

PRAGMATIC ANALYSIS OF SAFETY AND SECURITY IN TANZANIA MARITIME LOGISTICS: EVIDENCE FROM ZANZIBAR PASSENGER FERRY BOAT, TANZANIA

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Abstract

The issue of safety and security is paramount importance in Tanzania due to the number of fatal marine accidents. For Instance, in Zanzibar within the past decade, nine ferries accident has been reported result to fatalities and death. This article aimed at analysing the safety and security issues in maritime logistics in Tanzania by focusing on passengers ferry boats and ship which travel across Dar es Salaam – Unguja - Pemba corridor. This study adopted a cross-sectional survey research design in which mixed paradigm of qualitative and quantitative was used. The survey was carried out through administration of questionnaires to ferry boats and ship users in which 400 questionnaires were distributed to different respondents in Dar es Salaam, Unguja and Pemba. A total of 290 questionnaires returned made a response rate of 72.5%. The study found some improvement in safety matters after recently maritime misfortune. Unfortunately, security it is not at a satisfactory level, the descriptive findings provide some alert to the authorities responsible for marine and security in Tanzania not takes for granted the security concern in passenger ferry boats and ship.

Keywords: Logistics, Safety management, Security, Maritime, Zanzibar

INTRODUCTION

Zanzibar is located in the Indian Ocean, which is 35km off the coast of East Africa from Tanzania mainland and comprised of two big islands of Unguja and Pemba and other small islands (Abdalla, 2009). The traditional way to reach Zanzibar is through travelling using ocean

either by dhow or local boats known as (MITUMWBI/MADAU and NGALAWA). In now days the life style of Zanzibaris has changed result to change the entire logistic system in which most of the passengers (both residents and non residents) use modern passenger ferry boats and ship to reach Unguja and Pemba for safety and security reasons. Unfortunately, over the past decade the situation is worse due to the trend of reported accidents of those passenger ferry boats and ship.

According to WFSA (2014) for a period of 14 years from 2000 to 2014 around 160 accidents on passenger ferry boats were reported around the world results to 16,880 fatalities. Hetherington et al., (2005) argue that the shipping industry has a fairly good safety record in some countries; however maritime logistics have a high potential catastrophe across the world. This revealed that despite increased safety and security alert, as the number of passenger ferry boats has grown, there had also been an increased rate of passenger ferry boats incidents across the world (Baker, 2013).

In most East African countries, national responses to maritime safety and security are at the infancy stage. Minority of these countries have paid great attention to growing maritime safety and security system due to several factors such as poor governance, lack of maritime domain awareness, command and control capability, fragile regulatory and judicial structures, lack of political will, and deficient interagency coordination. Although most of the nation are signatories to various International Maritime Organization conventions and protocols, many have failed to take concrete measures to ratify these (FD I, 2012).

In Zanzibar within the past decade, there have been a nine ferries accident reported. In 2009 MV faith sank at port of Stone town in Unguja which result in 9 fatalities. The most catastrophic accident was seen in the sinking of the MV spice Islander in 2011 which travel from Unguja to Pemba Island with a total of 2,764 casualties (IPP media, 2011). In 2010 MV Skagit sank on its way to Unguja from Dar es Salaam, which results in the loss of 150 passengers. These incidents remind us those passengers' boats disasters are not just a thing of the past. In 2014 MV Kilimanjaro II through approximately 15 passengers on its way to Unguja Islands from Pemba (Salemme and Garant, 2014)

The issue of safety and security is of paramount importance in Tanzania due to a number of fatal marine accidents (Temba, 2012). For Zanzibar, the trend of passenger ferry boat accidents is gradually increased. The most cited causes include overloading, lack of adequate safety gears for passengers, inadequate maintenance and survey of vessels, complacency of harbour supervisors, lack safety officers and inadequate inspectors to survey the vessels operate in the Indian Ocean and unethical practice of ship owners and operators,

inadequate rescue response, lack of communication and Human error (Schacht, 2012, Dalziel, 2012 RGoZ, 2012a, RGoZ, 2012b).

The Spice Islander tragedy has pulled the attention of the author back on the safety and security standards in Tanzania maritime logistics. This article aimed at analysing the safety and security standard in maritime logistics in Tanzania, the study focused on passenger ferry boats and ships which travel across Dar es Salaam to Zanzibar (Unguja-Pemba) corridor. Specifically the study intent to: *Determine the safety and security level of passenger's ferry boat and ships operated in Dar es Salaam to Zanzibar (Unguja-Pemba) corridor and recommend a way forward to avoid frequently tragedy of ships and boats.*

LITERATURE REVIEW

Meaning of Passenger ferry boat

Table 1: Summaries the meaning of Passenger ferry boat from Different Authors

Meaning and Definitions	Author(s)
1. "A boat or ship used for conveying passengers and goods, especially over a relatively short distance and as a regular service".	Kiersten, (2015).
2. "A vessel that is used on a regular schedule a) to provide transportation only between places that are not more than 300 miles apart; and b) to transport only i. Passengers; or ii. Vehicles, or railroad cars, that are being used, or have been used, in transporting passengers or goods".	Chambers, (2011)
3. "Are ships with the capacity to carry more than 12 passengers"	Ventura, (1974)
4. "Means a ship which is constructed for, or which is habitually or on any particular occasion used for carrying more than twelve passengers and includes a ship that is provided for the transport or entertainment of lodgers at any institution, hotel, boarding house, guest house or other establishment".	The merchant shipping act, 2003

Tanzania maritime Laws governed Safety and Security of Passenger ferry boats

Tanzania as a member country of the International Maritime Organization (IMO) is obliged to follow international maritime conventions for safety and security (SOLAS) Conventions 74 (Safety of Life at Sea, 1974, as amended). The new SOLAS amended conventions of 2014 have come up with many new regulations for a safety and security of passengers on board. Tanzania introduced several laws and regulations governed safety and security of maritime logistics in line with IMO conventions like the merchant shipping act no.21 of 2003, the merchant shipping (ship and port facility security) regulations of 2004, the ports act of 2004, the Zanzibar Maritime Transport Act of 2006.

The Merchant Shipping Act of Tanzania No. 21 of 2003 indicates some basic requirements and conditions for passenger ferry operators to observe before being given the permission to ferry passengers. For instance, all vessels which are not propelled by mechanical system shall not ferry passengers in Tanzania unless they get special permission from the responsible authority and for special case also the vessels shall not exceed the cargo or passengers on board as identified in their certificate of seaworthiness which show the exact amount of passengers or cargo the operator is permitted to carry in the vessel (URT, 2003).

Apart from Tanzania Merchant Shipping Act No. 21 of 2003, Zanzibar is governed by the Zanzibar Maritime Transport Act of 2006. The act is of paramount importance in ensuring safety of passenger ferry boats. All vessels registered to carry passengers under ZMA are obliged to obey the internal convention's standards of safety of life at sea (SOLAS) and comply with International Safety Management (ISM) Code and those who failed to comply with the International standards shall be detained (RGoZ, 2006).

Despite the introduction of many legislation in Tanzania the implementation is not properly adhered to because some of the ferry operators always violate it, especially with regard to the maximum number of passengers they carry, quality of the vessels and availability of lifesaving materials in their vessels (Temba, 2012).

Factors contributing to passenger ferry boats accidents

Factors leading to passenger ferry boat disaster range from one location to another location and from time to time. This part reviewed different literatures inside and outside Tanzania to build good empirical evidence for this study.

Safety matters: This is one among the critical cause of many passenger ferry accidents operator's lacking of safety awareness, unreliable regulatory and safety checks, poor inspection of safety requirements; Lack of life jacks (Kiersten, 2015, RGoZ, 2012a, RGoZ, 2012b, Thomas, 2013). Schacht, (2012) argues that the blame for passenger ferry boat accidents continue to disregard the value of public safety, but the pointing fingers are turning to ship operators and owners hungry for profit. Under the crew's perspective, lack of good safety climate, culture influenced the individual crew to engage in safe or unsafe behavior and cause accidents (Berg et al, 2013, Hetherington et al, 2005).

Overloading Problem: There are a number of fatalities, including passenger death cases due to overloaded passenger ship problem all over the world (Rosli and Rahman, 2014, RGoZ, 2012a, Salemme and Garant, 2014, Kiersten, 2015, Allianz Global Corporate and Specialty,2015). According to Degiuli et al, (2015) a safe design lead stability, but not in overloading condition, the vessel does not remain safe making the vessel unstable and likely

result to inclines up to a certain angle (flooding angle) that resulting loss of stability and finally capsized of the vessels and cause fatalities.

Human Error: The human error in the maritime industry is a complex, diverse problem (Chesnokova and Kobylatskiy, n.d). According to Hetherington et al, (2005) and Rothblum, (n.d) argue that the most common human factors cause accidents in passenger ferry boats were errors of judgment and improper look out or watch keeping, followed by failure to comply with regulations, inadequate communication and coordination between pilot and bridge crew, and inadequate technical knowledge (especially of radar). It is estimated that 80% of shipping accidents over the world are caused by human errors which result in loss of life (Carpenter, 2013, Allianz Global Corporate & Specialty, 2014, Berg et al, 2013). This is supported by Routa, (2013) that Human error is the single most common cause of passenger ferry accidents which result in fatalities in developed and developing countries.

Sudden Hazardous Weather: According to EMSA, (2008) and EMSA, (2010) toward the end of 2008 to 2010 there is a strong relationship between the weather condition and seriousness of accidents of ferry boats. Due to stiff competition and demands to keep time tables despite of bad weather conditions have increased the number of passenger ferry accidents with many dead (Lennquist, 2012). Most of the passenger ferry boat accidents are attributed to human error; quite a lot to bad weather conditions and some also to force major reason (Akten, 2006). The inclement weather, the strong wind creates pressure on the lateral area of the superstructure of the vessel which tends to incline the vessel and result to disturb the stability and capsize the vessel (Degiuli et al, 2015).

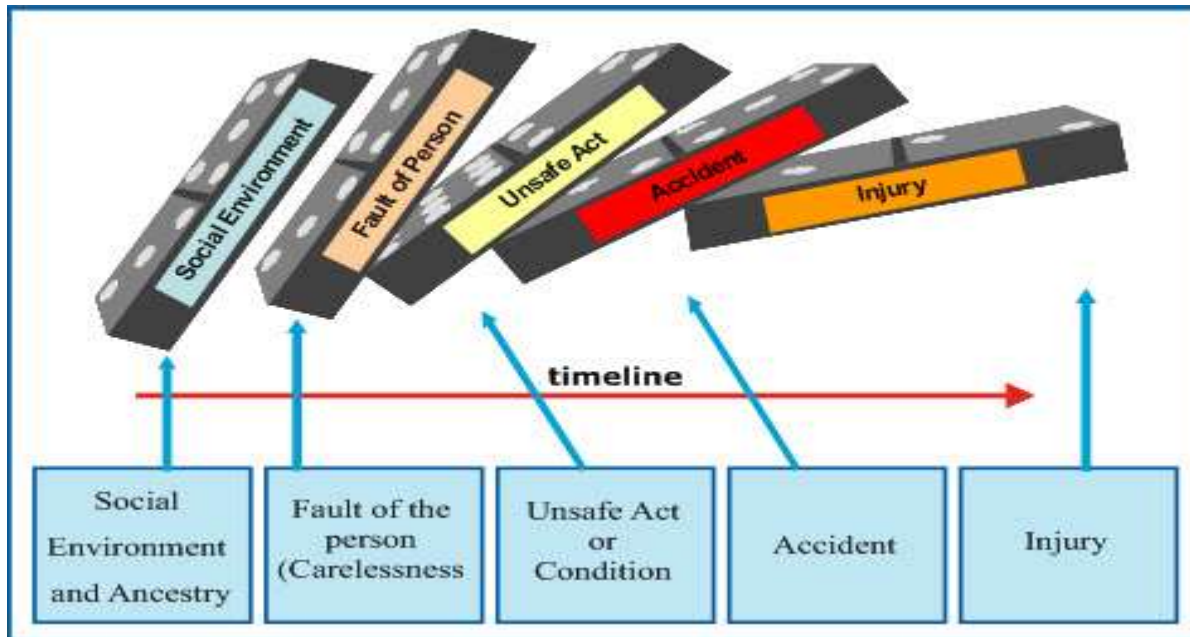
Inadequate Vessel Design & Maintenance: According to Soares and Pedro, (2006) “inadequate design of passenger ferry boats likely caused by radar failure, propulsion failure, steering failure, steer failure, engine failure, gearbox failure, coupling failure, generators, switchboards, accumulators, fuel system, hydraulic system, lack of on-board collision avoidance system, VHF equipment failure, power loss, CCTV failure, ARPA failure, GPS failure and DHF equipment failure which in turn increase the outcome in terms of vessel damage or casualties to the passengers and crew”.

Theoretical Base of the Study

The Domino Theory (DST): The theory received considerable acceptance in maritime logistics safety and security studies. The Domino theory presented by Heinrich in the 1930's (Heinrich, 1950). The Domino theory states that accidents result from a chain of sequential events, metaphorically like a line of dominoes falling over, when the chain of dominoes falls, its result to the next one. According to Heinrich, (1950) as adopted in maritime passenger ferry boat

transportation the key causes of accidents include social environment and ancestry, carelessness of crew and responsible personnel of the vessels, lack of safety equipments, awareness to both crew and passengers(DMI, 2015). The figure 1 represents the model suited to maritime accident causes in Tanzania.

Figure 1: Heinrich's Domino Model of Accident Causation



METHODOLOGY

This study adopted a cross-sectional survey research design in which mixed paradigm of qualitative and quantitative was used. The survey was carried out through the administration of questionnaires to ferry boat users operating within the Dar es Salam - Unguja - Pemba corridor. The targeted population of the study was 1.3 million citizens living in Zanzibar (URT, 2013). In determining the sample size, this study used the formulae proposed by Yamane (1967) which provides a simplified way for calculating sample size at a 95% confidence level and $P = 0.05$, where n is the sample size, N the population size and e the sampling error (level of precision).

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{1,300,000}{1 + 1,300,000 \times (0.05)^2} = 399.8769$$

Basing on the above formula, the sample size selected was 400 respondents. This was then categorized proportionately into three regional strata include Unguja, Pemba and Dar es

Salaam, Stratified and convenient sampling technique was used to select the respondents, while questionnaires are used as a data collection technique with five point Likert scale. The rating used to assess the degree of safety and security level for each group of variable is ranked according Table 2.

Table 2: Rating used to assess safety and security level of passenger ferry boats

Criteria	Rating
1 If the amount of the population mean is less than 3.00, group of safety and security variables are at satisfactory levels	+++
2 If the amount of the population mean is greater than or equal 3.00 and less than 4.00, group of safety and security variables are on medium level	++
3 If the amount of the population mean is greater than or equal 4.00, group of safety and security variables are at low level	+

ANALYSIS AND FINDINGS

Sample Characteristics

Under this study 400 questionnaires were distributed to different respondents in Unguja, Pemba and Dar es Salaam. A total of 290 questionnaires returned make a response rate of 72.5 %. However, only 288 questionnaires are used since two incomplete questionnaires were eliminated. The usable response rate was 72%. Table 3 summarizes the sample characteristics of the respondents.

Table 3: Sample Characteristics

Gender of Respondents	Frequency	Percentage
Female	127	44.1%
Male	161	55.9%
Age of Respondents	Frequency	Percentage
18 – 35 years	167	58%
36 – 55 years	94	32.6%
Above 55 years	27	9.4%
Education of Respondents	Frequency	Percentage
Primary	30	10.4%
Secondary	150	52.1%
Higher level	108	37.5%
Position of Respondents	Frequency	Percentage
Business Man	73	25.3%
Student	128	44.4%
Teacher	38	13.2%
Farmers	40	13.9%
Other	9	3.1%
Frequency in Traveling	Frequency	Percentage

Every day	5	1.7%
Once in a Month	83	28.8%
Once in a Year	124	43.1%
I don't Know	76	26.4%
Region of Respondents	Frequency	Percentage
Unguja	114	39.6%
Pemba	158	54.9%
Dar-es-Salaam	16	5.6%

Reliability Analysis

The reliability of the study was determined using the Cronbach Alpha Coefficient. According to Malhotra, (2007) "Cronbach's Alpha is very good when it is above 0.80, acceptable when it is above 0.70, moderate when it is above 0.60, and unacceptable when it is below 0.60". Therefore, the constructs used in this study are deemed to have adequate reliability as seen in Table 4.

Table 4: Coefficient Cronbach's Alpha Values

Variables	Cronbach's Alpha	Items
Safety and Security information	0.678	6
Availability of Safety Equipments	0.721	6
Security Monitoring System	0.704	4
Security of Cargo	0.772	4
Ship/boat Crew	0.779	3

Descriptive Analysis of safety and security level of passenger's ferry boats

Table 5: Average of safety and security level of passenger's ferry boats

Variables	No. of Respondents					Mean	Rating
	1	2	3	4	5		
1 Safety and Security Information							
Safety information before departure of boat/ship	58	133	64	26	7	2.27	+++
Instructions on how to wear life jacket	61	108	50	57	12	2.48	+++
Availability of accurate information during emergency	69	90	69	43	17	2.48	+++
Availability of speakers for conveying information	49	83	112	38	6	2.55	+++
Frequent information on how to escape during emergency	28	76	87	61	36	3.00	++
Availability of safety information in company website	20	66	146	32	24	2.91	+++
2 Availability of Safety Equipments							
Availability of adequate safety equipments	36	87	100	55	10	2.71	+++
Availability of alarms, signals and marking	37	89	99	53	10	2.69	+++
Availability of fire extinguisher equipments	53	82	87	49	17	2.82	+++

	Adequate Ventilation and air conditioning system	55	116	57	50	10	2.46	+++
	Availability of special first aid room and doctor	51	84	100	37	16	2.59	+++
	Life jackets can easily accessible	53	82	87	49	17	2.64	+++
3	Security Monitoring System	1	2	3	4	5		
	Availability of Lighting during Night journey	55	107	90	28	8	2.40	+++
	Availability of Surveillance camera	31	43	116	68	30	3.08	++
	Availability of Security officer on board	29	34	76	90	59	3.40	++
	Availability of coast guard patrols	11	28	55	77	117	3.91	++
4	Security of Cargo	1	2	3	4	5		
	Boats have special areas for handling cargo with full security	45	85	76	62	20	2.75	+++
	All cargo are secured during the journey	34	99	76	42	36	2.82	+++
	All cargo are inspected with special security equipment before loaded	37	64	84	46	57	3.08	++
	Hazardous cargo are kept separately in a vessel	33	61	92	66	36	3.04	++
5	Ship/boat Crew	1	2	3	4	5		
	Boats have adequate crew staff	51	92	101	34	10	2.51	+++
	Boats have experienced crew staff	54	80	97	45	12	2.59	+++
	Crew staff check the vessel all over the time	50	82	73	43	40	2.80	+++

1- Strongly agreed, 2-Agreed, 3-Not sure, 4- disagrees, 5-Strongly disagree

DISCUSSIONS

Safety and Security information

Table 5 summarizes the results of the study. All variables assessed under this part show a satisfactory level of safety and security in both passenger ferry boats and ships except information on how to escape during an emergency. The findings are inconsistent with previous researches of Yadav, (2014) and WFSAs, (2014) who divulged that most of crew puzzled and abandoned during emergency and failed to convey the proper information to their passengers on how they can escape from tragedy.

Availability of Safety Equipments

The results in Table 5 show that availability of safety gears used during emergencies in passenger ferry boats and ships are at a satisfactory level of those ships and boats operated in Dar-es-Salam –Unguja –Pemba Corridor. Despite that, the dispersion of results revealed that in some boat and ship life jacket kept far away from passenger seats and without any kind of marking. This is in contrary to SOLAS conventions, regulations 20 which need all stowage locations to be well marked and located nearby (SOLAS, 2009).

Security Monitoring System

The results in Table 5 indicate that boat and ships have adequate number lighting during the night journey which ensure maximum level of security. Furthermore, the study indicates that some of boat/ships lack an adequate number of surveillance camera for monitoring the security of passenger and also boats/ships travel without any security officer on board who can prevent any kind of terrorisms if happens. In addition to that there is no routine patrol done by coast guard that can prevent any attack from terrorist if happen. The findings are supported by the study of Baker (2013) that in order to ensure security ship are responsible for monitoring and controlling access, monitoring the activities of people and cargo, and ensuring that security communications are readily available. Furthermore, the findings are contrary with International Ship and Ports Facility (ISPS) Code in which is mandatory for a ship to plan, assess and declare security (Maspero et al, 2008).

Security of Cargo

The results in Table 5 also depict that all boats/ships have a special area for handling cargo with a full security during the journey to prevent any kind of theft and pilferage but unfortunately due to dispersion of results it shows that cargo are not inspected well during loading and also hazardous items are not separated from the other normal cargo. This indicates that despite the passenger feel secure, but those hazardous items can be explosive, flammable or toxic. This is supported by the study of Akten, (2006) that among the cause of ship accidents include cargo related factors by taking on-board dangerous/hazardous goods like (oils, chemicals, nuclear substances) and degree of diligence that such cargoes need all of which are related to ships' seaworthiness.

Ship/boat Crew

Under this part also Table 5 shows a clear analysis that respondents are well satisfied with aspects of crew who assist the boat/ship travel in Dar-es-Salam –Unguja –Pemba Corridor but in spite that, passengers didn't understand comprehensively the experience level of that crew. This is in line with IMO resolution on the principles of safe manning A.890 (21) (IMO, 2000) which states that there should be enough crew on board a merchant ship to have the capability of maintaining safely the navigation, mooring, environment, fire prevention and fighting, medical care, life-saving equipment and cargo handling of the ship.

CONCLUSION

The study indicates some improvement in safety after recent tragedy which results in too many fatalities and death from boat / ship travel in Dar-es-Salam-Unguja-Pemba corridor. Unfortunately, security it is not at a satisfactory level, the descriptive findings provide some alert to the authorities responsible for marine and securities in Tanzania not take for granted the security concern in passenger ferry boats and ship.

These results present new contribution to the literatures on safety and security of passenger ferry boats and ships in developing countries. The study was conducted for both passenger ferry boats and ships, but in reality these are two different passengers ferry with different dimension and standards in Tanzania, if further study could be done. Further study to be conducted comprehensively on passenger ferry ships instead of both. Also, this study excluded some key stakeholders like government authorities, coast guard security and even owners of the vessels, further study to include all these stakeholders for constructive opinions and views.

RECOMMENDATIONS

The author recommends the following to policy maker be taken into account:

- Zanzibar Port Authority (ZPA) needs to acquire inspection equipment immediately for monitoring security of all cargo passing at the port before taken on board to ensure maximum security and prevent any kind of terrorist attack or prevent any kind of hazardous items taken on board.
- Ship operators in collaboration with security authorities need to ensure there is a security officer(s) on board for every vessel in order to prevent any kind of attack on board.
- Zanzibar Marine Authority (ZMA) needs to conduct frequent inspection on ships and boat to assess the safety and security matters like availability of safety equipments on board and also determine the seaworthiness of the vessel.
- ZMA in collaboration with ZPA needs to ensure all ships and boats take on board maximum number of cargo and passengers as per their certificate of seaworthiness. They need to take more action on preventing overloading problems which seems to be one among the critical problem to ship owners and operators.
- Surface and Marine Transport Regulatory Authority (SUMATRA), the Tanzania Port Authority (TPA), the ZMA, the ZMA must ensure all ship and boat operators adhere to SOLAS conventions issued by International Marine Organization (IMO) before being given the certificate to ferry passengers across Indian Ocean.

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