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ASSESSMENT OF CONTRIBUTION OF MARITIME SECURITY TO SAFETY OF LIFE AT SEA AT MTWARA COASTAL REGION IN TANZANIA

Joel Michael Ojode
Department of Maritime Transport, Dar es Salaam Maritime Institute, Dar es Salaam, Tanzania
witchdudu@gmail.com

Mwesiga Leonce Leopord
Department of Maritime Transport, Dar es Salaam Maritime Institute, Dar es Salaam, Tanzania

Abstract

Mtwara region is one of 26 regions of Tanzania mainland it is the southernmost region. The matter of safety and security is dominant importance in Tanzania due to the number of marine disasters. This article aimed at analyzing the safety and security subjects in maritime Transport in Tanzania by focusing on Merchant ship, passengers ferry boats and Oil ridge Drill ship, Operating and navigating along Mtwara coastal region. The study conducted in Mtwara coastal region and investigates; identify factors that hinder the efficiency of maritime security and safety of life at sea in Mtwara coastal region. In addition, develop appropriate measure for mitigating the problem of security and safety of life at sea in Mtwara coastal region. Stakeholder of maritime transport and business community at large constitute the population of this study. These include officials from TPA, TASAC, TEMESA FISHERIES, MARINE POLICE, NAVAL STATION, and TRA. The method of data collection including, interviews and questionnaires. The research analyzes data qualitatively, tables, and charts descriptively based on the collected data. Fortunately, security is somehow satisfactory, and the descriptive findings provide some alert to the authorities responsible for marine and security in Tanzania not takes for granted the security concern ship operating in Tanzania water bodies.

Keywords: Contribution, Safety, Security, Maritime, Mtwara region, Tanzania

INTRODUCTION

Mtwara region is one of 26 regions of Tanzania mainland; it is the southernmost region lies between Longitudes 38◦ and 40◦ 30" east of Greenwich. It also situated between Latitudes 10◦ 05" and 11◦25" south of the Equator. It borders Lindi region to the north, the Indian Ocean to the east and separated by the Ruvuma River from Mozambique in the South to the West it borders Ruvuma region (URT, 2012)

The 2050 strategy built on earlier efforts, starting with the adoption in 2008 of a regional maritime security strategy by the Economic Community of Central African States (ECCAS), followed by the Southern African Development Community (SADC) maritime strategy in 2011, and the 2014 Economic Community of West African States (ECOWAS) strategy. These strategies further operationalized through regional maritime codes of conduct such as the Djibouti Code of Conduct (signed in 2009) and Yaoundé Code of Conduct (signed in 2013).

Kuo (1998) define safety as perceived quality that determines to what extent the management, engineering, and operation of the system is free of danger to life property and environment. A safety culture means that safe and proper methods of shipping and doing business in the maritime industry are not only economical, but a way of life. Individual seafarer must believe that safety is important, it is not possible to create a strong safety culture, if people do not believe that safety is everyone concern. Safety culture often involves changing the way people think it is important that the management behave in ways, which demonstrate “Safety comes first” example is the most effective way of creating strong safety culture (Madsen, 2006) the goal of everybody must be making the working condition safe. Bearing in mind that safety is not a problem that solved and then put aside, it is permanent feature of how everyone on board works and lives.

IMO have realized the importance of promoting safety culture concepts in shipping, despite the significant differences of its member states particularly in their abilities to make the necessary institutional change as well as developing their human resources. The ISM code were designed to influence the process aboard ship and within shipping companies and contribute to the mental attitude necessary for the promotion of a safety culture in shipping. For trade to flow effectively the connections between ships, ports and people must be secure. IMO facilitates this by helping member states enhance their maritime security, focusing on what the civil maritime stakeholders that include both the shipping and port sector can do to protect them and to assist governments to protect global maritime trade. The basis of IMO regulation to address maritime security is the international convention for the Safety of Life at sea (SOLAS). The ISPS code contains detailed security related requirement for government’s port authorities

and shipping companies in a mandatory section (Part A) together with a series of guidelines about how to meet these conditions.

EFFECTIVE SAFETY CULTURE STATEMENT ANALYSIS

In order to achieve an effective safety culture it is essential to have the means to monitor company current performance, in order to identify ways in which safety improved. While the SMS required by the ISM code to provide such a mechanism a readily comprehensible means of monitoring, the effectiveness of particular safety regimes and policies. Lost Time Incident (LTI) commonly used across many industries to measure personal injuries. The most common forms of LTI's are slips, trips, and falls. By adopting, a culture that will prevent these and other minor injuries from occurring lives ultimately be saved. With the objective of improving safety and pollution prevention, the ISM code requires the company to ensure that the SMS includes procedures to investigate and analyze non-conformities and hazardous situations. The study aim to assess factors contributing to decline of maritime security to Safety of Life at Sea in Mtwara Coastal region and find out the possible solution of non-conformities occurred. Especially in Indian Ocean where many people lost their lives, damage cargo, and properties due to Piracy and ships accidents. Efficient Maritime Safety and Security contributes greatly to low chances of non-conformities, accidents, and hazardous situation.

THEORETICAL SINKING OF SS TITANIC

The sinking of SS Titanic on 1912 was the initial incentive for the international maritime community to set up safety standards in order to reduce accidents at sea and later led to the establishment of IMO. Initially the focus was on enhancing the technology of ship design and operation, as well as introducing regulatory system on international basis to ensure safety at sea and preservation of the marine environment, over and above the adherence of ship's crew and operators to such regulations.

- However, there was a lack of attention to the human or system interface, so called human factor and the role of the human in marine accidents, human factor are such as:
- sophistication of modern ships,
- multinational crew,
- the lack of proper competency,
- education and training system

Many others resulted in the increase of the number of maritime accidents as a results of human errors which has establish the need for improving the performance of human element by studying the causes of human error and how to overcome it.

FACTORS AFFECTING THE ROLE OF HUMAN IN SHIPPING

The human role is vital in the shipping industry; ships require well-trained and motivated crew in order to operate safely and efficiently. Recognizing that most of the accidents are preventable and normally occur following unsafe action or failure to correct procedure, seafarers need to provide with the appropriate tools and properly trained to perform their duties safely and efficiently. In other words, the quality of output mainly depends on the quality of input. According to Squire (2006), the personal output of the seafarer is dependent of seven needs, which are competence, attitude, motivation, happy and healthy life style, safe and secure environment, self-actualization, moral values, and competence.

The seafarer's level of competence will not only depend on good and effective education and training but realistic competencies will depend on the ability to absorb knowledge and to understand the subject and personal skills and proficiency.

The basic main causes of maritime accidents

Talley (2002) has classified the main causes of maritime accidents as follows; flag of convenience, doubts about the vessel safety, performance enforcement of classification societies, avoidance crew size, vessel maintenance, the mature of world fleet of dry cargo vessels, insufficient fire protection, and instability of ferry vessels and human factor. It seems to be common knowledge that a majority of accidents actually caused by human factors or human error. Recently an analysis of 187 instances of groundings and collisions carried out by IMO's subcommittee on Flag State Implementation (FSI) indicates that in 150 cases 80 percent the human element was a contributory factor (Mitropoulos, 2006) the analysis indicates also that there are fewer accidents caused by technical failure.

Nevertheless when considering maritime safety it is necessary to address both the human element and the technical solutions, taking into consideration that human error may be due to an error in the equipment design, ship design, lack of proper maintenance onboard or the way the ships management is operating. Most of the analysis of human error aimed at improving understanding and its remedial value has fully exploited.

The American Bureau of Shipping (ABS) acquired 150 accident reports, from the website of Australian Transportation Safety Bureau (ATSB) attempting to codify the causal factors of each accident. Based on that review presented on the database it indicated over the period of 1992 to 2001 human error was primarily responsible for approximately 85% maritime accidents. Numerous other causes of marine accidents the common human cause of accidents including stress, solation, Fatigue, carelessness, operator error, calculated risk, improper loading, lack of

training, cultural differences, lack of communication, lack of motivation, error in judgment, lack of knowledge and physical impairment.

The human factor in the work of IMO

By the mid -1980's the international maritime community became anxious about the number of major maritime accidents continued to occur despite the IMO's stringent technical standards. Studies reveal that the human element was present in a vast majority of maritime causalities. Accordingly, IMO gave attention to the human element of daily ship operation and ship management. In addition to the key human element regulations include the STCW Convention and the ISM Code, IMO has also developed guidelines for the investigation of human factors in marine causalities and incidents included in the IMO code for the Investigation of marine causalities and incidents and comprehensive guidance on fatigue mitigation and management has been published. The STCW Convention requires that all seafarers to be properly, qualified for the position that they hold onboard.

Meanwhile MSC agree that a comprehensive review of the STCW convention and STCW code. In order to ensure that the convention meets the new challenges facing the shipping industry including the rapid technological advances today and in the future. The ISM code developed to provide a framework for the proper development, implementation, and assessment of safety and pollution management. Additionally the ISM code requires that ship-owners define the responsibility, authority, and level of competence required of each crewmember.

Table 1. Maritime Safety theories and implication to SOLAS

Author	The theory approach	The main factors of maritime safety
Guther Paulis (2010)	Blue Economy and resilience	Maritime safety procedure and requirements
Maritime safety procedure and requirements	Piracy	Marine casualty investigation salvage and rescue
Trope et al(2009)	Security practice	Smuggling and trafficking of person by sea
Martin and Owen, 2010 Gasper, 2005 and Paris, 2001	Mapping of Maritime Security	Climate change and interstate disputes
Climate change and interstate disputes	Securitization framework	Genuine logic to threat construction

Conceptual framework of maritime safety and security

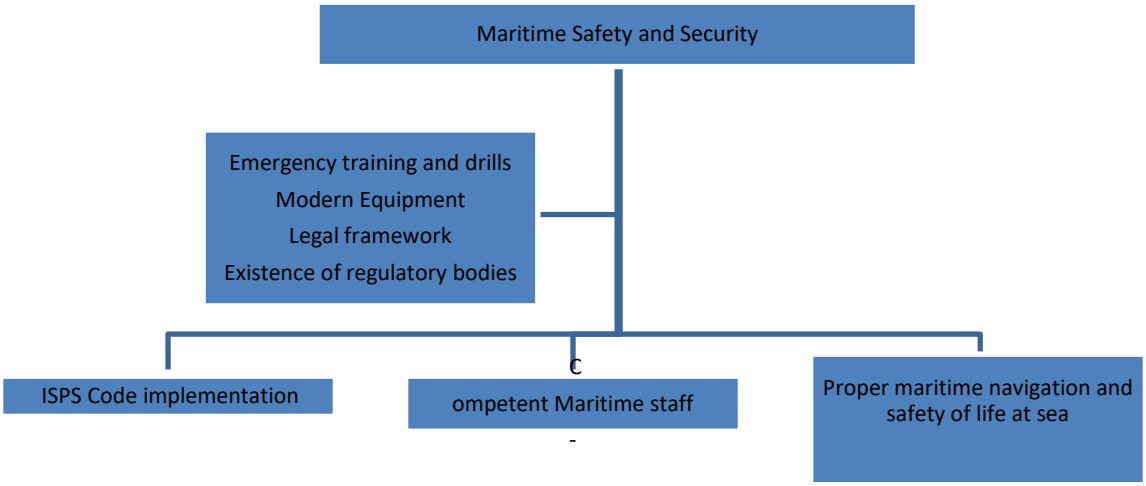

Figure 1. Maritime Safety and Security elements

Figure 1 above maritime safety and security is an independent variable and Safety of life at sea is dependent variable. In order to have a sustainable maritime transportation there is many intervening factors, which need to put in place such as emergence training and drills, modern equipment, proper legal framework and existence of active regulatory bodies.

RESEARCH METHODOLOGY

Study population and sample

The researcher used a study population of about 100 staff and stakeholders from different organization at Mtwara port (Table 2).

Table 2. Study population distribution

ORGANISATION	POPULATION(100)
Tanzania Port Authority (TPA)	15
Tanzania Shipping Agency Corporation (TASAC)	10
TEMESA	10
Fisheries	15
Marine Police Mtwara	15
Naval Station Mtwara	20
Tanzania Revenue Authority	15
Total	100

The respondents were selected from a population of 475. The distribution of respondents describe in table 2 above. By using Slovene's ample formulae for finding sample, size (Candida, 2016):

n=N/ $(1 + Ne)^2$

Where;

n= sample size of individual respondent,

N= Target population

e= level of statistical significance and in this study was 0.095

n=100/1+100$(0.09)^2 \cong 71$

A sample size of 71 respondents have been involved in the study as shown in table 3 below. The data was collected using questionnaires.

Table 3. Sample distribution N=71

Type of respondent	Number of respondent expected	Questionnaire Distribution (%)	Number of Questionnaire returned	Percentage Returned (%)	Sampling techniques
Tanzania Port Authority	15	15	10	14.08	Random sampling
Tanzania Shipping Agency Cooperation	10	10	8	11.27	Random sampling
TEMESA	10	10	8	11.27	Random sampling
FISHERIES	15	15	10	14.08	Random sampling
MARINE POLICE MTWARA	15	15	10	14.08	Random sampling
NAVAL STATION MTWARA	20	20	15	21.13	Random sampling
TANZANIA REVENUE AUTHORITY	15	15	10	14.08	Random sampling
TOTAL	100	100	71	100	Random sampling

Linear regression mode analysis

In this Study, the relationship between maritime security and safety of life at sea was determined using a multiple linear regression analysis with the aid of SPSS. According to

(Tofallis,2009) multiple linear regression analysis involves many techniques used for modeling and analyzing several variables the focus being the relationship between a dependent variable and one or more independent variables.

This has help in understanding how the typical value of the dependent variable changes when any one of the independent variable is varied while the other independent variable are held fixed. Most commonly, regression analysis estimates the condition expected of depended variable that is the average value of the depended variable when the independent variable is fixed. It is widely used in prediction and focusing. The relationship between under this study was analyzed using linear regression model. A positive correlation indicates a positive association between the variables while the negative correlation indicates a negative association between variables. As the lease –square will always pass through the means of x and y, the regression line was entirely described by the means of standard deviation and correlation of the two variables under investigation.

Mathematically, Research model specified as follows

MSS = f(ETD,ME,LF, ERB)

MSS_i = a+a_1ETD_i + a_2ME_i +$a_3 LF_i$ + a_4ERB_i+e_i where

MSS = Maritime Safety and Security

ETD = Emergency training and drills

ME = Modern Equipment

LF =Legal framework

ERB =Existence of regulatory bodies

a= Intercept (constant term) $e_i - errorterm$

The symbol $e_i$is the error term. It added to a regression equation to introduce all the variation in dependent variable that explained by the included explanatory variables.

Regression models application in computer is simple it can handle problems of various fields, simple to analyze mathematically as opposed to other models and the results from regression analysis can be interpreted easily even to a non-mathematician (Candida, 2016). Hence, this approach was used in the study.

Validity and Reliability Analysis of the data collection instrument

To ensure validity, the study used structured interviews that allowed the researcher to cross check the accuracy of the information provided previously. To test the reliability of data collection instrument's Cronbach's Alpha used to measure the internal consistency by the use of SPSS. There different report about the acceptable value of alpha ranging from 0.70 to 0.95; a

low value of alpha could be due to low number of questions, poor interrelatedness between items or heterogeneous construct. A maximum alpha value of 0.9 has recommended. The closer the Cranach's alpha coefficient is to 0.9 the greater the internal consistency of the items in the scale (Tavakol, 2011).

Table 4. Reliability Analysis

Variable	Cronbach Alpha coefficient
ETD	0.740
ME	0.737
LF	0.718
ERB	0.787

MSS: Maritime Safety and Security, ETD: Emergency training and drills; ME: Modern Equipment, LF: Legal frame work, ERB: Existence of regulatory bodies. The reliability coefficient of the variables Table 4 above demonstrated that all the variables (ETD,ME,LF and ERB) have the reliability up to the acceptance level ie.0.7 meaning variable is good which implies that probably few items could be improved. Moreover, it is implying that the scales used to measure contribution maritime security were consistent and therefore reliable. MSS has a reliability coefficient of 0.5 that means the variable is poor and need more items for improvements.

ANALYSIS AND FINDINGS

Response rate

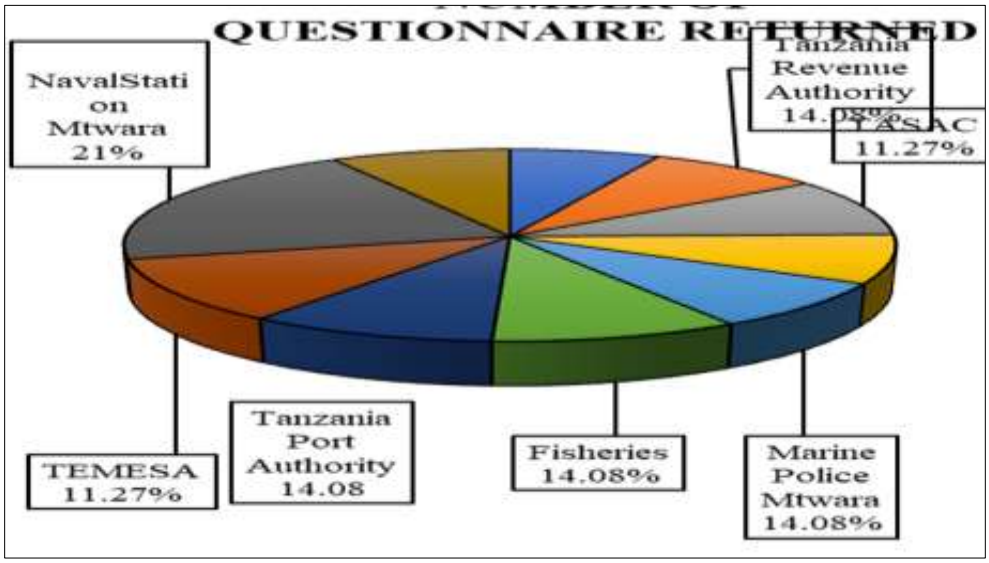

Figure 2. Percentage of Questionnaire returned

The study expected to collect data from 100 respondents. However, the data collected from 71 respondents out of 100 that are the same as 71% of the expected number of respondents. The study collected data from seven different organizations as shown in figure 4.

Working Experience Respondents assessment

Concerning the working experience of the respondents, the researcher was able to get data on their experience within their organization in order to get relevant information from different group of employees. The working experience has been presented on Table 4.4.1 shows that 23(32.4%) respondents have 1-5 years in service, 22(31%) respondents have 6-10 years in service, 15(21.1%) respondents have 11-15 years in service, 7(9.9%) respondents have above 16-20 years in service and 4(5.6%) have 21 and above years in service. Both groups have different period of working experience, the one with long experience were able to provide information deeply by using relevant examples while those with short experience were responding as much as they know which also provide support to the researcher.

Contribution of Maritime Security to the Safety of Life at sea in Mtwara

Table 5. Respondent on contribution of Maritime Security to the Safety of Life at sea in Mtwara coastal region

Statements	Excellent	Very good	Good	Satisfactory	Poor	Total
Degree of Maritime Safety and Security	3 (4.2%)	3 (4.2%)	10 (14.1%)	20 (28.2%)	35 (49.3%)	71 (100%)
Performance of Mtwara Port compared to other coastal Port in Tanzania	5 (7%)	6 (8.5%)	25 (35.2%)	20 (28.2%)	5 (7%)	71 (100%)
Level of investment in Maritime sector to cater for safety and security in Tanzania	9 (12.7%)	7 (9.9%)	10 (14.1%)	15 (21.1%)	30 (42.3%)	71 (100%)
Stake holders participation in Maritime safety matters	3 (4.2%)	4 (5.6%)	11 (15.5%)	40 (56.3%)	13 (18.3%)	71 (100%)
Planning from responsible maritime regulatory bodies (TASAC)	10 (14.1%)	12 (17%)	18 (25.5%)	20 (28.2%)	11 (15.5%)	71 (100%)

Table 6. Respondents on factors that hinders the efficiency of Maritime Security to the Safety of life at sea in Mtwara coastal region

Statements	Strong Agree	Agree	Moderate	Disagree	Strong Disagree	Total
Lack of emergence training and drills	20 (28.2%)	38 (53.5%)	3 (4.2%)	5 (7%)	5 (7%)	71 (100%)
Lack of modern equipment	21 (29.6%)	39 (50.7%)	4 (5.6%)	4 (5.6%)	3 (4.2%)	71 (100%)
Long range identification and tracking of ship (LRIT) and ISPS code if well implemented	22 (30.9%)	37 (52.1%)	6 (8.4%)	4 (5.6%)	2 (2.8%)	71 (100%)
Legal framework for preventing and suppressing threats	15 (21.1%)	35 (49.3%)	12 (16.9%)	7 (9.9%)	4 (5.6%)	71 (100%)

Measures taken to mitigate the problem of Maritime Security in Mtwara

Table 7. Response to mitigate the problem

Statements	Strongly agree	Agree	Not sure	Disagree	Strongly disagree	Total
Enforcement of regulatory bodies like TASAC	36 (69%)	23 (27%)	6 (1%)	4 (3%)	2 (0%)	71 (100%)
Massive investment in maritime security	37 (62%)	25 (34%)	4 (1%)	3 (3%)	2 (0%)	71 (100%)
Education on Maritime Safety and Security	39 (69%)	23 (23%)	4 (1%)	3 (7%)	2 (0%)	71 (100%)

Respondents on enforcement of regulatory bodies like TASAC

TASAC should provide more education; improve enforcement of laws and regulations enhancing safety and security knowledge, awareness and understanding among the stakeholders through training and practices. They should come with the policy that will oversee all marine craft and the associated activities to make sure they regulated and inspected at least twice per year. Also strong investment in Maritime sector especially increasing the use of modern equipment for security and safety at sea, emergency training, and drills on maritime security and safety of life at sea. TASAC should establish standards in conformity with international Maritime regulations

related to vessels sea worthiness, shipping practices, port facilities, and supervise on their implementation and enforcement adherence to these standards and regulation following educating the stakeholders on the rules. All ships operating within our waters (domestic and international) should register for monitoring and controlling their operations.

Assessment of Variables on Maritime safety and security

Table 8. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.320	.751		1.258	.004
	Emergence training and drills	.055	.091	.076	.612	.518
	Modern equipment	.074	.127	.362	.640	.422
	Legal framework	.146	.070	.331	1.063	.041
	Existence of regulatory bodies	.063	.064	.124	.978	.246

Therefore, the estimated model is

$$MSS = 1.320 + 0.076ETD + 0.362ME + 0.331LF + 0.124ERB$$

Where;

MSS= Maritime Safety and Security

ETD= Emergency training and drills

ME= Modern equipment

LF= Legal framework

ERB = Existence of regulatory bodies

Test of autocorrelation assumption

Table 9. Results of Autocorrelation Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.788[a]	0.620	0.615	0.74239	1.42
a. Predictors: (Constant), emergency training and drills, modern equipment, legal framework and existence of regulatory bodies					
b. Dependent variable: maritime safety and security					

Table 9 shows the results of the test of independence of observations. It assumed that assumption that the errors associated with one observation correlated with the errors of any other observation cover several different situations. Errors are residuals or difference between the actual score for a case and the score estimated using the regression equation. No serial correlation implies that the size of the residual for one case has no impact on the size of the residual for the next case. Durbin Watson statistic used to test the presence of serial correlation among the residuals. The value of the Durbin Watson statistic ranges from zero to four as a general rule of thumb, the residuals not correlated if the Durbin Watson statistic was 1.42 and an acceptable range is 1.5 to 2.50. The findings imply that there is no serial correlation of errors and therefore the model correctly specified.

CONCLUSION

This study aimed to assess the contribution of maritime safety and security to safety of life at sea. The research paper finds the priority measure that taken to promote safety and security in Mtwara coastal region. Are such regular training and drills to different stakeholders and massive investment on modern maritime security equipment. In Mtwara, coastal region the research paper advised that the suppression of armed attacks on merchant vessels is not the responsibility of international shipping industry but of terminal operators, port authorities, coast guards, and relevant local, regional and national government of coastal states. The future study could be the investigation on factors that hinder efficiency of aid to navigation to the ship entering the Mtwara port. As a way forward, further research on the Tanzania speculation policy in the maritime safety and coastal security shall be conducted.

RECOMMENDATIONS

The findings presented in this study have prompted the researcher to make the following recommendations;

- The government through ministry of Transport must ensure that policies, regulations, procedures, and international standards implemented on national and international aspect of maritime management.
- TPA should support national economic development by providing the necessary maritime infrastructure, facilities and technical. Advise to the government on development of various domestic ports in a professional and cost effective manner in order to make maritime transport comfortable, efficient, and reliable for both passengers and cargo ship.

- DMI should support training through its MET fund due to lack of adequately well trained Captain and Engineers this has to be a key area of attention because most of them are foreigners who are employed as expatriates and paid a lot of money which forced the local companies to incur high operation cost.
- The government through ministry of Transport should conduct a pilot study on how best can invest on modern maritime technology to protect our natural resources available at our water bodies for the betterment of future generation.
- Seafarers should be educated on the various types of condition they may face while being held captive such as may be held hostage on own vessels or other vessels, or onshore. Crew kept together in small confined areas of the ship for long periods or separated to avoid communication.
- Seafarers should be educated on the various tactics that pirates may employ to manipulate them during captivity such as withholding or manipulating level of basic needs.

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