

Risk Management for Vessels Maneuvering in Yangon Port

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Abstract: Risk management has to be taken before performing any activities to prevent incident or accident or to minimize them. Particularly, navigational risk management for entering a port is also important among them as most of marine accidents happened in port areas around the world due to existence of navigational hazards, congested waters and other restricted conditions within port limits. For consideration risk management for entering a port, this paper has been based on formal assessment of the hazards and risks to navigation within the port which was introduced by the Port of London Authority (PLA), formal safety assessment of International Maritime Organization (IMO) and Hazard and Operability analysis (HAZOP) for hazard identification. Moreover, port legislation and the Port Marine Safety Code should also include this process, and then ship masters, officers and pilots should take it before entering a port. This study was also based on the method of data collection, phone interviewing, and my last 13 years seafarer experience in respect of navigation within the limit of the Yangon Port.

The Yangon port is a river port which is far away from sea about 40 nautical miles and was a premier port of Myanmar, a port of handling 90 % of import/export cargoes of the Myanmar. This paper presents weak point of port authority, hazards and incidents occurred by master or pilot or port authority, and action taken not to occur incidents or accidents in the port of Yangon based on risk management.

Keywords: Navigation safety, Hazards and Limitations of Navigation, Risk assessment, the port facilities.

INTRODUCTION

Risk management is the most important process to protect participated persons and surroundings so that it has to address hazards and to ensure risks to be reduced to an acceptable level within control frame. In recent decades, Marine transportation was instantly increased all over the world because of improvement of international trading and marine industry urgently needs to prevent accidents coming from ships and impacts to marine environment. If accident can be happened during navigation, it cannot be countable to calculate loss or damage of marine environmental concerns and can cause loss of human life and serious injuries.

Risk includes damage and uncertainly, to say definitely as possibility of loss or injury, and the degree of probability of such loss. In defining risk management, it is a system including risk assessment and implemented process to identify hazards, and to ensure risks to be reduced to an acceptable level within control frame. In practice, navigational risk can be assessed based on frequency; consequences and impacts of Accident occurred in specified area and then needs to implement the process to override or to minimize the risk with standard model or method. In studying marine accidents regarding to navigation, most of the navigational accidents occurred in restricted areas, in port limit or under pilotage operation but they were generally based on human error, not mostly machinery and equipment's fault. Therefore, they can be eliminated or minimized as much as possible not to occur as a major accident within the limit of Yangon port with precaution measures and risk management for vessels maneuvering before commencement of any operation in respect of navigation. To study this area, it was based on "Risk

Assessment of Marine Traffic Environment Using Unascertained Quantity” by Hu shenping et. al.(2009) focusing on issues and problems of marine traffic environment with unascertained measurement.

The Port of Yangon is a river port, a port of about 40 nautical miles far away from sea, and it was not be regularly maintained for dredging and hydrographic survey along waterway for maximum allowable draft vessels and also there is no vessel traffic information system (VTIS) for safe navigation in port area so there are many hazards to navigate for outbound/inbound vessels of the Port of Yangon. Particularly, foreign maximum allowable draft vessel's safe navigation which will be first to visit the Port of Yangon will have high risk. This study cannot be perfect to describe detail accidents and hazards which were happen in this port because the statistics and data cannot be easy to take for all occurrences due to lack of information and facilities. Therefore, new study or research should be taken depending on acquired data and statistic in respect of navigation hazards and accidents or incidents happened in the Port of Yangon in succession.

LITERATURE REVIEW

As Hu shenping et. al.(2009, pp. 4952) points out that “The traffic environment at port areas is an open and complex system, involving the factors in many aspects such as the society, economy, and natural environment etc. So the reasons initiated maritime risks are very complicated”, port areas are more risk than open sea for navigation. Moreover, the port which is not full facilities for safe navigation can be more dangerous than developed ports. Fuzzy method is one of the methods to assess marine risks as it can be more popular than others and easy to formulate in the author's point of view. Furthermore, the authors drew out one unascertained measure including various concepts in unascertained measure model (UMM) to evaluate factors and degree of reliability. As per their presentation, traffic environment at port is concerning all related factors including existence of nature, artificial construction such as VTS stations, shore bases capability and vessel traffic density. This paper described how to evaluate and establish matrix table for assessing risk in defined port.

In studying these concepts for marine traffic environment at port areas, it was seen that most of the assessments are based on mathematical calculations and complicated risk assessment methods and so it cannot be easy to be understood by mariners who are willing to navigate within the port areas. Therefore my research findings for the port of Yangon and navigation risk assessment method should be based on simple methods to be easily understood by mariners who they used to take risk assessment in practice onboard. The reason is that safety for navigation falls mainly upon navigation officers than port authority whatever the port facilities for safe of navigation are enough or not.

METHOD AND METHODOLOGY

To formulate navigation hazards and risks within the Port of Yangon, Correlation research, particularly Multi Linear Regression, under Non-experimental design is now more available than other methods of research as the Yangon port statistics and current data cannot be accurate to be obtained due to variable tide, wind and water way condition depending on weather changes. In using this research method, there are independent variable, dependent variable and extraneous variable. Among these variables, this paper describes relationship between two variables or more to come out risk assessment of navigation within this port. For this research, primary sources such as phone interview from the Myanmar port authority and data collection, and secondary source such as printed book and research papers. Above the findings, design and procedure, risk assessment for vessels maneuvering in the Port of Yangon can be analyzed to manage risks within these areas.

GEOGRAPHICAL POSITION AND BACKGROUND HISTORY OF THE PORT OF YANGON

The Port of Yangon is situated in the city of Yangon which is the biggest business city of the Republic of the Union of Myanmar and its estuary is connecting with the Andaman Sea which lies on the international shipping route close to the Malacca strait. It was established in 1755 under the Emperor of Myanmar and it became chief port of the Myanmar. At present, the Port of Yangon is handling about 90 % of import/export cargoes of the Myanmar.

Port Limit Particulars and Information

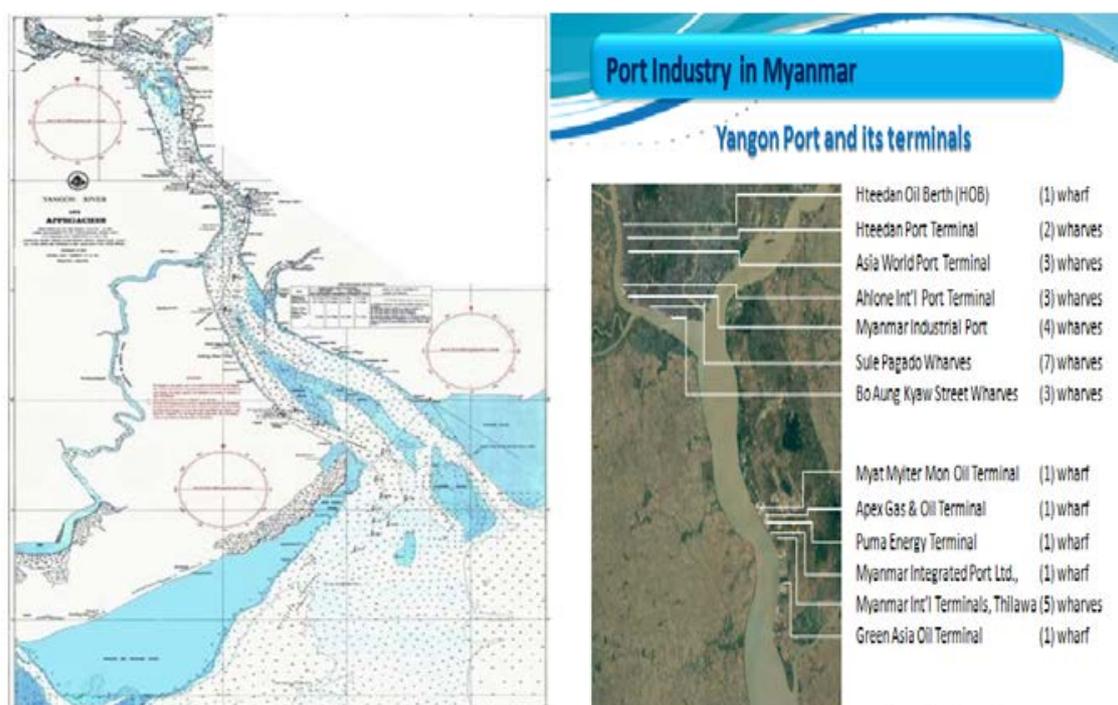
The Yangon Port Limit shall be defined as a distance of about 30 nautical miles outward from outer point of the Yangon river estuary. In this region, average tidal range may be about 5.85 meter at spring tide , 2.55 meter at neap tide and current velocity 4 to 6 knots. Obviously, the Yangon port consists of total

33 international wharves, 23 wharves of the Yangon inner harbor area and 10 wharves of Thilawa area, and other domestic wharves of coastal and inland water transportation.

Above the subject matter, they are classified as two groups for navigation in the Yangon River as follows,

1. Yangon Inner Harbour Terminals can allow ships of length overall 167 meter, deadweight tones 15000 and maximum draft 9 meter to enter as a maximum limitation.

2. Thilawa Area Terminals defines as a maximum limitation to enter for ships of length overall 200 meter, deadweight tones 20000 and maximum draft 9 meter. Teaching profession is a special form of joint activity of the teacher and the learner. The main “weapon” of a teacher for the transmission the socio-cultural experience, for the development of natural inclinations of students are not only knowledge of the subject which he teaches, knowledge about methods, pedagogical technologies of teaching, professional skills, and special personal qualities, among which a special place is the teaching artistry.

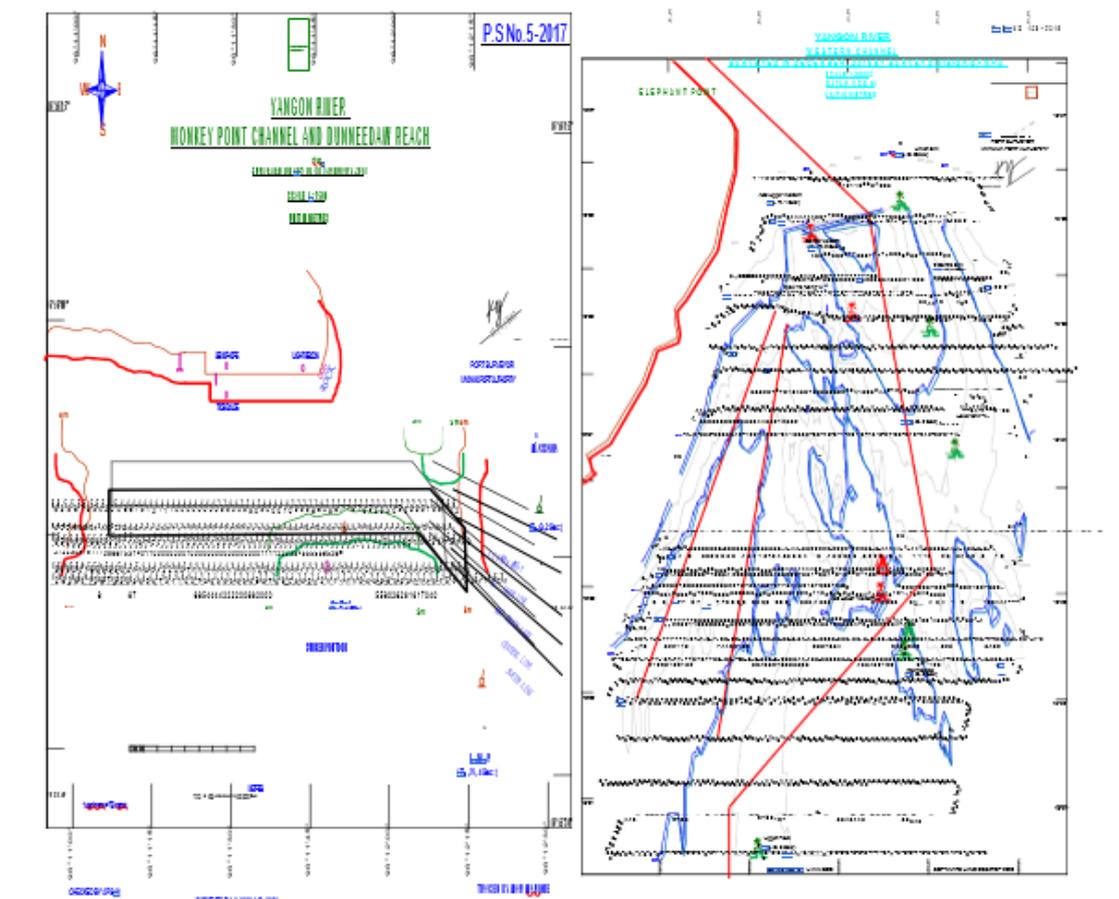


Navigable waters, Hazards and Port facilities in the Port of Yangon

According to surveys, there are two major constraint areas called major shallow waters, namely outer bar and inner bar, which are major obstacles for restriction of vessel's draft and size to the Yangon inner ports along the Yangon River. At the outer bar, the Elephant point, the chart datum is practically about 5 meter and at the inner bar, the Monkey point below 4.5 meter. Furthermore, there are many shallow waters near by navigable passage although the Yangon River is wide.

On the other hand, the Yangon River is tidal river so all inward/outward vessels are being allowable to pass these bars in only flood tide which is near highest tide and otherwise they have to wait as a delay till required time near temporary anchorage. Moreover, vessels are generally being allowable to pass the inner bar only in day time as per local instruction except permission to pass it. According to survey report, 3 different navigation routes are often changed alternately depending on the depth of water as the sand bar area varies periodically at the outer bar and also 4 dredgers have been used daily to maintain dredging to ensure navigable water about 1850 meter at the inner bar for having width of about 100 meter and depth of about 6 meter based on the dredging rate of 1,000,000–2,000,000 cubic meters per year. As a result of limitation of navigation in the Port of Yangon, any master of ships over 500GT shall take compulsory pilot except approval of self- pilotage allowed by the port authority.

According to my past experience regarding to the Yangon River passage, the Yangon Port facilities are still needed to upgrade for safe navigation, particularly pilot arrangement, harbor tugs and efficient monitoring and communication of port control. Depending to present port facilities, it can be said that it is no safe navigation even at the commencement of the passage.



[Figure: Left - The Monkey point (Inner Bar), Right - The Elephant point (Outer Bar)]

FORMAL ASSESSMENT OF THE HAZARDS AND RISKS

The risk assessment is generally consisting of five steps as follows,

1. Data Collection and familiarization
2. Hazard identification
3. Risk analysis
4. Risk assessment
5. Risk control

Data Collection and Familiarization

According to survey, the following facts are seen to become barrier of safe navigation in the passage of the Yangon River,

- Navigational hazards along the passage of the Yangon River
- Particular caution to approach pilot vessel and to pick up pilot
- No Vessel Traffic System (VTS) for efficient monitoring and control of safe navigation along the Yangon River
- No Port Marine Safety Code for risk assessment, marine safety management system, emergency preparedness and response, management of navigation, pilotage, towage operation, marine services, accident reporting and investigation and updated survey notice for navigation
- No Land based Automatic Identification System for navigational and meteorological warning to ships
- No efficient navigational marks such as Buoy, Beacon or Racon for safe navigation along the passage

- No emergency preparedness and response team for urgent marine incidents
- No Marine/Navigational safety procedure
- No technical assistance for marine incidents
- No established incident database or digital records

Hazard Identification

Hazard is “a physical situation with potential for human injury, damage to property, damage to the environment or some combination” defined in formal safety assessment. In maritime field, mostly hazards can be seen such as safety hazard, chemical hazard, mechanical hazard and environmental hazard. As a result of these hazards, accidents can be happened such as contact or collision, grounding or stranding, flooding, human injury or loss of life, loss of hull integrity, machinery failure, fire, explosion and pollution.

Commonly the following methods for hazard identification are used as follows,

1. Check list
2. Hazard index method
3. Hierarchical trees
4. System identification of release points (SIRP)
5. Failure Mode and Effect Analysis (FMEA)
6. Hazard and Operability analysis (HAZOP)

Among these above methods, Hazard and Operability analysis method should be chosen for hazard identification of navigational risk management, the method of first developing in chemical process industry, can be so suitable for deductive aspects (search for causes) and inductive aspects (consequence analysis). Modern economic situation in our country is reflected in such important sphere as education. A teacher of high school educates by his personality, his attitude to the world and people, he impacts on students emotionally. The teacher's ability to engage his students, to pass beautifully, convincingly scientific information, to engage in the creative process of cognition reality is teaching artistry. Therefore, pedagogical artistry is regarded as a professional competence in the activities, both women and men teachers.

UNIT: 1		HAZOP TABLE					
OPERATION MODE:							
Port Communication		Keyword	Deviation	Cause	Consequence	Hazard	Actions needed
		Weak port communication to ship	Weak traffic information to be gained from port control	No mutual agreement to take proper action between ships in congested waters or restricted visibility	Ships cannot take proper action to avoid collision or grounding	Grounding or Collision in narrow passage of the Yangon River	Frequently communication to port control for vessel traffic

The above table should be used to identify of all hazards in respect of data collection and familiarization in stage 1 for safe navigation in the Yangon Port. Based on this example in the table, each above data should be identified to assess expected hazard by ship master, officers or pilot to ensure the safe passage of the Port of Yangon before any movement of ship.

Risk Analysis

Risk analysis should be prioritized to identify hazards in “Hazard identification” stage. If hazard is potential than others at present, this hazard shall be prioritized for control measure to defend or mitigate that risk based on previous incidents which had been happened at specified location per years, every 3

years. Furthermore, consequences of risk should be known such as impact to human life, marine environment, port authority operations or port users.

For instance, there will be safety hazard, environmental hazard and so on in stage 2 but the prioritization should be safety hazard. Moreover, the risk profile should be generated based on frequencies of incidents per years.

Risk Assessment

Risk assessment should be focusing on which was based on uncertainty and identifies “gaps” between existing risk profile for present operations and procedures and new risk profile regarding to them, and it intends to mitigate the level of risk till acceptable level by creation of new risk profile. When the risk of stage 3 was known, it can be measured and managed very well. In this stage, measures can be taken by risk assessment including two categories such as probability and consequences of that risk and then need to establish the level of risk based on these two categories.

Table 1: Risk Matrix of Elements to Navigation in the Yangon Port

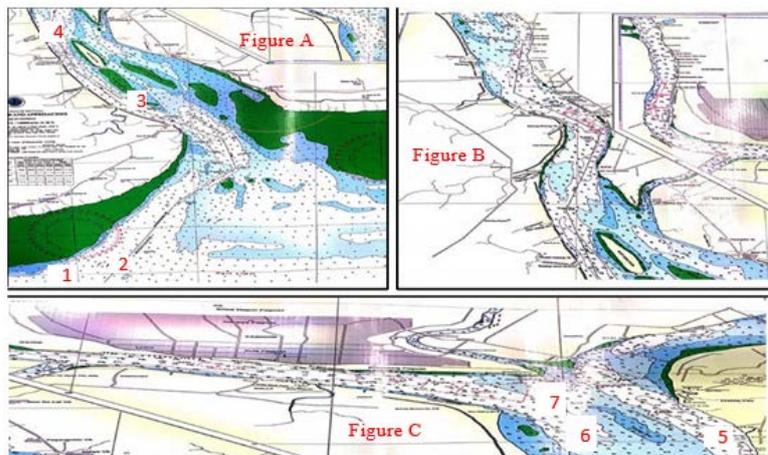
Index	Low Risk	Moderate Risk	High Risk
A		Current rate about 7 Kt	
B			Depending on Tide
C			Not sufficient
D		Depending on Location	
E	Due to Pilotage		
F		Depending on Location	
G		VHF range from Port Tower	
H			Not sufficient

(A = Current, B = Depth of water, C = Fairway Buoy, D = Width of Navigation Water, E = Traffic Density, F = Wrecks and Navigational hazards, G = Port Control Communication, H = Emergency Response Possibility)

Table 2: Risk Matrix for Specified Areas in the Yangon River

Location	A	B	C	D	E	F	G	H	Remark
1.Lower Float	L	L	ML	L	L	MH			16°17.14”N 96°17.81”E
2.Upper Float	L	L	ML	L	L	MH			16°20.00”N 96°22.81”E
3.Central Middle Bank	M	M	M	H	H	MH	H		16°28.62”N 96°19.08”E
4.Hmawun Lumps	M	M	M	M	H	M	M	H	16°34.20”N 96°15.00”E
5.Hasting	H	M	L	M	M	L	M		16°44.23”N 96°13.13”E
6.CCA	M	M	M	M	M	L	L		16°45.67”N 96°20.86”E
7.Lower Monkey Pt.	H	H	L	H	M	L	L		16°45.87”N 96°12.27”E

(L = Low Risk, M = Moderate Risk, H = High Risk)



Based on the above assessment, ship master, officers and pilot should take risk assessment for safe passage in the Yangon River before taking any movement in respect of these critical points. After consideration of priority, probability (likelihood) and consequences (severity or impact) from risk profile and then risk can be deductive from this calculation depending upon these two facts.

Risk control

After taking risk assessment bases on the above stages, the last stage is control measures for that risk. In implementation of risk control measures, parties should also use Cost benefit analysis techniques which was a part of the Formal safety assessment laid down by the International Maritime Organization (IMO) for identification and choice of recommendations, especially port authority.

For instance, suitable control measures for risk assessment from stage 4 in respect of weak port communication to ship should be taken to avoid that risk such as follows,

1. Ships should contact the Yangon Port Control for traffic condition in the passage of the Yangon River frequently and request any assistance for safe navigation.
2. Inbound/outbound ships should communicate each other for their present accurate positions to provide safe passing in the passage of the Yangon River.

Based on these control measures, risk assessments depending upon stage 2 hazards should be taken before any movement for safe navigation in the Port of Yangon.

DISCUSSION AND CONCLUSION

Navigational risk assessment for vessels maneuvering in ports is directly concerning with not only ship masters, officers and pilots but port authorities. Both ship and port operation will be impacted simultaneously when accident will be occurred in port limit and therefore both parties shall take risk assessment for navigation safety. Although risk control measures by ship is not burden of cost, port risk control measures is mainly connected with costs and expenses based on port navigational safety management system so it can be directly depending upon port finances and capacities. Nevertheless, navigational risk management in ports shall be taken appropriately as safety is the most importance pillar.

As per research data for the Yangon Port facilities, the Yangon Port condition is at moderate risk level to navigate. The Yangon Port should take more steps to become safe navigation in the Yangon River. Furthermore, the Yangon port should initially adopt Port Marine Safety Code to implement risk assessment, formal safety assessment, marine safety management system, emergency preparedness and response, management of navigation, pilotage, towage operation, marine services, accident reporting and investigation and updated survey notice for navigation and should maintain regularly dredging and hydrographic survey for maximum allowable draft vessels. On the other hand, land based AIS and VTS system should be earlier established for proper and effective information to ships and all stakeholders and also navigational marks should be updated and efficient for safe navigation in the Yangon River. These above requirements are needed to implement navigational risk assessment for navigation in the Yangon Port to be supported by the port of Yangon.

Similarly, all of ship masters, officers and pilots should take the above risk assessment for navigation safety in the Port of Yangon before any action. All masters and ship officers are legally binding to implement risk assessment in accordance with ship safety management system so they need just to know hazards in the passage of the Yangon River to take the navigational risk assessment for vessel maneuvering in the Port of Yangon.

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