The Input of Human errors as constituents to Marine Accidents in the Niger Delta, Nigeria. A Quantitative Approach

Gbasibo, Lawrence Addah
Department of Maritime Management Technology,
Federal University of Technology, Owerri, Nigeria

DOI: 10.56201/ijssmr.v8.no3.2022.pg154.165

Abstract
The number of causalities, injuries, loss of life and properties accompanied with marine pollutions per year recorded from marine accident is quite alarming in Niger Delta. A very large proportion of these accidents have been attributed to human errors. This study elucidates the main human factors or errors that have contributed to the incidence of marine accident in the Niger Delta navigational waters. A descriptive and quantitative survey was carried out and data collected using well-structured questionnaires distributed to 400 respondents, out of which 287(71.8%) was retrieved. An appropriate statistical tool (SPSS Softwares-2010 Chicago version) such as multiple logistic regressions using The Adjusted Odd Ratio (AOR) was employed for predictors/independent variables at 95% confidence interval. The socio-demographic results showed that majority (78.4%) of the respondents are of sound mind with over 10 years of working experience. The P-value is 0.02 < 0.05 *for the multiple logistic regressions; there exist a statistically significant relationship within the predictors (independent variables) and incidence of marine accident in the Niger Delta. The constituents of Human errors do not contribute equally towards marine accident incidence. Six(6) out of the ten(10) identified human related factors/error namely crew fatigue, unruly behaviour, unsafe vessel speed, commercial pressure from management, lack of maintenance culture, organisational structure/inadequate safety culture were frequent human causes of marine accident and are significantly related to safety performance. The highest ranking human error/factor is unsafe vessel speed of about 3.01 times higher odds of occurrence of marine accident while the least human factor is the influence of drugs and alcoholism with just 1.01 times higher odds. It is advisable for mariners to have positive and robust safety culture in place. Employers should recognise, encourage and reward Staff with impressive safety records. The Marine Safety Performance Plan of the International Safety Management (ISM) Code should be implemented in all maritime companies navigating the Niger Delta waters.*

Keywords: *Human errors, Marine accidents, Casualties, Severity*

1.0 Introduction

The maritime business has shown impressive development over the past decades, including increases in the size of ships, in speed, in the number of passengers and volumes of goods. However, sad event such as marine accident has being the parasite to the smooth operation of the global maritime business. Marine accidents are undesired events resulting from unexpected combination of conditions that lead to adverse consequences such as injury, loss of life, economic loss, environmental damage and damage to or loss of property in the marine environment(Karimpour, and Karimpour, 2016).Marine accidents can happen by failing to perform or omitting a task, performing the task incorrectly, performing an extra or non-required task, performing tasks out of sequence, failing to perform the task within the time limit associated with it, and failing to respond adequately to a contingency. A very large proportion of marine accidents have been attributed to human error. Therefore, having knowledge and understanding of what constitute human errors, the organizational learning capacity and process and how marine accidents are recorded, monitored and documented cannot be overemphasized.

The Nigeria maritime sector is an embodiment of economic activities such as water transportation, deep and shallow water port operation, oil and gas exploration, cargo and freight business. The industry is run by people and for people. People design the ships, build them, own them, crew them, maintain them, repair them and salvage them. People also regulate them, survey them, underwrite them and investigate them when things go wrong. Therefore, there is a need to understand the interrelationships and interdependencies of the shipboard evolutions, relevant technology and work processes in the marine industry as it relates to errors from the people that may lead to occurrences of marine accident (Osemudiame *et, al*, 2015). Human error is **a failure of a planned action to achieve a desired outcome**. It can occur in both the **planning and execution** stages of a task. Plans can be adequate or inadequate, and actions (behaviour) can be intentional or unintentional. If a plan is adequate, and the intentional action follows that plan, then the desired outcome will be achieved. If a plan is adequate, but an unintentional action does not follow the plan, then the desired outcome will not be achieved (Dogarawa, 2012).

Human errors can result from a variety of influences, but the underlying mental processes that lead to error are consistent, allowing for the development of a human error typology. By understanding human error, responsible parties can plan for likely error scenarios, and implement barriers to prevent or mitigate the occurrence of such errors. An understanding of the different error types is critical for the development of effective error prevention and mitigation tools and strategies. A variety of these tools and strategies must be implemented to target the full range of error types if they are to be effective. Performance shaping factors (PSFs) exist at individual, job, and organisational levels, and when poorly managed can increase the likelihood of an error occurring in the workplace.

In Nigeria, the number of marine accidents increases with increase in the level of oil prospecting and other maritime transport activities along the Niger-Delta and coastal regions specifically those caused by human errors. These are accident or mishap in a form of grounding, collision or contact, fire or explosion, breakdown of the ship underway, capsize and stranding.Several human errors such as poor crew interaction, crew fatigue, drugs and alcohol use, unsafe vessel speed, commercial pressure from management, complicated work processes, gap in working knowledge, faulty crew judgment and unruly behaviour. Others

include negligence of watch keeping, careless fixing of ship's position, poor preparation prior to departure, deficient response to adverse weather and negligence of lookouts are contributory causes of marine accidents on global navigational water.It is therefore, penitent to find out whether these same human errors are the causes of marine accident in Niger Delta navigational waters and which one/s is/are mostly contributing. Hence, on which this study is initiated and driven to examine whether human errors are related to marine accident and identify the behavioral components of maritime safety with the view to determining the human factors responsible for marine accidents in Niger Delta navigational waters.

This study aimed at identifying and analysing the input of human errors as constituents of marine accident in the Niger Delta navigational waters. There need to explore and examine human errors and their framework in the Niger Delta marine environment. And to integrate results from the analysis to current practices and strategize solutions to safe maritime operations in the Niger Delta.

2.0 Conceptual Framework

Accident involving marine vessels is common in inland and coastal navigation where requisite safety regulation may not be strictly observed. This is of serious consequence since such occurrences impact on safety of shipping in inland/coastal and inland waterways especially in developing countries. In recent times, cases of marine vessel casualties involving personal injury, deaths and property/ environmental damage have grown in tandem with increased vessel traffic associated with oil prospecting activities and other commercial seaborne transportation in Niger-Delta/coastal regions of Nigeria. For example, statistics (cumulative figures) based on the study carried out by Dogarawa (2012) indicate that between year 2000 to 2009, a total number of five hundred and fifty-two (552) persons died either as a result of marine vessel and boat capsizing or collision in inland waters of Nigeria. This figure indicates an average fatality rate of about 55 deaths per year excluding vessel and cargo losses, in Nigeria's coastal and inland waterways in the last ten years. Based on anecdotal evidence from some of the investigated cases; over-loading, excessive speeding, poor attention to weather condition, abandoned wrecks on navigation channels, incompetence and inadequate navigational aids are implicated.

Osemudiame *et, al* (2015) among the factors identified, Negligence of watch keeping (30.0%) occupies topmost position of errors that causes accidents in Nigerian maritime environment. This is followed by careless fixing of ship's position (20%), poor preparation to departure (18%), poor preparation and response to adverse weather 10%, and negligence of lookouts (10%). It is also observed that undue pressure, and faulty navigational aids sharing 2% each occupied the bottom position in the list of errors. Moreover, this finding may have suggested that pressure and lack of navigational aids are not potent factors to significantly cause marine accidents. One important conclusion from the findings is the significance of the top four human errors (Negligence of watch keeping, poor preparation to departure, poor preparation and response to adverse weather, and negligence of lookouts). For instance, negligence of watch keeping frequently occurred as a result of work fatigue, and work overload and has been fingered in many shipwrecks causing injury to crews, damage to property and loss of vessels. In the case of reducing marine accidents, it is important to concentrate on the type of human factors that cause casualties (Ćorović, B. 2011). Therefore, marine accidents do not occur due to one human error. Usually, there are a lot of small mistakes that accumulate and may produce large-scale consequences.

Safety and profitability of a shipping company depend on human factors. Creating a good relationship among crew is very important. Compliance with international and national regulations is also implied by the mentioned legislative framework (Ćorović, B. 2011). In the last few decades, the main goal of maritime industry has been to increase the productivity and prevent marine accidents. Besides modern technologies and safety systems onboard, the accidents still occur. Here different human factors are presented and discussed, that can cause errors and are available in literature. Obviously, there are many but we will pay attention to some of them.

Following the hierarchical aspect, first we start with communication barriers that occur between seafarers and are presented in all types of ships, especially when there is a multinational crew. For example, this can cause misunderstandings between the pilot and the ship's master. There were situations in which due to the weather conditions and imprecisely given information about it, a marine accident was caused. Also, the mistakes and insufficient information about the ship's environment resulted in sinking (Osemudiame *et, al,* 2015).

Health is one of the factors that influence professional efficiency of seafarers. It is directly connected to psycho-physical strength, resting periods, seafarers' satisfaction with the job, internal relationships and stressful situations, etc. In some circumstances, psychological problems such as impatience, dissatisfaction and lack of motivation may provoke intolerance between crew members which mostly results in cultural and religion differences. In these circumstances, the master of the ship has to use their management skills to acknowledge these differences and to provide good behavior of the crew. The results from investigations of predominant problems in the case of multicultural crew are rooted in cultural and linguistic (Mokhtari and Didani, 2013).

Anyanwu (2014) observed that human error was a predominant factor in capsizing of vessels. He asserts that vessels may capsize when they hit high and steep breaking waves from the side which will subject them to severe rolling or pitching, gale and loss of stability. Mokhtari and Didani, (2013) carried out an empirical survey of the role of human error in marine incidents. 1,816 marine accidents were investigated in five Iranian shipping companies. The authors found 17 factors responsible for occurrence of human error in these accidents, out of which four factors were the most influential-negligence, poor training, inadequate tools, and lack of skill and experience. To reduce human errors and minimize accidents they recommended appropriate training of human resources, proper implementation of national and international laws and regulations, maintenance of vessels and the equipment on board, improved port facilities, and utilities for marine search and rescue.

Onwuegbuchunam, (2013) classifies human errors into two components, namely: operational errors and handling mistakes. Operator errors are faults of omission or commission on the instance of the ship operating crew. These might include poor preparation for departure, insufficient checking of waterways, careless fixing of ship's position, negligence of lookouts, faulty crew judgment, and improper handover, violation of collision regulation, and non observance of safe working practices on board. On the other hand, handling mistakes relates to technical faults by ship designer. It may include handling mistakes of engine room machinery, bad handling of firearms, old and faulty electric cable that may increase risk of fire outbreak etc.

Dogarawa, (2012) evaluates marine accidents in northern Nigeria by examining the causes, prevention and management of marine accidents. He found that marine transportation are marred by dilapidated jetties, ill-equipped marine police, non-functional ferries and boat, and overloading. This is prone to cause accidents in marine waters. Mokhtari and Didani, (2013)

stated that there are many types of marine accidents and their effects on marine life and property differ from one another. These include collision or contact, grounding, breakdown of the ship underway, capsize, foundering, stranding, and fire or explosion. In areas where shipping traffic exists, collision is bound to be frequent occurrence unless appropriate learning and caution mechanism are put in place.

Collision is a major type of maritime accidents. It can be explained as the impact of ship against ship through body contact. Seafarers and passengers are also faced with risk of fire outbreak on board. It sometimes results in total loss of the ship and / or her cargo. Marine fires pose great risk for life, cargo and the environment (Uğurlu *et al.*,2015)

Mokhtari and Didani, (2013) observed that maritime accident, whether caused by meteorological events – such as storms, waves, or currents – or related to the ship or seafarer, is a term used for incidents causing financial losses and/or physical damages. Uğurlu *et al.*,(2015)concluded that between 80 and 90% of the causes of maritime accidents are attributable to human error. Disaster and accident investigation methods should be comprehensive in order to ensure that their underlying causes are well-defined and that the activities necessary to modify the problems are effectively implemented. In spite of perceptual problems, we can look at models, trends, and root causes and get valuable lessons from single events and basic information about the accident.

The direct study of human error is impossible, and can only be studied indirectly through the study of human behavior. Marine accidents investigation methods based on the role of human factors in accidents should know that: First, no single method can provide all the necessary analyses to complete the calculation of the causes of the accident. Several methods can complement each other and their rotational estimates should be used to obtain the desired results. Second, analytical methods cannot be implemented mechanically and without thought if tools and analytical tools are not cumbersome and ineffective; and if not used in special circumstances and not compatible with those conditions. The inventive method can also help in identifying the central human error in navigational problems. The effect of text analysis before an accident and the analysis of human error is important as a descriptive analysis of the report. (Mousavi and Jafari, 2015).

There is none better equipped to provide the information necessary for an assessment, than these who constitute the human element of the information system/structure themselves. To this end, information gathering approaches that are based on focus groups, individual interviews, questionnaire distribution etc, can be directed towards the people in the Organisational structure under examination, whose actions affect the IA posture of the structure. (Frangopoulos *et al*, 2014).The necessity for continual awareness education is highlighted in all IA best practices and standards texts such as the ISO 27000 series (ISO/IEC, 2014). This creates, among other administrative difficulties, the problem of tracking each employee's educational record with respect to IA and calling him/her to participate in relevant seminars and other IA awareness actions when the time is due. One way of tackling this is by creating an "IA point system" whereby each employee/respondent must reach a yearly quota of points gained by participating in IA-related activities such as -but not limited to- awareness seminars and assessment procedures.

According to Marine in sight 2016, the extensive studies looking into human errors and their implications have categorized few reasons that mostly lead to a mistake somewhere, the top most reason being fatigue. The studies have revealed that in most cases, it is an overworked tired and somewhat disoriented crew that fails to make the right decision which maybe as small as pulling the correct lever. Another of the top reasons for human error is insufficient communication.

Where the crew fails to communicate effectively with each other, the risks of maritime accidents increase manifold. Another important reason for human error that is detrimental to marine industry as a whole is insufficient knowledge. High-tech gadgets around people who have not been provided with sufficient training to use them would be equivalent to nothing. This is a seemingly minor thing but ships have been sunk because someone couldn't operate the emergency alert system. Other reasons include improper hazard management training, faulty managerial decision, insufficient knowledge, lack of maintenance of standards etc which result in a mistake being made somewhere.

Invariably, there is a human hand in each major marine accident. In a nutshell, the main reasons may not be different from the following: fatigue, inadequate communication, lack of general technical knowledge, inadequate knowledge of ship's system, automation error, decision based on incomplete information, faulty standards and procedures being followed, imprudent hazard management training, inadequate decision making, lack of maintenance procedures, unsafe working environment and lack of emergency drills. The window for human error is small if you consider it singly in the bigger picture but this single little window is where the sole of ship lies. Maritime industry depends on its manpower to keep it running smoothly. Hence, even seemingly minor errors by a single person can lead to a series of errors, something marine industry can definitely not afford. As such, it is important that implications of such minor things should be understood (Barsan *et al*, 2012).

However, with continuous improvement in vessel design, technical infrastructure, and stringent global regulatory oversight, the incidences of technical failures has diminished, and human error has become more apparent determinant of marine accident (Dogarawa, 2012; Barsan *et al*, 2012). The accidents still occur regardless of the impact of modern technology. Moreover, one hundred years after the foundering of the Titanic there was foundering of the Costa Concordia in January 2012 and it shows that human and organizational factors (latent conditions) still exist (Jens-Uwe *et al*.,2012). The latent errors are reported to be much more investigated in the future (Suleiman *et al*, 2012). Jens-Uwe et al, (2012) concluded that physical factors were not causes of major marine accidents but organizational ones are changeable due to increased horizontal and vertical integration as consequence of ubiquitous information technology. Being a seafarer and taking part in a crew immediately they also suggested that this task is one of the most responsible and toughest jobs in the world that requires constant improvement and knowledge check.

Many risks affect the maritime safety so the crew must work as a team or group. However, all these mentioned factors that contribute to human errors must be reduced and solved on time because otherwise the worst scenario that could happen is the loss of lives at sea. However, beside these factors that imply human errors, the seafarers must pay attention to recognize the latent errors and reduce them. These errors are based on the mitigation of the impact of psychological factors. Despite the fact that the human error is probably the main cause of majority of marine accidents, a continuous improvement of safety culture and knowledge of crew members can minimize the number of marine accidents caused by human errors (Ćorović, B.2011; Djurović, 2013).

3.0 Research Methodology

The study employed a survey design in which primary data used for the study was obtained by the use of questionnaire as survey instrument. The questionnaire was administered to shipping crew members, master mariners, marine engineers, sailors, deck crew, cargo surveyors, safety coordinators and other on-board technicians at Onne Port Complex, Port Harcourt Port Complex, Warri Port Complex, Calabar Port Complex and jetties within the Niger Delta. The target population of (400) constitutes the maritime operators at the Ports and jetties. Out of which, 287(71.8%) was retrieved. This study employed descriptive and quantitative approach. This could include personal observation of watch keepers, post-accident analysis/statistical analysis of computerised accident records, analysis of voluntary incident reports, carrying out a survey/interview, designing and carrying out simulator experiments, personal logs, and observations using remote radar are possible research methods. Out of which, carrying out a survey/interview was employed as the research method for the purpose of achieving the aim of this study.

An appropriate statistical tool (SPSS Softwares-2010 Chicago version) was employed for the analysis of the collected data. The Adjusted Odd Ratio (AOR) was distinctly employed where the multiple logistic regressions was adjusted for the predictors or the independent variables. The independent are communication problem, crew fatigue, unruly behaviour, unsafe vessel speed, and commercial pressure from management, improper hazard management, lack of maintenance standard, organisational structure /inadequate safety culture, and inexperience/lack of adequate knowledge. The dependent variable is the incidence of marine accident. Finally, results from the statistical analysis were integrated with current policies/regulations to strategize solutions for safe maritime operations in the Niger Delta.

4.0 Results and Discussions

It is necessary to unravel the status of the respondents in such a sensitive study as this research and Table 4.1 shows the socio-demographic distribution of the respondents. From Table 4.1, reveals that majority of the respondents (45.3%) were between the ages 31-41 years. Similarly, 30.3% of respondents were aged 18-30 years and 24.4% were above 41 years of age. This means that 75.6% of the respondents were considered young, energetic, and still in their productive working age. Majority of the respondents were on-board officers (39.1%) holding HND/BSc degree, (32.4%) with NCE/OND, and 78.4% of them having more than 10 years maritime experience, out of which 45.6% have maritime experience of16 years and above and 16.4% respondent at management cadre. Given these characteristics, they were expected to be of sound mind and body to understand the main theme of this investigation and to make meaningful contributions.

Several factors are related to marine accidents in Niger Delta navigational waters. Human errors are contributory factors to marine accidents and relationships exist between them and safety culture, hence, human factors can predict safety performance in maritime organizations in Niger Delta. The study showed that ten (10) human related factors are major causes of marine accidents; in the Niger Delta namely: communication problem, crew fatigue, unruly behaviour, safe vessel speed, and commercial pressure from management,

improper hazard management, lack of maintenance standard, organisational structure/inadequate safety culture, inexperience/lack of adequate knowledge.

The constituents of Human errors do not contribute equally towards marine accident incidence in the Niger Delta. The result also showed that six (6) out of the ten human related factors/error namely crew fatigue, unruly behaviour, unsafe vessel speed, commercial pressure from management, lack of maintenance culture, organisational structure/inadequate safety culture were frequent human causes of accident and significantly related to safety performance while four (4) were not regarded as serious human errors that result in accident. These results are in agreement with previous studies carried out by Dogarawa (2012) and Onwuegbuchunam (2013) that argued that "poor communication between crewmembers who are not speaking the same language can, through misunderstandings and mistakes, be a threat to the overall safety of a vessel." Furthermore, the more conscious individuals are about these factors and their readiness to address them in daily work, the more improved the safety culture in their day to day operations.

The P-value is $0.02 < 0.05$ for the multiple logistic regressions; there exist a statistically significant relationship within the predictors (independent variables) and incidence of marine accident in the Niger Delta. Therefore Research Hypothesis 1 is accepted. From Table 4.2, more specifically inadequate communication within the crew members as a problem or human error had 1.94 times higher odds of causing marine accident compared to the chances of such inadequacies of not causing marine accident.

The variability of the AOR for the predictors unravelled that their odd contributions to marine accidents differs, therefore, Research Hypothesis 2 is rejected and the Null Hypothesis accepted. Crew fatigue had 2.13 times higher odds; unruly behaviour had 2.02 times higher odds, while the highest ranking human error/factor is unsafe vessel speed of 3.01 times higher odds, followed by lack of maintenance culture with 2.98 times higher odds, then commercial pressure from management having 2.86 times higher odds. The least human factor from the study is influence of drugs and alcoholism with just 1.01 times higher odds. The reduced value of influence of drugs and alcoholism might have been the strict compliances of mariners to safety rules and regulations as regards to hard drugs and alcohols. In addition, the disciplinary actions taken by the management of the marine companies where employees lost their jobs is another factor that has drastically reduced marine accidents due to the influence of drugs and alcoholism.

In order to prevent the occurrence of marine accident, it is advisable for mariners to having positive and robust safety culture in place and specifically by avoiding unsafe vessel speed, improving communication within the crew on board ,ensuring proper feedback mechanism, training and retraining staff, ensuring accurate safety/hazard analysis, holding daily safety meeting, prompt incidence reporting, stiff punishment to defaulters, avoiding wrong use or non-usage of sound signals in restricted visibility areas, proper look out and observing collision regulations etc. It is also advisable implement stress management policy to the latter to address issues of crew fatigue. It is also recommendable to recognise and reward staff with impressive records of safety which is a sure way to improving safety performance and reducing accidents in Niger Delta maritime industry.

Table 1: Socio-demographic characteristics of the respondents

Variables	Frequency	Percents (%)
Age		
18-30	87	30.3
31-40	130	45.3
≥ 41	70	24.4
Educational status		
FSLC	7	2.4
SSCE	41	14.3
NCE/OND	93	32.4
HND/B.Sc/B.Tech/B.Eng	112	39.1
Master's Degree	13	4.5
Certificate of Competency	21	7.3
Years of Experience		
0-5	14	4.9
6-10	48	16.7
11-15	94	32.8
≥16	131	45.6
Official Ranks		
Directors	8	2.8
Manager	22	7.7
Supervisor	17	5.9
Engineer	67	23.3
Mechanic	23	8.0
Specialist/ Advisor	12	4.2
Operator/Technician	18	6.3
Shore-Based Personnel	31	10.8
On Board Officers	57	19.9
Safety Officers	28	9.8
Crane Operators/Others	17	5.9

FSLC:FirstSchoolLeavingCertificate;SSC:Senior SecondaryCertificate;NCE/ND:NationalCertificate/ NationalDiploma;HND/BSc/Bng:HigherNational Diploma/Bachelor'sdegree

Source: Authors Calculation

Table 4.2: Multivariable analysis of Human error's on Marine Accidents Predictors in the Niger Delta, Nigeria

Predictors	Frequency	Percents (%)	AOR(95% CI)
Communication problems			
Yes(1)	178	62.5	1.94(1.03-2.41)
No(0)	109	37.5	1
Crew Fatigue			
Yes(1)	241	84	2.13(1.60-3.01)
No(0)	46	16	1
Unruly Behaviour			
Yes(1)	189	66	2.02(1.40-2.72)
No(0)	98	34	1
Unsafe Vessel Speed			
Yes(1)	260	90.6	3.01(1.90-3.23)
No(0)	27	9.4	1
Commercial Pressure from Management			
Yes(1)	238	97	2.86(1.52-2.94)
No(0)	49	3	1
Improper Hazards management			
Yes(1)	173	60.3	1.99(1.12-2.56)
No(0)	114	39.3	1
Drugs and Alcoholism			
Yes(1)	20	7	1.01(1.00-1.01)
No(0)	267	93	1
Lack of Maintenance Standard			
Yes(1)	253	88	2.98(2.02-3.07)
No(0)	34	22	1
Organisational structure/Inadequate Safety Culture			
Yes(1)	223	78	2.02(1.51-2.86)
No(0)	64	22	1
Inexperience/Lack of adequate Knowledge			
Yes(1)	86	30	1.07(1.01-1.21)
No(0)	201	70	1

Source: Authors Calculation

5.0 Conclusion

It is obvious from the findings that Human errors are major contributory factors to marine accidents in the Niger Delta navigational waters. Communication problem, crew fatigue, unruly behaviour, safe vessel speed, commercial pressure from management, improper hazard management, lack of maintenance standard, organisational structure/inadequate safety culture, inexperience/lack of adequate knowledge are major causes of marine accident in the Niger Delta. The constituents of Human errors do not contribute equally towards marine accident incidence in the Niger Delta. Crew fatigue, unruly behaviour, unsafe vessel speed, commercial pressure from management, lack of maintenance culture, organisational structure/inadequate safety culture were significantly related to safety performance

6.0 Recommendations

It is recommended that:

i. . In order to reduce the accidents, there should be more attention to the factors such as crew fatigue, unruly behaviour, unsafe vessel speed, commercial pressure from management, lack of maintenance culture, organisational structure/inadequate safety culture, non-implementation of national and international laws and regulations.

ii. Regulators and Government agencies should improve on the Marine Safety Performance Plan, which is part of the International Safety Management (ISM)Code, should be implemented to international standard in all maritime industries in Niger Delta.

iii. Marine company owners should recognise and reward staff with impressive records of safety.

References

Anyanwu, J. O. (2014), Maritime tranker accident on coastal areas in Nigeria. *Global Journal of Researches in Engineering: Industrial Engineering*.14 (2)

B. Ćorović, P. Djurović (2013), Research of marine accidents through the prism of human factors. *Promet – Traffic Transportation*, 2(4), 369-3577

Barsan, E, Surugiu, F and Dragomir (2012), Factors of human resources competitiveness in maritime transport. *International Journal on Marine Navigation and Safety of Sea Transportation*, 6(1)

Ćorović, B. (2011), Ship crew management, University of Montenegro, Maritime Faculty in Montenegrin)

Dogarawa, L. B. (2012). Marine accidents in Northern Nigeria: Causes, prevention and management. *International Journal of Academic Research in Business and Social Sciences*, 2(11), 378-389

Frangopoulos, E.D., Eloff, M. M and Venter, L. M.:Human Aspects of information Assurance: Questionnaire based Quantitative Approach to Assessment. Proceedings of the English international Symposium on Human Aspects of information security and Assurance (HAISA, 217-229, 2014)

https://www.nopsema.gov.au/resources/human-factors/human-error/ Commonwealth of Australia 2018

IMO, International Maritime Organisation. Port state control [online]. Available: www.imo.org/ ourwork /safety/ implementation/pages/ portstatecontrol.aspx. 2015.

IMO 2012, Code of International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code), 2008 edition (resolution MSC.255(84)), paragraph 14.1, chapter 14 of the mandatory Part II; accessed at http://www.imo.org/OurWork/Safety/Implementation/Casualties/Documents/Res.%20MSC.255(84)%20Casualty%20Iinvestigation%20Code.pdf

ISO/IEC, 2014. International Standard ISO/IEC 27000:2014. Information technology - Security techniques - Information security management systems - Overview and vocabulary. Geneva: ISO Copyright Office.

Jens-Uwe Schröder-Hinrichs, J-U., Hollnagel, E., Baldauf, M (2012).: From titanic to costa concordia — a century of lessons not learned, *WMU J Marit Affairs*, 11 (5), 151–167

Karimpour, R and Karimpour, Z. (2016). A study on the role of human element (Staff) in marine accidents. Open Journal of Marine science, 6, pp. 405 – 411. http:dx.doi.org/10.4236/oims.2016.63034

Marine in sight. https://www.marineinsight.com/marine-safety/the-relation-between-human-error-and-marine-industry/Jul 21, 2016]

Mousavi, Majid and Jafari, Mehdi, (2015), Marine accidents investigation methods based on the role of human factors in accidents. *International Journal of Scientific Study* | September 2017 | Vol 5 | Issue 6. Pg 256 -265.

Onwuegbuchunam, D. E. (2013). An analysis of determinants of accident involving marine vessels in Nigeria‟s waterways. *Management Science and Engineering*. 7(3) ,39-45

Osemudiame, Inegbedion Daniel , Nsikan, Efiok John, Bariate, Mbaa, Ime, Tommy Uduak, (2015). Human Error and Organisational Learning in Nigerian .Maritime Industry: A Survey of Exxon-Mobil *Nigeria IOSR Journal Of Humanities And Social Science (IOSR-JHSS*) 20(10), Ver. III (Oct. 2015) 67-74 e-ISSN: 2279-0837, p-ISSN: 2279-0845. www.iosrjournals.org DOI: 10.9790/0837-201036774 www.iosrjournals.org

Özkan Uğurlu, Umut Yıldırım, and Ersan Başar.(2015) Analysis of grounding accidents caused by human error. *Journal of Marine Science and Technology*, 23(5),748-760 (2015) DOI: 10.6119/JMST-015-0615-1

Sulaiman, O., Saharuddin, A.H., Kader, A.S.A(2012).: Human reliability analysis (HRA) emanating from use of technology for ships navigating within coastal area, *African Journal of Business Management*, 6(10),. 3602-3