P3 Network as initially planned will not come into existence. The lack of implementation of the P3 Network will have no material impact on the Maersk Group's expected results for 2014."

According to MOFCOM, formation of a global alliance might have benefited Maersk, MSC and CMA CGM at the expense of other operators, and that in "numerous discussions" the P3 Network had failed to address whether the positive elements would outweigh any adverse impact. The P3 Network was considered a merger, which differs from the opinion that authorities of the alliance hold. China's decision to reject the formation of a global alliance, however, did come as a surprise to the partners as they had worked hard with regulators from China side to address all the regulator's concerns said Group CEO Nils Smedegaard.

Maersk Line had been thrilled about the strategic benefits that P3 alliance would have offered, such as expanding vessel networks, enabling them to make further reductions in cost and carbon emissions, improving its customer services, and improving margins in the end. Nevertheless, it is said that the absence of P3 alliance would not make much difference to Maersk's target earnings in 2014, basing on the performance of the previous several quarters where there was an absence of P3. Moreover, Maersk Line has proved to be able to achieve many accomplishments alone in terms of reduction in cost and carbon emissions and making profits during downturn periods. Maersk Line would continue in this way, declared Maersk Line's Trade and Marketing Officer Vincent Clerc, though he was also surprised by the decision from regulators of China.

STRENGTHENING HONG KONG'S LEADING POSITION AS A LOGISTICS HUB

AN EXCLUSIVE INTERVIEW WITH PROFESSOR CHUNG-YEE LEE

BY EDITORS OF THE MARITIME INSIGHT

VENUE: THE HONG KONG POLYTECHNIC UNIVERSITY



Prof. Chung-Yee Lee is Chair Professor/Cheong Ying Chan Professor of Engineering, Department of Industrial Engineering & Logistics Management (IELM) and Director of the Logistics and Supply Chain Management Institute at The Hong Kong University of Science and Technology. He served as Department Head of IELM in 2001-2008. He is a Fellow of the Institute of Industrial Engineers and Hong Kong Academy of Engineering Science. Before joining HKUST in 2001, he was Rockwell Professor in the Department of Industrial Engineering at Texas A&M University. His research areas are in logistics and supply chain management, scheduling, and inventory management. He has published more than 130 papers in refereed journals and has engaged in more than 40 research projects sponsored by RGC, ITC, NSF and industries in U.S. and Hong Kong.

We recently had the privilege to meet Prof. Chung-Yee Lee in order to solicit his views on how to transform Hong Kong's Ocean Transport Logistics Network so as to strengthen Hong Kong's leading position as a logistics hub. Prof. Lee also shared his personal experiences and thoughts on how to conduct quality research.

Q1: What direction to date has your research taken in finding solutions to transform Hong Kong's Ocean Container Transport Logistics Network? Are there any policy implications that have come from your research findings for the Hong Kong Government on how to strengthen Hong Kong's leading position as a logistics hub which is currently perceived to be under serious threat from neighboring port cities?

Prof. Chung-Yee Lee: Presently, there are two active models of what we term and understand as a maritime centre. The first one is the London/New York model which has been transferred from a centre focusing on actual physical cargo flows to one that currently deals with financial and service flows. Conversely, the other representation is termed the Rotterdam model which is mostly concerned with the physical flow of cargo. However, Hong Kong has to determine its future in a way which is

significantly different from those two models. The London/New York model and the Rotterdam model are operated within one country and one system, while Hong Kong is in a unique position of being administered under the umbrella policy known as “One country, two systems”. This situation presents a variety of challenges thus making it harder for Hong Kong to simply adopt the London/New York model.

In my opinion, Hong Kong could visualize its future as developing into an international maritime centre with mixed functions of both the London/New York model and the Rotterdam model. On the one hand, Hong Kong continues to play its physical advantage, which is a foundation to promote both service and financial flow. That is to say, the real advantages of Hong Kong provide a solid foundation for its soft power so that it can supply both functions and therefore, in the long term, ensure a high degree of prosperity. On the other hand, Hong Kong has to further improve its competence in the area of service flows. In the future, one possibility could be that Hong Kong collaborates with Shenzhen to establish the world's largest logistics zone. A very important aspect to strengthen Hong Kong's leading position as a logistics hub is that leading academics continuously focus effort and research into this area in order to present clear and viable options and solutions to the Hong Kong government. In this way, effective policies can be implemented particularly with regard to the global supply chain.

With regards to the whole supply chain, efficiency as well as predictability is of equal importance. I believe that one reason why neighboring port cities in China are unable to match Hong Kong in a short time frame is due to these two characteristics. Overall supply chain costs might be higher in Hong Kong, but since it is predictable and highly efficient, customers would still be willing to buy into its services. Apart from logistics efficiency, transshipment in Hong Kong is more predictable both in terms of time and cost. From a customer's perspective, predictability in time and cost currently make Hong Kong a more reliable business partner and destination.

Q2: Except for the star ports like Shanghai, Singapore, Hong Kong, and Shenzhen, do ports in Vietnam, India and Indonesia have a future?

Prof. Chung-Yee Lee: Yes, they certainly have a future in terms of growth and influence in the region but this will greatly depend on whether they can improve in both their efficiency and effectiveness. Most academic research aims to improve efficiency yet effectiveness usually is strongly affected by government regulation and

policy. India has recently been showing great improvements in the high-tech sector, particularly the software industry. With greater expectations by the middle classes and a corresponding increase in living standards, this will automatically lead to greater demands on the logistics industry and India will need to expand its ports. For the time being, I should say that India is not quite ready yet for huge expansion of its port operations.

Q3: Could you please share any of your ideas about the application of your research with the professions from the shipping and logistics industries?

Prof. Chung-Yee Lee: We are actually in preliminary stage where building the inventory is our priority task. Several pilot projects are being conducted in collaboration with the ocean industry, for example, OOCL and HIT. We hope that the experiences obtained from these implementations could be further scalable and widely applicable in other companies of shipping and logistics industries as well.

Q4: Could you please share research experiences with the academia about how to conduct quality research and publish papers in top journals?

Prof. Chung-Yee Lee: Achieving global excellence and making great local impact are usually the twin goals in my research. To achieve these, we have to improve a number of skills including communication, problem solving and IT as well as have a thorough understanding of the latest trends in both business and industry knowledge. To make great local impact we have to work closely with industries to solve practical problems and also incorporate what we learned from practice into interesting, relevant and practical class materials. My advice to junior faculty would be that in addition to devoting most of your time (say 80%) to your duties in terms of teaching, research and publishing under your institute's specific requirement, I would also strongly encourage them to make full use of the rest of their time (say 20%) and work extra hard to do what they want to do to really make a difference. I believe that this is the only way to achieve self-improvement and reengineer your career.

Q5: It's important for shipping companies to improve their cost efficiency particularly when facing the problem of overcapacity. Would you like to share the research outputs related to this problem

**(methodology, results, conclusion and management insight, etc.) with
the readers of Maritime Insight?**

Prof. Chung-Yee Lee: We are conducting pilot research in finding solutions to the problem of overcapacity. In particular, we are currently focusing on the issue of empty container repositioning which is trying to figure out coordination mechanisms to counter this matter. This research is still ongoing as it is a challenging and complex area; however, we are confident of practical solutions.

With regards to the problem of overcapacity, we have conducted another pilot research project which is concerned with the impact of slow steaming of ocean container transport on global supply chains, and we have already presented research results to our collaborators and sponsor companies. Slow steaming has always been a controversial issue that affects the entire supply chain, and is currently implemented by the main liner shipping companies. Our research findings lead to a simple and implementable policy with a controlled cost and guaranteed delivery reliability. Firstly, we found out that, ideally and theoretically, vessels which adapt slow steaming would save more than 10% of energy. Energy saving means cost saving, so even 1% of saving in energy would help decrease the vessel's operating costs sharply because today fuel costs account for up to 60% of a vessel's operating cost.

Additionally, based on port congestion and other historical data necessary for identifying a pattern of a vessel's randomness, we also found out that reliability and predictability increases as a result of a flexible slow steaming strategy. Shippers care most about the "predictability" of the deliveries, and our findings did show that the variance of the delivery time under the flexible slow steaming strategy is always smaller than that under the fast steaming strategy. This ensures more accurate deliveries.

Moreover, by applying slow steaming, vessels have the flexibility to speed up and the speed can be adjusted anywhere in the interval so as to combat the randomness of port times, leading to an improvement in service quality as well.

For detailed information about the impact of slow steaming of ocean container transport on global supply chains, please refer to Prof. Chung-Yee Lee's research paper titled "The Impact of Slow Ocean Steaming on Delivery Reliability and Fuel Consumption" published in 2013.

A BRIEF INTRODUCTION TO THE CRUISE SAFETY ISSUES

The case of the ferry accident in S. Korea



Photography by Prof. Chin-Shan Lu, 2014

As economic growth is making it more affordable for people to travel by cruise ship, taking a cruise holiday is becoming increasingly popular among passengers all over the world. According to the Cruise Lines International Association, 20 million-plus global passengers went on a cruise vacation in 2012. With more than 20 million passengers taking cruise holidays each year, the safety and security of passengers and crew is highly regarded by the cruise community, the industry and relevant organizations. Cruises have proved to be a very safe method of taking a vacation (Cartwright & Baird, 1999). Over the past decades, scientific and technology advances have made ship design safe, innovative, enjoyable, and comfortable for passengers. The International Maritime Organization also mandates global standards for the safety and operation of cruise ships. The cruise industry and community have adhered to strict regulations which ensure safety and security of the crew and passengers. Apart from the international regulations specifically designed to meet requirements of safety of passengers and crew, a unique organization, the U.S. Coast Guard, has partnered with the Cruise Lines International Association and conducted safety inspections for every cruise ship that embarks passengers in a U.S. Port.

A review of the cruise accident in S. Korea

On April 17, 2014, a huge ferry named SEWOL carrying 476 passengers and 150 vehicles sunk off the coast of South Korea with hundreds of high school students on board. The captain was one of the first one to leave abandoning many passengers to sink together with the vessel. It took two and a half hours for the ferry to submerge in waters, and before that no any crew members had assisted or even notified passengers to escape from their quarters, nor did the captain and ship's crew use the abandon ship drill to notify passengers before they themselves run away, only leaving passengers to sink with the vessel. From the day the accident happened till June 10, 292 victims and only 172 survivors were declared and 12 passengers are still missing. Nearly all the survivors were those who did not follow the Captain's orders and rushed to the deck of the ship. A brief profile of the SEWOL Ferry is presented in Table 1.

Table 1: Profile of the SEWOL Ferry

Profile of the SEWOL Ferry	
Previous name	<i>Ferry Naminoue</i>
Birth place	<i>Japan</i>
Vessel age	<i>≥ 20 years</i>
Vessel type	<i>Car Ferry, one kind of Ro-Ro ships</i>
Owner	<i>Chonghaejin Marine Co.</i>
Modification	<i>Added many cabins which were built on the top floor of the ship, increasing passenger capacity and overloading the cargo</i>
Operation information	<i>Operated in Japan from 1994 to 2012</i>

Attention has also been switched not only to cruise safety but also to the reasons that caused the accident of a huge and modern ship in South Korea. News reporters, commentators and worldwide observers all have different opinions towards the factors contributing to this accident.

According to CNN news report on April 26, 2014, the Chonghaejin Marine Co. purchased the ferry on October 2012 and refurbished it. Chonghaejin added extra passenger cabins on the third, fourth and fifth decks raising passenger capacity. This action would lead to altering the weight and balance of the vessel. A marine science and technology professor at Tokyo University stated during an interview by CNN that the modification was part of the reason for the accident because the company bought a used vessel from Japan and added extra cabins. Since the extra cabins were built on the top of the ship, it thus shifted the centre of gravity upward. However, various

news reports found out that the Sewol Ferry has gone through regulatory and safety checks which were conducted by the Korean Register of Shipping. It is unclear if there were any problems with the regulatory and safety checks.

Table 2: Mainstream viewpoints covered by different media groups

Media	Factors contributing to this accident
Aljazeera	<ul style="list-style-type: none"> • <i>The third mate of Sewol Ferry ordered a sharp turn which caused the ship to list.</i> • <i>The vessel was actually owned by a dubious company and the president of this company got permission for major modifications of the SEWOL Ferry through illegal activities.</i>
Bloomberg	<ul style="list-style-type: none"> • <i>Cargo management. The Vessel was carrying too much cargo with too little ballast water.</i> • <i>Ferry operator’s lacking of safety awareness.</i> • <i>Unreliable regulatory and safety checks.</i>
CNN	<ul style="list-style-type: none"> • <i>Unreasonable major modifications to the vessel through illegal methods.</i> • <i>Extreme system failure from the company to the government.</i> • <i>Classic case of corruption between government agencies, associations and corporations.</i> • <i>The Korean Culture that takes government safeguards or proper inspections of safety requirements for granted.</i>
New York Times	<ul style="list-style-type: none"> • <i>The captain’s decision to abandon the ship.</i> • <i>The crew’s emergency performance and clearly a breakdown in safety training, which could be attributed to its officers and to Korean regulators.</i> • <i>There were no safety instructions before passengers boarded the ship.</i> • <i>Life jackets were on the fourth floor where the sleeping cabins were, but those who were on the third floor at the time had no life jackets.</i>

If we look inward on this disaster, the sinking of the ferry might be viewed as a reflection of a system failure. Due to a lack of enough surveillance, the company took advantage of relationships between government agencies, associations and corporations so as to increase passenger loads and cargo loads. On the other hand, Korean people might expect a little bit more from the government. They should not take safety initiatives, safeguards, and proper inspections of safety requirements conducted by the government for granted.

Another perspective to view this accident is the information from AL Jazeera English. According to the report published on AL Jazeera English on April 16, 2014, the third mate of Sewol Ferry ordered a sharp turn which caused the ship to list. As a result, the ferry lost stability. This was likely because the cargo and cars inside the ship began to move. In minutes, the ship reported an emergency and asked for assistance.

The sudden sharp turn makes us wonder if the ship was off course, and the third mate tried to correct it before the captain noticed. What was the captain doing at that time? Was he on the bridge? Would the captain know better about how to rectify the situation when there is a sharp alteration causing cargo shifting and vessel listing? How can a huge ship sink off the coast South Korea? In Table 2 we summarized and presented various voices for readers' further concern.

Basing on the viewpoints presented in Table 1 and Table 2, it is clear that factors contributing to the ferry disaster could be categorized into the following groups.

❖ *Ship construction and ship structure*

Although South Korea is one of the world's ship building kingdoms, and it is capable of manufacturing such kind of ferry, South Korea has not yet enhanced its shipping standards and safety regulations with the result that tourists become victims of the accident on board a second-hand ship built in Japan. From 2,000, China has set strict regulations on purchasing second-hand ferries due to safety concerns. Usually, aged ferries of more than 20 years old are prohibited from operation in China. Sewol Ferry is an aged ferry built nearly 20 years ago, and was purchased by the Chonghaejin Marine Co. It was soon discovered that Chonghaejin Marine made major modifications to increase the capacity of the ship, and as such the vessel become heavier than it used to be. This caused steering and stability problems, pointed out by the vessel's regular captain. Not mentioning the modifications of the ship, Sewol ferry follows strict regulations and safety checks when it operates in Japan, and it sails in routes that are more suitable for commuting.

❖ *Cargo management*

Kim Han Shik, the CEO of Chonghaejin Marine Co., was accused of homicide through occupational negligence. Sewol Ferry was carrying too much cargo with too little ballast water, according to Bloomberg on May 8, 2014, and this has made the vessel unstable. In addition, cargo on board was not lashed correctly so it further contributed to the listing trend of the vessel.

❖ *More human errors*

Apart from the factors of the ferry itself, this disaster is mostly attributed to factors related to the incapability of the ferry operator, a lack of awareness of safety management among crews, and other human errors. Furthermore, a lack of emergency evacuation capability is also an important factor. The captain and the

crew did not have passengers evacuate to the open deck and wait for rescue.

According to memories of some survivors, they were requested to stay still within their cabins until water was above their necks. “I repeatedly told people to calm themselves and stay where they were for an hour” said Kang Hae-seong, the communications officer on the South Korean ferry than sank.

As reported in the New York Times on April 17, 2014, the communications officer indicated that he could not remember how to handle any evacuation drills for the huge ship so he did not have time to refer to the evacuation manual when the real emergency came. It took two and a half hours for the ferry to submerge in waters, and before that no crew members had assisted or even notified passengers to escape from where they were staying, nor did the captain and ship’s crew use the abandon ship drill to notify passengers before they themselves abandoned the ship, leaving passengers to sink with the vessel.

❖ Safety issue not being regarded highly by the Korea government

Some commentator thought that this accident is a typical result of human error which reflects the safety issue not being highly regarded by the society in South Korea. Some even accused the Korea government of caring too much about the economic development, making profits and increasing the reputation of enterprises at the price of increasing public welfare. Another widely spread comment is that because of a culture that teaches everyone to obey rules in particular, this is what made students follow the instructions and stay in their cabins.

A subtle observation was that marine accident expert claimed that the ferry is equipped with 46 life boats with a capacity of 25 people each, but only one life boat automatically opened. Moreover, with this kind of rescue equipment the vessel was said to have successfully been through regulatory and safety checks, conducted by the Korean Register of Shipping.

❖ Extreme system failure from the company to the government

This accident is widely considered a classic case of corruption between government agencies, associations and corporations in Korea. Further evidence supports this opinion. Chonghaejin Marine is found to be actually owned by a group which had a very dubious reputation, having been implicated in a number of ugly scandals and declared bankruptcy in 1997. Therefore, it is alleged that the president of this

dubious company actually got permission for the major modifications of the Sewol Ferry through illegal activities or through bribery.

Are there any other factors? Did the government manage the rescue operations properly? Did rescue teams react efficiently and effectively? The captain was covering for the ship's regular captain, and it is said that he had no power to stop the cargo overloads that contributed to the disaster. As captain, however, he could have refused to sail.

Furthermore it was discovered that Chonghaejin Marine made major modifications to increase the capacity of the ship, and as such the vessel became heavier than it used to be. This caused steering and stability problems, as pointed out by the vessel's regular captain. Newstapa, an investigative journal in Korea, reported that a team of four government employees inspected 12 ships at once, spending only 13 minutes on each. It was also reported that the owner of the ferry spent only \$50 for the crew training for the entire year of 2013.

It becomes clear that many factors contributed to the accident. Still, many observers do not understand why this turned out to be a tragedy when it could have been prevented? As it took two and a half hours for the ferry to submerge in water and the accident happened within 15 miles of the coast and in the immediate vicinity of many islands, the first rescue groups could arrive within 10-15 minutes.

The disaster should not have been a tragedy,

If the captain had notified the passengers to leave their cabins;

If everyone had had a life jacket;

If the crewmembers had had knowledge of emergency rescue;

If safety instructions had been announced before passengers boarded the ferry;

If the crew had been certified to be trained;

If regulatory and safety checks had been strictly followed;

If the ship had not been permitted to make major modifications;

If everyone had been trained or nurtured with a sense of safety....



Photography by Fang Zhang, 2013

Yet each part of the chain have neglected their duty. The crew, and officers, had no training in emergency procedures, or, it seems, basic seamanship. The owners did not provide it, the government inspectors did not care, and the officers apparently did not see any need for it. The third mate was said to alter course sharply. Why? The captain was not on the bridge? Would that captain know anything better? A sharp course alteration in rough seas with unfixed cargo meant that the cargo shifted and the vessel listed sharply and began taking on water.

During this disaster, we have at least three human errors due to irresponsibility. First error: **designing a ship without the necessary stability against tilting**. All new passenger ships have numerous decks, to heights never before experienced, creating a situation where the centre of gravity is at a very high level. A sharp turn was enough to tilt the ship. **All those ships should have ballast down below, calculated or tested with models, so that tilting is impossible under any circumstances**. Second error: **the irresponsible order to stay inside cabins**. Third error: as happened with the Costa Concordia, the captain and the crew were among the first to flee instead of taking care of the passengers.

The children obeyed order and therefore did not try to escape, and those who are raised to obey orders are less likely to think for themselves, less likely to not take their own responsibility, and less likely to be able to make their own decisions. Perhaps even the captain was somebody who needed orders from a higher authority? Government agencies, finally, kept sending out inaccurate information.

An accident happened, and along with it comes great loss. While we cannot change what has happened, what we can do is prevent such accidents from happening again in the future. The astonishing thing about this maritime tragedy is gross human error and incompetence in one of the most educated and technologically advanced nations in the world, South Korea. For Koreans, they may have more to reflect upon, while, for the rest of others over the world, we care more about safety of life at sea.

There are organizations that regulate safety issues at sea. For example, Safety of Life at Sea (SOLAS) requires that lifeboats be capable of being loaded, launched and maneuvered away from the ship within 30 minutes of the Master's signal to abandon ship. Furthermore, each and every crewmember is required to receive training in emergency procedures, safety, security, and first aid, and to participate in an abandon ship drill and a fire drill once every month. The International Safety Management Code (ISM) provides an international standard for the safety management and operation of ships and for pollution prevention. The purpose of ISM Code is: To ensure safety at sea; to prevent human injury or loss of life; and to avoid damage to the environment and to the ship.



Apart from the international standards for the safety of all ships at sea, there is literature analyzing factors which lead to ferry accidents. Lu and Yang (2011) empirically evaluated the safety climate and safety behavior in the passenger ferry context, and they identified five main dimensions of safety climate as measured on a passenger ferry safety climate scale, which from the contemporary standpoint are easily understandable and applicable. **The five main dimensions are: safety policy, safety motivation, emergency preparedness, safety training, and safety communication.** The

The study findings show the relationship between the main dimensions and crewmember safety behaviors in terms of safety compliance and safety participation. Respondent’s age, ferry capacity, and safety compliance were also revealed to be associated

with one another during their research. As one of the important contributions, the research offered implications on how to increase safety in ferry operations and how to develop safety management.

One of the research findings is that the respondents’ level of agreement with the safety climate can be summarized. According to Figure 5, the top five agreed safety climate attributes are:

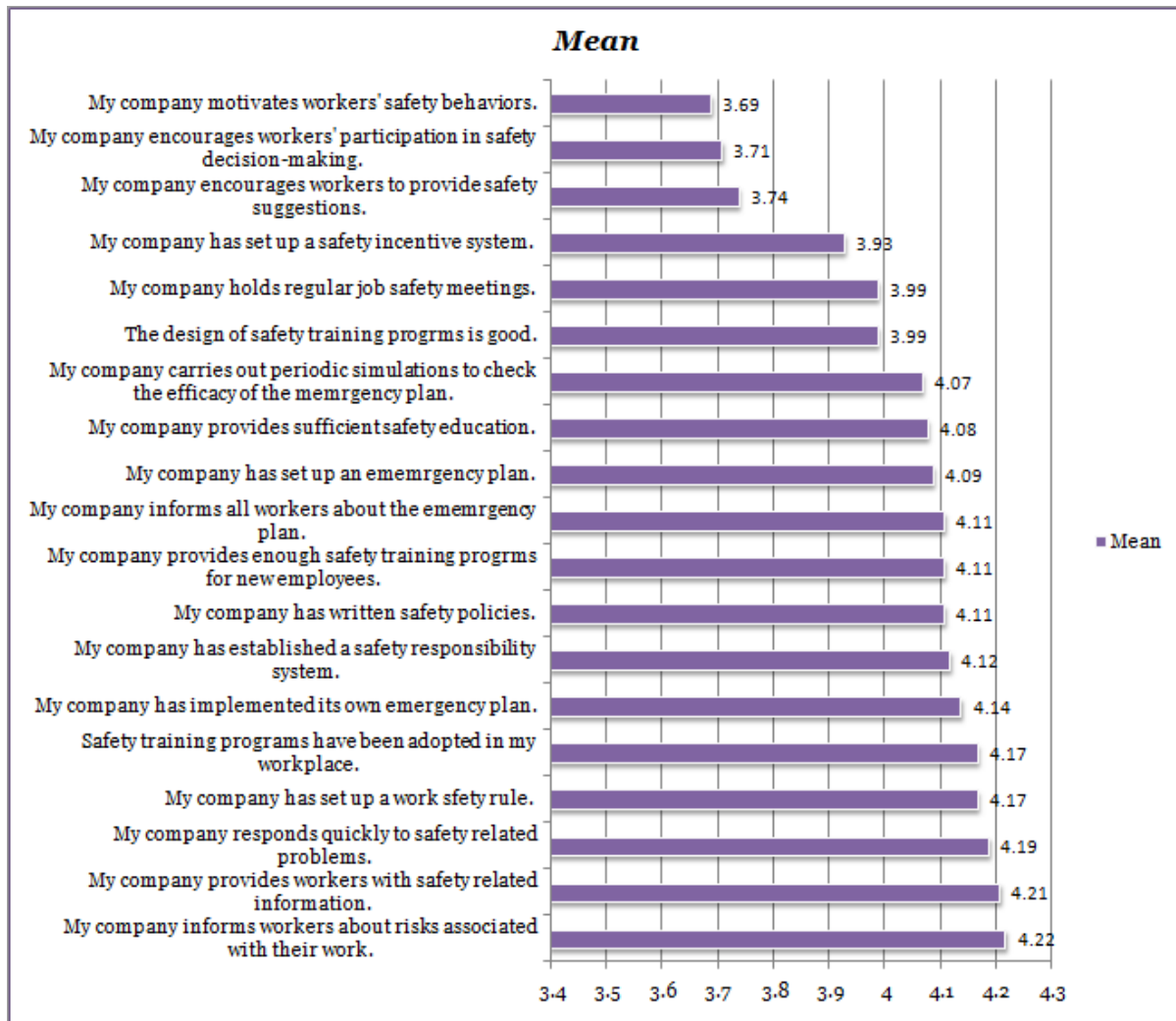
- ❖ My company informs workers about risks associated with their work.
- ❖ My company provides workers with safety related information.
- ❖ My company responds quickly to safety related problems.
- ❖ My company has set up a work safety rule.
- ❖ Safety training programs have been adopted in my workplace.

Among the above agreed safety climate attributes, “my company informs workers about risks associated with their work” and “my companies provides workers with safety related information” belong to the safety communication-related dimension. These hypotheses, however, were proved to be not supported by this study.



Featured Research and Interviews

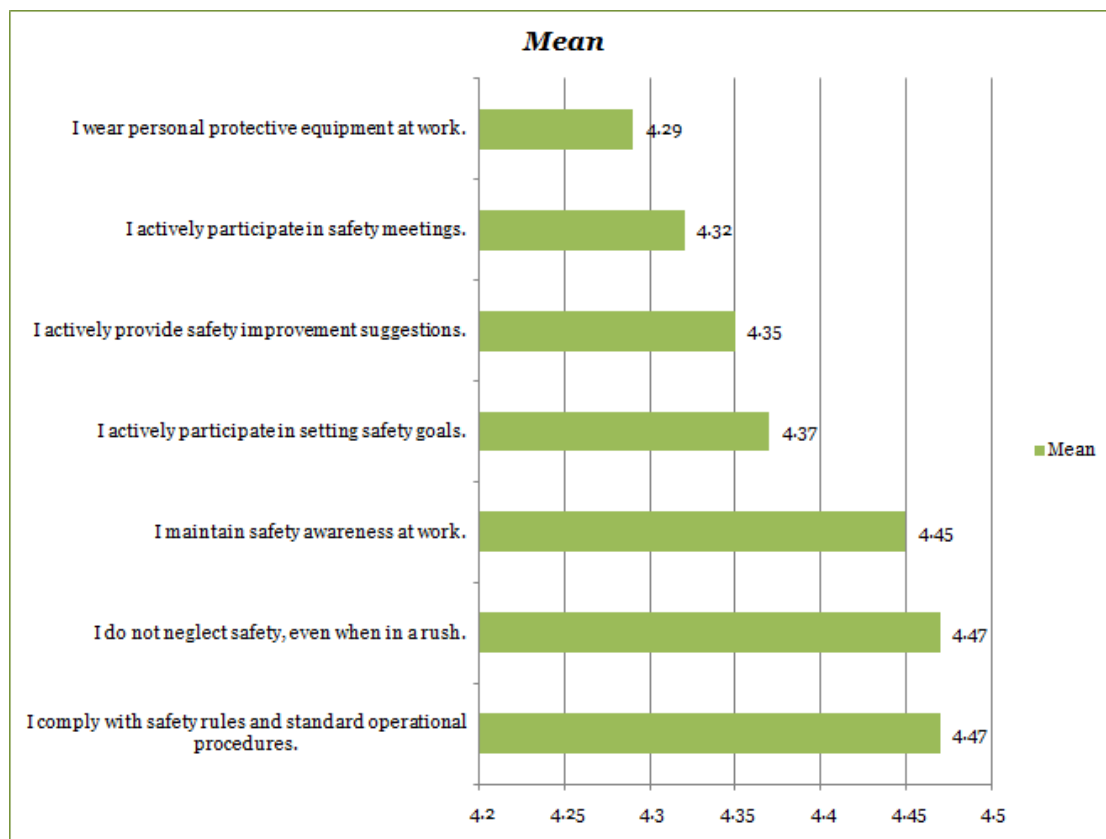
Figure 5: Respondents' agreement with safety climate attributes



Note: The mean scores were based on a five-point scale (1= very unimportant to 5 = very important agree); Adapted from Lu and Yang (2011)

Lu and Yang (2011) further found that only safety training and emergency preparedness are major indicators of safety behavior in the context of passenger ferry operations. In their analysis, most of the safety climate dimensions are highly related to safety behavior. Thus, passenger ferry managers should pay more attention to safety climate since it is a crucial factor that influences self-reported safety behavior in passenger ferry operations. Another research finding summarized in Figure 6, indicates respondents' perceptions of each safety behavior. According to Figure 6, three of the seven safety behavior attributes rank notably higher than the other attributes, namely, "I comply with safety rules and standard operational procedures", "I do not neglect safety, even when in a rush" and "I maintain safety awareness at work".

Figure 6: Respondents' agreement with self-reported behavior attributes



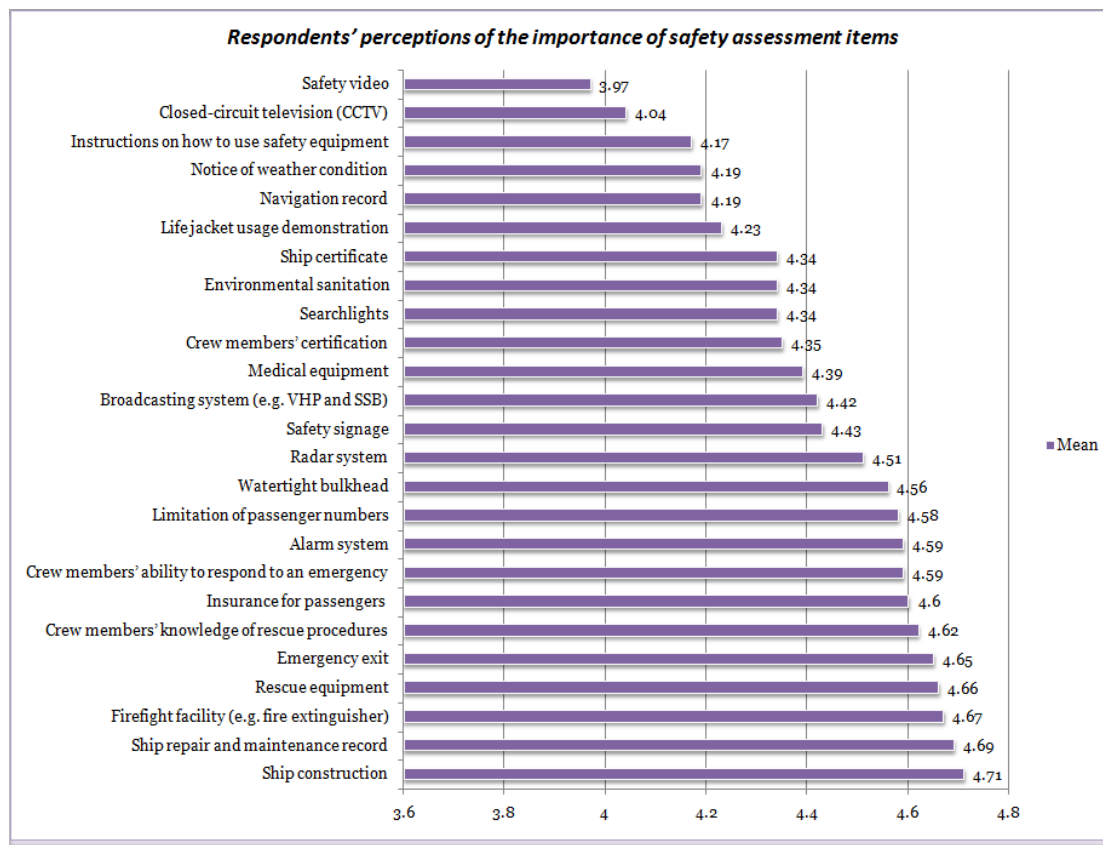
Note: The mean scores were based on a five-point scale (1= very unimportant to 5 = very important agree); Adapted from Lu and Yang (2011)

In Lu and Yang (2011)'s research, several implications can be drawn among which safety climate is the factor of most influence where it boosts safety training and emergency preparedness. Safety climate plays a crucial part in passenger ferry operations in terms of self-reported safety behavior, thus it must be attached with importance by managers. Second, **since safety training and emergency preparedness are proved to be positively related to safety behavior, an environment that boosts such activities is significant so as to lead to better safety behavior and further reduce accident occurrences.**

Lu and Tseng (2012) identified crucial safety assessment criteria for passenger ferry services by which ferry safety and difference between various ferry parties' perception of safety importance were compared. Respondents' perceptions of the importance of safety assessment items are summarized in Figure 7. Among all those items the respondents were asked to rate, **ship construction, ship repair and maintenance record, firefight facility, rescue equipment, and emergency exit are the top five most important ferry safety assessment ones.** Further analysis taxonomizes these items into six different factors or dimensions of safety assessment items,

namely: safety equipment, ship structure, ship documentation inspection, safety instructions, and navigation and communication, and crew members' ability.

Figure 7: Respondents' perceptions of the importance of safety assessment items



Note: The mean scores were based on a five-point scale (1= very unimportant to 5 = very important agree); Adapted from Lu and Tseng (2012)

Lu and Tseng (2012) have also investigated the differences in the importance of ferry safety assessment criteria from different perspectives. **Figures 8, 9, 10, 11** summarized the means scores of the level of importance of safety assessment item(s) perceived by different parties. Further analysis of the each party's perceptions of the importance of safety assessment items indicates that from ferry operators' perspective, *rescue equipment* and *crew member's ability* were two factors of the utmost importance in the safety of passenger ferry context, according to Figure 8. While, in the passengers' point of view shown in Figure 9, *ship construction* and *ship repair and maintenance record* were two critical factors of ferry safety, and these two items are regarded highly by academics as well, which is indicated in Figure 10. According to Figure 11, it is notable that ferry governors regard *ship construction* the highest too.

Figure 8: Mean scores of ferry operators' perceptions of the importance of safety assessment items

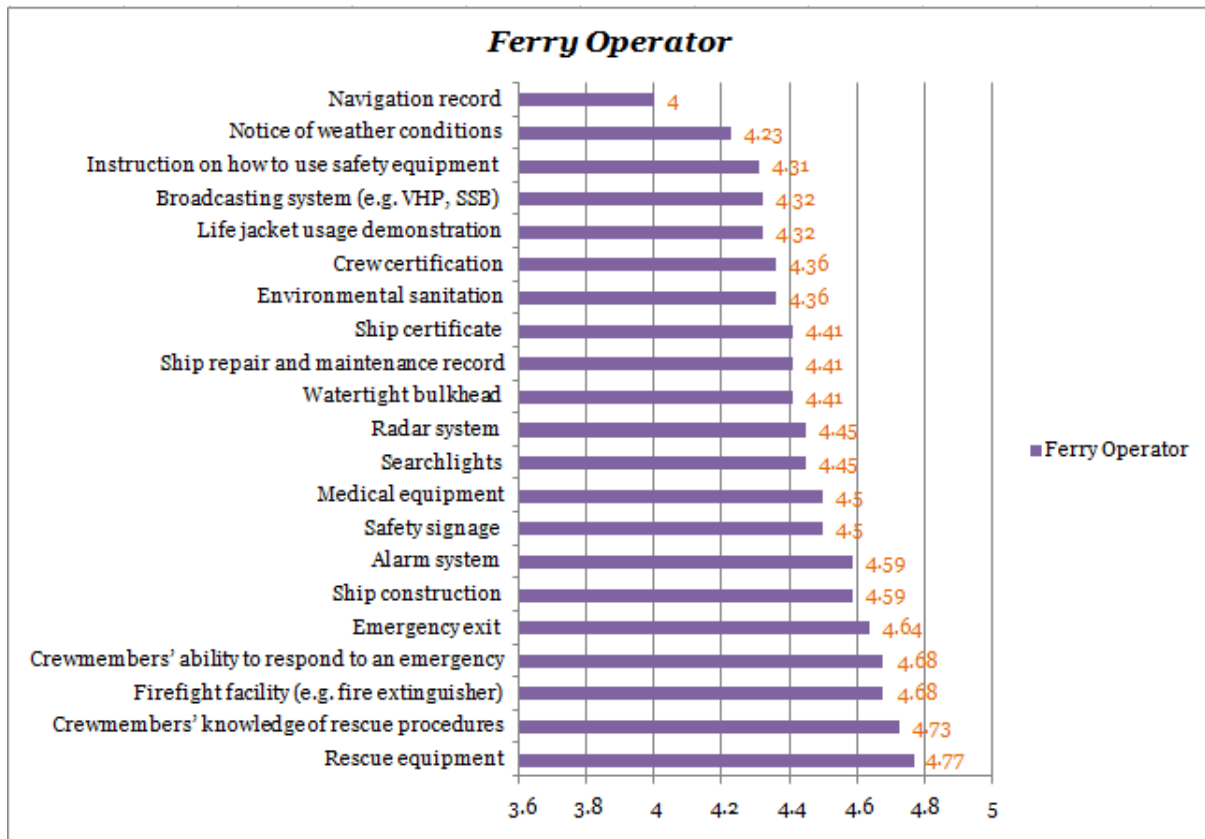


Figure 9: Mean scores of passengers' perceptions of the importance of safety assessment items

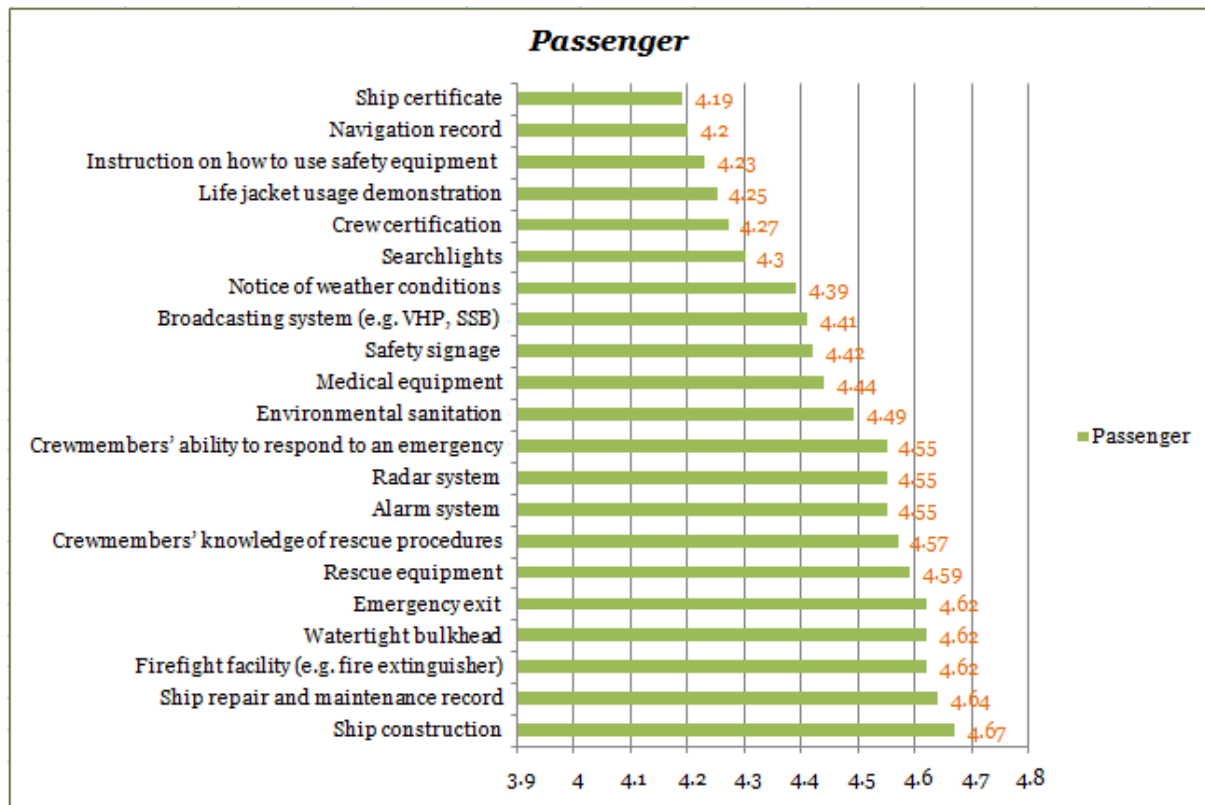


Figure 10: Mean scores of academics' perceptions of the importance of safety assessment items

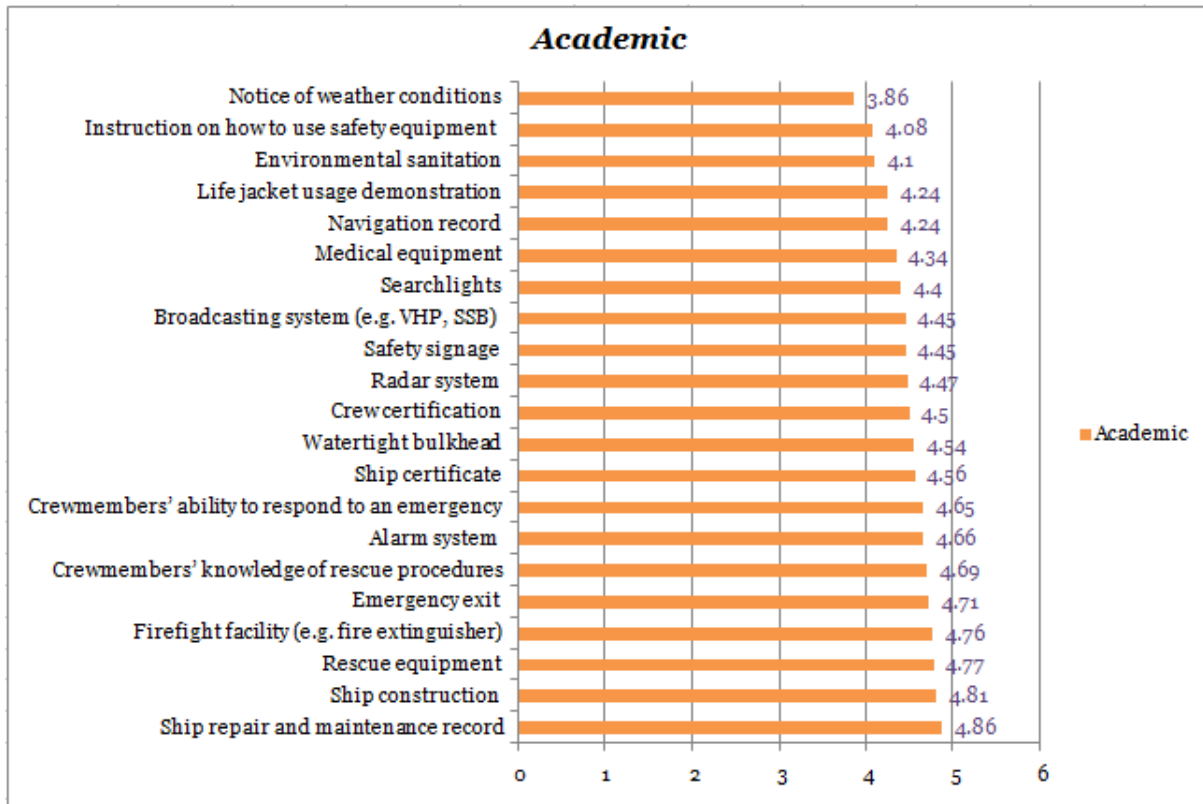
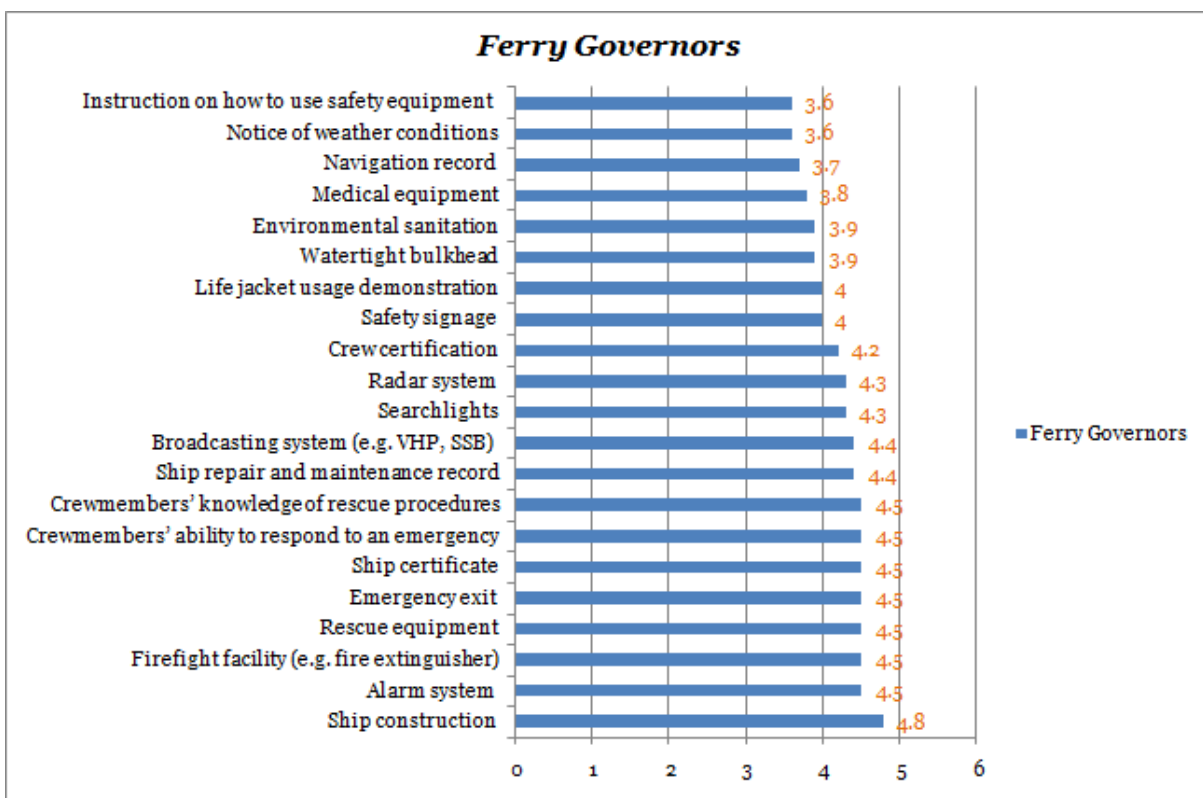


Figure 11: Mean scores of ferry governors' perceptions of the importance of safety assessment items



Note: The mean scores were based on a five-point scale (1= very unimportant to 5 = very important agree); Adapted from Lu and Tseng (2012)

Basing on the above analysis, Lu and Tseng (2012) further provided policy implications to individual parties. According to their study, for ferry governors, compared with other interest parties, they should attach a higher level of importance to safety equipment, ship structure, ship documentation inspection, safety instructions, and crew members' ability dimensions. Ferry governors are suggested not only to enhance crewmember's ability through regular safety training, but also to enhance their ability to respond to an emergency effectively by way of increasing knowledge in rescue procedures. It is also advised that ferry governors should attach more attention to safety assessment criteria, such as safety equipment, ship structure, safety instructions, ship documentation inspection, and navigation and communication, in particular.

Though several studies regarding the ship safety have been conducted in some specific areas, the research on safety assessment criteria for passenger ferry services is still rare. This study contributes a helpful approach to measuring the level of importance of safety assessment criteria and dimensions by four stakeholder groups. The authors believe that the adoption of such assessment criteria will help improve the effectiveness of safety audits, and furthermore, it could be used as key safety performance indicators for benchmarking.

Conclusion

To conclude, a lot of researchers have pointed out that the way in which crewmembers respond in an accident greatly influences the loss. Gossard (1995) reported that when ship's crew members have responded professionally to accidents this has often prevented loss of both the ship and lives. Williamson et al. (1997) has also pointed out that a crew's emergency response behavior is an important factor for improving maritime safety. Moreover, the safety awareness and safety climate as well as the value a social culture holds have a great impact on accident evacuation. Last but not the least, the main indicator of a great nation should be the welfare of the public rather than the economic development and global reputation, especially when such reputation is established at the price of public welfare.

INTERVIEW WITH PROF. CHIN-SHAN LU

BY DR XINYU SUN AND MISS FANG ZHANG



Prof. Chin-Shan Lu, Director of C.Y Tung International Centre for Maritime Studies, and also Professor of the Department of Logistics and Maritime Studies at The Hong Kong Polytechnic University, has been dedicated to the safety research in the context of the shipping and ferry industries for decades. His relevant research about safety issues has been published in international journals such as the Journal of Business Ethics, Journal of Safety, Accident Analysis & Prevention, and Safety Science. We are privileged to have Prof. Lu to share his research with us.

Q1: What has driven you to conduct quality research regarding the safety issues in the context of the shipping and ferry industries?

Prof. Lu: There are two concerns that drive me to conduct quality research regarding safety issues in the context of the shipping and ferry industries. From the practical point of view, safety must come first for both industries. In particular, it would be better to have no other services if customers' safety could not be guaranteed. Over the past few years, maritime accidents have happened around the world, such as the **Costa Concordia disaster in 2012, the Lamma ferry accident in Hong Kong last year, and several months ago, the Sewol ferry sank off South Korea.** Being a researcher, I want to figure out the factors contributing to maritime accidents so as to help the industry to promote safety behavior. Secondly, although international organizations such as the IMO have set strict safety regulations and codes of conduct, accidents still happen which are largely attributed to human elements which go beyond policies and regulations. As such, conducting research in finding relationships between maritime accidents and human safety behavior is necessary especially when there is little literature focusing on safety issues in the maritime industry and only safety-related reports released by relevant organizations and associations, e.g. P & I club.

Q2: What implications have your research findings provided to help boost maritime safety so far?

Prof. Lu: Three major implications have come from our research. First and

foremost, we have identified safety assessment criteria by way of collecting and consolidating varied parties' voices. Previously, there were no explicit safety assessment criteria. Instead, operators of shipping and ferry industries conduct regulatory and routine safety checks mostly on facilities along with the fundamental requirement that laws regulate. Different groups, such as the passengers, governments, academics and operators, would however, have different requirements. Thus the safety assessment criteria we provide would be rather inclusive and all-rounded. The second important result we have got is the significance of safety management. The following questions should be addressed when it comes to the safety management. Do companies promote and nurture a working culture of safety? Are employees reminded of the importance of safety behavior? Lastly, we investigated if passengers are aware of their personal safety when boarding ferries and if they know how to respond to emergency situations.

Q3: Will you further your research in the safety area in the years to come? What would be the next step? Are there any perspectives on the research area you would like to share with us?

Prof. Lu: Presently, there are three major international journals with special commitment to the safety issues, namely, *Accident Analysis & Prevention*, *Journal of Safety Research*, and *Safety Science*. The former two journals are focusing on transport safety in particular, and the later is more inclusive. In the future, I will do more interesting and innovative research with regards to the maritime safety. Implications from my previous safety research are applicable to container shipping as well. In my opinion, the thought leadership would be a gateway to further explorations about safety leadership and safety behavior. Based on this understanding, last year I have submitted a research proposal about thought leadership to apply for a Government Research Fund in Hong Kong.

Recently, I started to think about a new research field, ethics and safety. I think that those who unconsciously behave ethically will be more aware of safety, and ethics might come from education, religion and family influences. From my point of view, ethical leadership will to a great extent help boost safety behavior in companies. I have published a paper titled *"The Effects of Ethical Leadership and Ethical Climate on Employee Ethical Behavior in the International Port Context"* in the *Journal of Business Ethics* where I explored and examined the relationship between ethical leadership and safety.

In the past, however, almost all ethics-related literature discussed how business corporations dealt with ethical problems, such as protecting confidential information and not appropriating public assets and capital. Little research discussed the application of ethics in the area of safety. Therefore, I propose to further develop the sense of ethics in terms of maritime safety. It is reasonable if you put the sense of ethics in the following scenarios. For the first scenario, even if regulations are made perfect, if no one is ensuring the safe behavior, then regulations are in vain and nonsense. On the contrary, even if there are some shortcomings in established policies and regulations, if everyone is trained to behave in a much safer manner, then the overall consequence would be more positive. That's why I think ethical leadership and thought leadership will play a much more significant role in nurturing a safer environment.

Q4: With regards to your research, do you have any comments on the ferry accident that happened in South Korea on April 17, 2014?

Prof. Lu: Safety is like a series connection grouped with many components, with each component having its own responsibility. Crew members' training, captain and mates' skills, operator's safety management, crew members' emergency preparedness and passengers' awareness of safety are individual components which are independently from each other. The fact is that only if all these components stay normal can safety be ensured at a relatively higher level.

In the case of the ferry sinking off South Korea, safety was decreased sharply due to each component not taking their responsibilities. Crew members lack enough training, as did the captain and the mates. It was said that the third mate's incorrect driving behavior caused the ferry's listing. Furthermore, the ferry did not follow international regulations and safety checks in terms of its construction and capacity. The company had made major modifications to the ferry, which had a great impact on its stability since gravity was shifted upwards. Thirdly, incorrect cargo lashing contributed to the instability of the ferry as well. Cars and cargos in the ferry were not fixed, and as such they began moving to one side as the ferry was listing, which in turn made the ferry totally unbalanced and thus list more quickly. Apart from the mentioned contributors, the disaster led to so many people dying could have been prevented. Crew members did not organize an effective rescue. Last but not least, passengers who were like teachers and adults should have been more concerned with self-safety and should have taken their lead in stepping out of their cabins. If there was a lesson to be learnt from the passengers, it would be that we should not take the

government's and operator's safety initiative and protection for granted.

Negligence of details turned out to be the major determinant of the Sewol Ferry accident. For the sake of safety, every component or process throughout the whole operation should be attached with as much attention as possible. Most importantly, safety is not only about regulations and operations, but also about awareness and ethics, and these should always be a focus in the future.



Photography by Prof. Chin-Shan Lu, 2013

INTERVIEW WITH DR T.L. YIP

BY DR XINYU SUN AND MISS FANG ZHANG



Dr T. L. Yip, is Associate Director of C. Y. Tung International Centre for Maritime Studies, and also Associate Professor of the Department of Logistics and Maritime Studies at The Hong Kong Polytechnic University.

We are honored to have Dr Yip share his research regarding the safety of the cruise industry here.

Q1: What direction to date has your research taken in finding determinants of cruise-ship accident injuries?

Dr Yip: Two years ago, after the Italian cruise ship Costa Concordia sank off the coast of Tuscany with a loss of 32 lives, global concerns were raised about the safety of the cruise industry. Together with other cruise ship accidents that had happened previously, the Costa Concordia Disaster has alerted us researchers once again to hold maritime safety in the highest regard. Furthermore, the Hong Kong Government issued an open tender in 2007 for the development of the new cruise terminal, and the Kai Tak Cruise Terminal is expected to help Hong Kong become a regional transport hub for cruise liners. In this regard, our research in the direction of investigating the determinants of the number of crew and passenger injuries in cruise ship accidents would be of help in controlling risk factors for the cruise industry. Thus far our research has explicitly examined the relationship between crew injury and passenger injury in cruise accidents.

Q2: Are there any implications that have come from your research findings for the cruise industry on how to boost ferry safety?

Dr Yip: Compared with cargo ships and ferry ships, cruise ships generally have a better ratio of crew to passenger which makes the sailings safer. Usually, cruise ships have a 1 to 2 ratio of crew to passengers, that is to say, there will be one crew for every two passengers, serving emergency duties in addition to their primary job. Our research findings showed that the safety of passengers on board of a cruise ship depends on the safety of the ship's crew members, and as such in order to ensure the safety of passengers on board, enhanced crew training is necessary so as to improve

crewmembers' safety. As can be seen from the ferry accidents, one of which happened in Hong Kong last year and the other one in South Korea, if the crew on board are more capable of handling emergency situations, there might be different results.

Q3: With regards to your research findings, please share with us your suggestions on the following two aspects. For passengers, what steps should they take to keep safe on a cruise ship? For cruise lines, do they need to take more measures in order to ensure crew safety during the voyage?

Dr Yip: There are few requirements for passengers except to follow safety instructions. However, more should be done by the cruise or ferry lines. Generally speaking, a half-day safety drill will be conducted every week on cargo ships where fewer crew take the whole charge of a vessel. Unlike cargo ships, cruise ships are more elaborately designed with increased fineness in terms of quality and construction. This means that safety drills on board cruise and ferry ships are less frequently conducted than those on board cargo ships. On the one hand, cruise ships sail along the coast where it is necessary to keep the ship stable, and as such even when emergencies occur, rescue could be done immediately. On the other hand, as was mentioned earlier, cruise ships keep a better ratio in terms of crew to passenger numbers, so every crew can take charge of a single issue instead of several crew having to take charge of all the safety work as happens on cargo ships.

All in all, cruise ship sailings are one of the world's safest transportation methods. Cruise ships are well designed, carefully built, and equipped with advanced facilities. Moreover, captains of cruise ships are better paid and trained, and thus of much higher quality than those of other ships. Cruise ship sailings are also in compliance with international standards and regulations, and in most cases, cruise ship sailings follow code of conduct beyond the international standard regulations. Evidently, all these factors contribute to the fact that cruise ship accidents rarely happen.

Q4: How can we control the risk factors that may contribute to cruise-ship accidents? Please share some of your opinions with the cruise-ship shareholders. Will you further your research in the cruise safety area in years to come? Are there any perspectives to share with us?

Dr Yip: Our research findings indicate that the number of passenger injuries is positively related to that of crew injuries. Furthermore, the results of our analysis

suggest that the passenger safety on board can be improved through effective training of cruise-ship crews, which offers an insight to the cruise industry on how to ensure both their crew safety and the passenger safety.

Apart from the above two factors, we have also identified other factors that contribute to elevated levels of injuries for crew and passengers during cruise-ship accidents. In particular, accidents associated with collisions would lead to a higher level of injuries for both crew and passengers. To control these risk factors, managers and regulators should cater their training programs to match different accident types including explosions, collisions, groundings and loss of vessel maneuverability. In addition, managers and regulators might also consider adopting new navigation technologies in cruise ships if necessary.

Since we only explicitly examined relationships between the number of crew injuries and that of passenger injuries based on the collected history data of injuries in cruise ship accidents, we can only indicate that the cruise industry has to enhance crew safety through effective training so as to ensure passenger safety when in emergencies. In the future, research with regards to the difference between cruise safety and ferry safety in terms of factors that contribute to accidents and risk controls towards types of accident prevention will be further studied.



Photography by Fang Zhang, 2014

For detailed information about the research background and method, please refer to Dr T.L. Yip's research paper titled "[Determinants of Cruise-Ship Accident Injuries](#)". Should you be interested in the topic, please contact the author directly for further discussions. (Email: t.l.yip@polyu.edu.hk)

IMPORTANCE OF SAFETY AT SEA SHOWN THROUGH THE MARITIME ACCIDENT

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Senior Researcher, Maritime Safety Research Center,
Korea Ship Safety Technology Authority, Korea

What happened in the South Sea of Korea?

On April 16, 2014 at 8:55 AM, a ferry ship capsized and sank 1.5 miles north of Byeongpung-do, located off the southern coast of Korea. This ferry ship was carrying 476 passengers and crew. The majority of passengers were high school students who were heading to Jeju Island on their way for a field trip. A total of 172 persons were rescued while 292 persons lost their lives including 12 people who are still missing and presumed to be dead. Cargoes loaded on this ship consisted of 124 sedans, 223 1-ton trucks, 34 2.5-tons or larger cargo vehicles for 180 vehicles, with a total weight of 3,608 tons, including 1,157 tons of cargo. The name of this ship was “SeWol”, a ferry ship of 6,825 tons sailing regularly between Incheon port and Jeju port and was carrying passengers, trucks and containers simultaneously. The basic dimensions of this ship are as follows: full length of 146m; width of 22m; gross tonnage of 6,825 tons; speed of 21 Knots; the maximum number of permitted persons 921 along with 200 containers (based on 10-ft); 130 sedans; and 60 cargo vehicles (based on 5 tons each); and the deadweight is 3,960 tons.



Why did this accident take place?

The Korean government has been investigating the cause of the ship capsizing. Therefore, it may be unwise to draw hasty conclusion, but this article is intended to examine the case with the objective contents displayed in the press to this point. This accident may be a result of hardware defect related to the ship’s hull or due to safety management.

❖ **Hardware defect**

First, safety has not been secured due to unreasonable ship structure and modifications. This ship was built in Japan in 1994 and it was imported to Korea as a used ship in October 2012. Thereafter, the alteration of the ship was done to enlarge the cargo and passenger capacity. Because of this, it seems that GM (transverse metacentric height) of the ship was heightened which lowered the ship's stability. In addition, the ship was excessively loaded when it departed from the port of Incheon; also fuel, clean water and so forth were exhausted during sailing which could mean that the stability of the ship had clearly declined. Second, the ship was obsolete and also preventive maintenance had been neglected. The ship that is 20 years old requires more preventive maintenance on its steering wheel, power generator, engine and so forth than other vessels. However, according to the statement of a previous deck officer, the shipping company did not carry out any systematic preventive maintenance but instead did some breakdown maintenance as and when the need arose. Furthermore the shoring and lashing conditions for the cargo trucks and containers loaded on the ship were also defective. Because of this, when the ship was skewed toward starboard, it lost its stability and drastically capsized. In fact, for saving the costs, the shipping company is known to operate without proper lashing, shoring and hence cargo trucks and containers were loaded onto the ferry without doing so.

❖ **Management problems**

First of all, the ship was delayed while departing due to the mist at Incheon port but it still departed under the adverse weather situation. In other words, there was a lack of care on part of the management of ship. It is highly likely that the senior management forced the ship to depart to avoid any loss of profit. Second, in order to shorten the arrival time and to compensate for the delay in departure, the ship chose a route where it had to face a strong tidal current. Furthermore the ship was being handled by a junior and therefore not sufficiently experienced officer. If it chose to sail on shorter route, the master had to maneuver in a more dangerous zone, but there was no awareness on safety regarding this. Third, after facing such a severe ship accident, at the initial time period the crews totally lacked emergency response capability. After the accident, crews were expected to follow the safety management manual to evacuate passengers first and help out with the rescue but they chose to abandon the ship and passengers to evacuate themselves from the ship first. This ship actually had the procedure for the emergency situation in its safety management

regulation, but it was not followed under the actual situation. And fourth, after the ship accident, there was no prompt rescue system, and as a result of the lack of management in the control tower, there was a delay in the rescue, resulting in an inability to save more passengers. After first receiving the report of the marine accident, it can be seen that they had two hours until the complete sinking of the ship, but the responsive system of Korean Coast Guard (KCG), and government agencies were poorly organized and not prepared to handle the fallout of this marine disaster.

What needs to be done to prevent these accidents in the future?

Due to this maritime tragedy, a few suggestions have been made with regards to passengers as well as with regards to the shipping company. Some measures need to be implemented to prevent such disaster from not only occurring in Korea but throughout the world, as well as planning how to respond in the future. In case of passengers, first of all, there has to be the awareness of safety at all times and it has to be part of the culture. Korea has made dramatic developments to escape poverty and war, and improve democratization and economic advancement. While having such a speedy growth process, awareness on safety is never a priority and people have a strong tendency to consider it as a nuisance. However, there is a need to recognize high awareness and culture on safety in order to evolve into an advanced country. And second, passengers getting on the passenger ships will definitely have the concern about safety as well. The passenger ship company should actually implement the drills that they are supposed to implement when passengers embark on the ship, and the passengers embarked on the ship should actively participate in the drills for preparation in times of emergency.

The safety management plan of business also has to be established and the safety management has to be strengthened. Executives have to consider safety as a cost which cannot be neglected during education or training with their employees. As proved through this accident, safety may determine the very existence of the company. Therefore, executives of a shipping company have to establish the safety management plan to fully monitor the safety management issues. In addition, drills to experience the emergency situation have to be practiced in order to understand the safety management techniques during the actual situation, not just to consider it as a “dead knowledge” found only in documents. Second, unlike the crews for ocean-going ship, crews in the coastal ships have become older. The ship companies have to make efforts to secure younger crewmen with rich, specialized knowledge, while the government also has to contribute towards this in order to avoid any

unbalance in crew qualification in ocean-going ships and coastal ships by reviewing the policies on crew members. Third, the system has to be overhauled to retire those obsolete ships from domestic routes and not allow them to sail again if they are of a certain age or beyond. In such events wherein there are many passengers in the passenger ship, a separate system has to be made to enable safe ship operation. For this particular reason where the coastal shipping company that does not have sufficient financial means, the government has to review certain plans to procure the financial resource at low interest rates. And fourth, the search and rescue response system needs to be prepared for possible maritime accidents and also have to be maintained with the disaster management system in case of a maritime accident through major overhauling. A powerful control tower has to be structured to enable immediate implementation of a prompt and flawless rescue and search when any marine accident occurs. Furthermore, there has to be a joint system of rescue and search with surrounding countries.

Securing safety in an open sea is like the foundation to support the maritime logistics. If the safety and security collapsed in the sea, it is difficult to maintain the maritime logistics network. Therefore, the researchers around the world have to consider prevention and response measures against marine accidents along with the presentation of alternatives in the Asian region as well as on the global scale.



Photography by Fang Zhang, 2014

CARGO THEFT AND SMUGGLING

Zhongcheng SUN¹ and Hong Yan²

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2. Department of Logistics and Maritime Studies, The Hong Kong Polytechnic University

For shipping industry, the Corporate Security Policy refers to a company's procedures and guidelines for maintaining the safety and integrity of its people, assets and customer's cargo, etc. To demonstrate their commitment to supply chain security, most shipping companies have endorsed Corporate Security Policies to guide their staff both ashore and at sea on how different staff levels can contribute to ensure the safety and integrity of the whole shipping logistics network. Shipping companies have also offered their utmost effort and cooperation to the authorities in their fight against any unlawful act on maritime or cargo security. Such acts may include, but not limited to terrorist attack, piracy, cargo pilferage and smuggling.

The Customs-Trade Partnership Against Terrorism (C-TPAT) is a voluntary supply chain security program led by U.S. Customs and Border Protection (CBP) and focuses on improving the security of the private companies' supply chains with respect to terrorism (U.S. CBP Website); Partners in Protection (PIP) is a Canada Border Services Agency (CBSA) voluntary program that enlists the cooperation of private industry to enhance border and trade chain security, combat organized crime and terrorism and help detect and prevent contraband smuggling (CBSA Website); Authorized Economic Operator (AEO) is developed by the European Commission (EC) and can be defined as a party involved in the international movement of goods in whatever function that has been approved by or on behalf of a national Customs administration as complying with World Customs Organization (WCO) or equivalent supply chain security standards(European Commission).

To date, C-TPAT (U.S.), PIP (Canada) and AEO (EC) are the main government-business initiatives which aim to promote and strengthen overall supply chain and border security. These programs recognize that the highest level of supply chain security can only be achieved through closer cooperation with the ultimate owners of the supply chain.

Taking the U.S. as an example, CBP's Office of Air and Marine (OAM), a critical component of CBP's layered enforcement strategy for border security, has **made great contributions to US Border Security in the past. As can be seen from the statistics, OAM's achievements during Fiscal Year 2013 included but were not limited to the followings:**

- 1,015,075.89 pounds of marijuana seized with a value of over \$2.6 billion
- 155,120.44 pounds of cocaine seized with a value of over \$11.6 billion
- \$25.3 million in currency seized
- 2,194 weapons seized

From the above figures, we can imagine that smuggling has been and will be one of the most dangerous security issues in the container shipping industry; containers are considered to be integral to an extensive range of smuggling operations. Compared with the annual global throughputs of 420 million containers, only about two percent of targeted shipments are inspected by customs officials.

The revolution of containerization in the international trade has had a positive impact on the decrease of cargo pilferage throughout the global supply chain. Yet, it has likewise become an ideal umbrella to the organized criminal activities, mainly due to the particularity of the cargo journey from the origin to the final destination, such as combined land and ocean transit.

In the following, we present three recent cases encountered by a shipping company. Two of them are about cargo theft while the other one is about cigarettes smuggling.

❖ *Case 1: Cargo Pilferage at Port of Le Havre*

An increasing trend has been observed in pilfering incidents at Port of Le Havre in these recent years.

On August 05 2013, a container ship was berthed at Port of Le Havre to load and discharge cargo. Realizing that the Port of Le Havre is a high-risk place of cargo pilferage, the vessel has taken additional preventive measures to maintain high vigilance against any possibility of cargo theft.

At 6am, during a routine security patrol, the duty AB found that the seals of several containers stowed on bay 05 decks were missing, while broken seals were seen

nearby. The duty AB reported his findings to the duty officer promptly, and then the case was brought to Ship Safety Officer (SSO) and the Master's attention.

The SSO and the Master arrived at the scene of the incident a few minutes afterwards, and the Master ordered a thorough investigation in order to determine the radical movement of the broken seals. Later, it was found that a total of five containers have been tampered with, and additionally some empty packing boxes were found scattered beneath containers and on the catwalks nearby. It was suspected that this might be the case of cargo pilferage. In order to find the origin of these empty packages, these five tampered containers were opened by the ship's crew under the supervision of the SSO and the Master, and there was no surprise that one container was found to have some cargo missing with the packing matching exactly with those empty boxes. The cargo was perfume from a renowned brand of France. Apparently, the thieves had stolen the perfumes and left behind the packing boxes. Later on these five containers were resealed using shipboard High Security Seals.

According to cargo operation records, these five broken-seal containers were loaded at a previous port and all seals had been physically checked by the ship's crew after the container was loaded on board. Security patrols were taken out regularly during sea passage from the last port, and there were no abnormal findings. All crew had been interviewed by the SSO and nobody was found to have been involved in this incident.

The terminal manager and local agent were informed about the incident.

There were good reasons to suspect that the incident had happened during cargo operation at Port of Le Havre. The master reported the accident to the ship owner, while at the same time he issued a Statement of Fact and requested terminal to carry out further investigation into this incident.

❖ *Case 2: Cargo pilferage at Suez Anchorage*

On October 16 2013, a container vessel was anchored in Suez North Anchorage waiting for Canal transit. The ship's crew was alerted about theft activities in this area and preventive actions were brought against any possibility of theft prior to arrival. Regular deck safety/security patrols were arranged and performed at an interval of 30 minutes.

Soon after the vessel had anchored, the duty crew member patrolling deck and

surrounding areas suddenly caught sight of one intruder on the catwalk of forward bays. He then shouted at the intruder and immediately reported the case to the duty officer via VHF radio, who when promptly sounded the general alarm from the bridge. Simultaneously, the duty crew member heard many footsteps retreating hastily to port side of the vessel's forecastle; obviously there was more than one intruder. Thinking about the possible safety threat, the duty crew member did not attempt to pursue the intruders. Soon after he heard some mixed sounds and noticed that the intruders might have leaped into the water and escaped. A few minutes later, when he came to the forecastle together with other crew members, they saw one speed boat at a distance of about 50 meters moving away quickly from the ship's bow.

The ship's crew carried out a thorough inspection and found that a total of 17 container seals were broken or missing while six containers had signs of tampering.

As per incident reporting procedures, the Master reported the incident to the ship owner and local authority (Suez Canal Inspectors). All containers involved in this accident were resealed using High Security Seals as per the owner's instruction.

❖ ***Case 3: Cigarettes Smuggling***

On November 25 2013, at one of the Malaysia's Container Terminals, four 40ft reefer containers were detained by local Customs after being discharged from the ship. These reefers were transshipment cargo and their final destination was Pusan, South Korea. The shipments were ordered for further inspection under Customs Act.

The carrier immediately notified the shipper of this incident. In reply, the shipper strongly requested the carrier to challenge the Customs' decision and claimed that the Customs should not open their containers without reasonable cause. The request was totally denied since nobody had the right to go against the Customs Act.

As a follow-up, the shipper anxiously provided excuses and requested the carrier to negotiate with Customs to release the shipments as soon as possible. The shipper claimed in the letter:

- The mentioned reefer containers had been wrongly sent to Port Kelang and they were thought to have been transited at another port;
- These containers were still in trade zone and under transshipment status;

- Consignee at Port Kelang would not accept these wrong shipments;
- The Marine insurance policy contained “original seals” clause;
- Consignee at final destination would not accept cargos if no original seals were applied.

Apparently, some of the above conditions were unreasonable.

There was no doubt that inspections were performed as scheduled by Customs Officers. Finally, three out of those four reefer containers were found to have no problem and were released by Customs to the shipper for re-export to the final destination.



Photography by Fang Zhang, 2012

Only the fourth container was found to have cargo discrepancies against the cargo manifest and cartons of cigarettes were found by Customs Officers. Therefore, this container was detained for further investigation.

Apparently, this was the event of foul declaration and also an attempt of smuggling of cigarettes by the shipper. The carrier immediately took proper preventive actions in order to protect their interests. They also held the shipper fully responsible for their fault and reserved their rights to recoup any costs and penalties from the shipper that might arise from this incident.

SUMMARY

We have learned from above cases that the global cargo theft risk is one of the biggest concerns to supply chain security as the extent of risks vary greatly between different

countries and regions. Shipping companies and port authorities continually face different challenges of supply chain security. As per UK P&I Club, the estimated yearly costs of cargo crime are between US\$30-50 billion globally. The cargo theft threats are typically rooted in social, economic and cultural conditions.

Ports, terminals and depots are the most favored locations for this kind of offense, as well as land transport. Ship operators also claim that they are also the focal point of cargo crime, one of the reasons being that the ship is more easily accessed than that of other facilities. Cargo in transit may involve a long journey and various handling procedures in different places, and this may present a risk of undetected cargo pilferage. Often it is extremely difficult to identify where and when an incident has taken place and who did this.

The prevention of cargo theft requires awareness and efforts from different parties within the whole supply chain, such as, shippers, ship operators, terminals, authorities and so on. More and more security measures have been taken in every aspect of the supply chain. For example, a mechanism called the High Security Seal (HSS) is used by industry for securing containers, and the HSS must conform to the ISO 17712:2010 standards (effective from March 1 2012) in order to be accepted by customs internationally. The HSS is so designed and manufactured to provide tamper evidence and some degree of security. The integrity of container seals provides evidence that the cargo has remained secure throughout its journey. But the HSS is not an anti-theft device, and it can be easily tampered during a criminal act.

Nowadays information technology is playing a more important role in the integration of security practices with efficient operation and information flows. Its power to track cargo through the supply chain has brought great benefits to supply chain security. An electronic submission of key data (EDI) is essential in container targeting for inspections and terminal operations planning.

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CYBER-SECURITY AND MARITIME TRANSPORT

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THE Snowden affair (in which Hong Kong played a not insignificant role) and the discussion on cyber security have rekindled interest on the negative potential of the internet. If not addressed immediately this debate about the control of the digital global commons, could to a large extent undermine the huge positive gains that have accrued, large due to global connectivity to all strata of the society. Instead it just might become a basis of a future global conflict.

The idea of the ‘global village’ might also be negatively impacted if consensus is not arrived at amicably by nations and communities themselves with regards to laws and regulations which would be applicable to this phenomenon. The process of ascertaining and enforcing the ‘rules of the game’ is highly contentious. Having said this, the debate must take place with the right earnestness if common ground should be discovered as soon as possible.

While this unprecedented global digital connectivity has provided numerous opportunities for billions all over the world including individuals as well as groups large and small, threats such as cyber hacking and malware, are simultaneously attempting to erode the trust that these billions have put in these networks. This is despite governments attempting to address these issues by creating mechanisms to discourage misuse. The very transnational nature of cyberspace constrains the efforts to regulate it and has forced the international community to come to the negotiating table.

The United Nations (UN) too has been endeavoring without success for over a decade to develop a consensus amongst member nations with regards to regulation of cyberspace. But the gap between the views held by respective national state governments is too wide and not easily bridgeable.

The conflict is basically about two issues. The first issue deals with matters where stakeholders are unable to agree upon the inclusion of new threats posed by States themselves who exploit ICTs for military and security purposes. Secondly, they are constrained by inability to focus on information content or information

infrastructures. There are also significantly different opinions regarding the control of trans-border information content. Opposing calls for state control over information, most governments argue that it is their unalienable sovereign right to approve or ban information transmitted into national territory from outside its borders should it be deemed harmful for their countries.

Several incidents in the recent past have highlighted the destructive power of disruption in communications between the government and its citizens using cyberspace, which severely impacted governance and usage of basic utility services infrastructure, leading to chaos and confusion.

Cyber Security and Maritime Transport

Recent statistics show that about 70% of the goods traffic is carried by maritime transport. This fact underlines the importance of maritime transport. As in other industries, the maritime industry relies heavily on Information Communication and Technology (ICT) in order to enhance its operational efficiency. It is used to enable almost all essential maritime operations, whether during the sea leg or land leg of cargo transportation. Disruption or deniability of these ICT capabilities might have disastrous consequences for the service providers as well as cargo interests. As such the need to ensure dependability and enhance the robustness of systems to withstand cyber-attacks is a key challenge to all concerned.

Prima facie analysis of the cyber security in the maritime sector highlights the policy context at an international level which emphasizes the low awareness of cyber security challenges in the maritime sector. Considering the lack of awareness and focus on cyber security leads to a low sense-of-urgency, this results in inadequate preparedness while facing cyber threats. As such, the effects of a potential cyber attack could cause considerable damage.

Hence all sovereign governments need to consider developing and implementing awareness raising campaigns and imparting specialized training. Such awareness campaigns and training initiatives should be coordinated by relevant cyber security organizations. It would also be appropriate to point out that though the government should develop relevant policies and coordinate implementation, it should be left to highly trained professionals and respective experts to conduct the highly complex training programs. Thus it would be beneficial for all stakeholders to consensually

develop a strategy to tackle cyber threats. This is because current maritime regulations focus on physical aspects of security while ignoring the non-tangible cyber risks.

One can begin by conducting an objective audit and assessment of existing cyber risks and then proactively applying sound security risk management principles to develop specific policies. The individual nation state governments should also consider aligning and harmonizing their domestic and international policies with regards to cyber security. There should also be proper coordination and cooperation between them, particularly by emphasizing better information exchange.

Currently ICT systems deployed in maritime operations have become increasingly complex. In addition the rapid technology development and need to upgrade existing systems has reduced the focus on the security aspect of this issue. The vulnerabilities created by these security gaps may corrupt the invaluable databases. Furthermore, it was noticed that there was inadequate standardization of good cyber security practices thus causing incompatibility and delays.

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A telling example is the increasing usage of ICT systems for cargo tracking and cargo identification which are facing increasing incidents of cyber attacks or system failures. The automated systems handling the cargo in ports are also highly vulnerable to data theft or manipulation for criminal purposes. Such incidents are bound to increase in the near future as a direct result of insufficient cyber security measures.

This is despite the presence of various global organizations such as IMO, WCO and the IMB, which is a specialized division of the International Chamber of Commerce (ICC). It is the lack of coordination between these stakeholders and stakeholders at other levels hinders them from playing the desired role.

Conclusion

In the current regulatory context there is very little consideration given to cyber security threats. Most security related regulation such as the ISPS code only covers threats relating to physical infrastructure. This also implies a greater dependency on stakeholders to identify such threats and take corrective action. In such circumstances the stakeholders may face inordinate difficulties while addressing such cyber attacks as they are not competent enough to do so in the first place. To summarize it can be said that no holistic approach to tackle maritime cyber risks exists. This is despite some national governments attempting to minimize the threats in a rather ad hoc manner.

Finally it should also be stated that the key stakeholders also lack the necessary incentives to improve their overall cyber security posture. It appears that we are waiting with bated breath for the next astounding ‘incident’ to happen.

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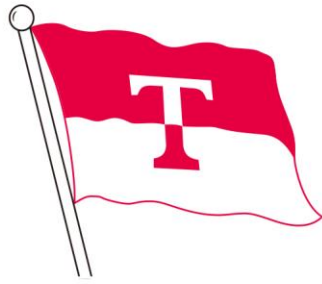
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