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Assessment of the Human Factors Influences on Maritime Accidents in Tanzania: A Case of Dar Es-Salaam-Zanzibar Route

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Abstract:- The research centered on assessing the influence of human factors and associated environmental and job factors on maritime accidents in Tanzania. It pursued three specific objectives: identifying mostly human factors contributing to accidents among maritime professionals, examining challenges affecting their attention to maritime accidents, and proposing strategies tomitigate these factors. The research employed various analyses, including descriptive statistics, regression analysis, and thematic analysis, to achieve its objectives. The study acknowledged that the frequency of occurrence of maritime accidents in Tanzania had remained constant, yet there was a potential for an increase if interventions would not be effectively implemented to address underlying causes. While individual human factors generally had a low influence on maritime accidents, specific factors such as the use of illicit drugs and alcohol, fatigue while performing duties, communication barriers, and non-adherence to safety regulations emerged assignificant contributors. Similarly, human-related challenges had a low influence on the occurrence of maritime accidents in Tanzania. However, their collective influence on maritime accidents highlights the need for inclusive interventions against them. Specifically, density of seatraffic, communication failures between crew members and shore operators, pressures from bosses, and conflicting maritime regulations were noted to be significant challenges that could determine occurrence of maritime accidents. Strategies proposed for lowing maritime accidents in the country were: such as strict enforcement of maritime regulations, ensuring personnel remain well-informed about maritime safety, enhancing communication channels, establishing a safe working environment, observing speed limits, and conducting regular vessel maintenance.

Keywords:- *Maritime Accidents, Human Factors, Safety Management, Security, Maritime,United Republic Of Tanzania.*

I. INTRODUCTION

Shipping sector concedes more than 90% of global goods transportation hence vital vehicle for global economy (Ma, 2023; Oluseye and Ogunseye, 2016). The advancement of on-board ships through enactment of directions, guidelines and rules by international institutions such as International Maritime Organization (IMO), International Labour Organization (ILO) and International Association of Classification Societies (IASCS) has not left behind human element(Sheng et al., (2023). This is due to the fact that 80-85% of maritime accidents are the result of human error caused by human factor (Wu *et al.*, 2022; Ashgale *et al.*, 2017). Hence ISM code special for combating human error in shipping (SSR, 2021).

Maritime sector like other sectors, safety improvements has been often triggered after accidents with serious fatalities and massive distortions of non-human properties, such situations bring together all parties and stakeholders involved in order to initiate and improve safety policies andprocedures in avoid repeated occurrences of such maritime accident or incident (Uflaz *et al.*, (2023); Kari and Steinert, 2021). For instance, the oil spill in Europe due to tumbling of the Prestige off the coast of Galicia in 2002 lead to enactment of a bundle of actions with the aim ofconsolidation of maritime safety and strengthening capacity to avoid and respond to pollution (IMO, 2019; Dent et al., 2023). This scenario portrays in a nutshell the consequences of safety failures in human performance.

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II. LITERATURE REVIEW

➢ *Meaning of Key Conceptions Such as Maritime Accidents Caused by Human Factor,*

Table 1: Description of Human Factor Analysis and Classification System for MaritimeAccidents.

Causal Categories	Description
External Factors	
Administration Oversights	It includes failures of relevant authorities andorganizations in implementing and enforcing existing rules or codes and negligent performance of their duties.
Legislation Gaps	It includes the shortcomings of existing rules or codes serving as guidelines to the maritime industry stakeholders and relevant authorities.
Design Flaws	Poor system design includes inadequate consideration of ergonomics and maintenanceof the system.
Organizational Influences	
Organizational Process	The company's formal policy is implemented onboard ships and includes shipboard
	operations, procedures, and crewmembers' oversight.
Resource Management	A way of managing and allocating human and financial resources and equipment necessaryfor the safe performance of daily tasks.
Organizational Climate	A working atmosphere on ships includes onboard ship command structures, policies, and culture.
Unsafe Supervision	
Planned Inappropriate Operation	The factor includes shipboard leadership failures in planning operations related to improper or inappropriate crew scheduling,inadequate operational planning of the operation, or operation assignment withoutclarifying essential data for the shipboard operation's safe-conduct.
Failure to Correct Known Problem	The factor includes knowledge of the deficiencies of specific processes, equipment, training, individuals, or other safety aspects bythe supervisor, but the operation's unsafe performance is still allowed to continue without rectification.
Preconditions	
Physical Environment	It includes natural forces that can influence individuals' decisions, such as gale winds, tidal streams, sea currents, waves, and fog, thus creating unsafe situations or human error.
Condition of Operator(s)	It includes factors that reduce a person's performance ability and includes mental, physiological, and physical preconditions, suchas alcoholism, illness, knowledge, fatigue, complacency, and others.
Unsafe Acts	
Knowledge-Based Mistakes	It includes mistakes that happen due to lack of knowledge of person operating or inadequateapplication of knowledge acquired [10,27].
Rule-Based Mistakes	It includes mistakes due to the choice of wrongrules due to the wrong perception of the situation or mistakes caused due to not applying the correct rule at all
Skill-Based Errors	It includes unintentional actions, which includefailures that involve attention (slips) and failures that involve memory (lapses).

The main objectives of this paper was to assess the influence of human factors on maritime accidents in Tanzania, while the specific objectives is to identify the most influential human factors for maritime accidents built on maritime professionals, to explore human related challenges affecting maritime professionals' concentration towards maritime accidents and to propose strategies that can enhance maritime professionals to reduce human related causativesfor maritime accidents.

III. METHODOLOGY

This chapter detail procedures to be used in undertaking this study. It spells out methods and techniques that will be employed in the study, study design, data sources, and techniques to be used for sampling and sample, target population, data analysis, validity and reliability, method ofdata collection and ethical consideration.

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A. Research Design

The research design is a full idea for shepherding study. In other words, research design is the devising ofstandards for data acquisition and analysis aimed atmaking surethat techniques are economical and relevance to study design(Creswell, 2019; Kothari, 2014b).

The sample for this study was obtained by using simple random sampling techniques for questionnaire and purposive sampling for interview. With consideration of Slovin formula forsampling, representative sample depends on the confidence level the researcher expected in study and that the error tolerance is at least of the population. Slovin's sampling formula was used to obtain a sample size for this study. The formula is given as follows:

Whereby:

$$n = \frac{N}{1+Ne2} \quad \text{..... (Eqn 1)}$$

N= Total population (174 seafarers)n= Sample size
e=Error Tolerance (the study confidence level was 95% which gave a margin error of 0.05)

$$n = \frac{174}{1 + 174(0.05)^2} \quad 121$$

Total sample size was calculated and found was supposed to be 121 individual.

B. Research Phases

The research design is a full idea for shepherding study. In other words, research design is the devising of standards for data acquisition and analysis aimed at making sure that techniques are economical and relevance to study design (Creswell, 2019; Kothari, 2014b), this research adopted descriptive and explanatory approaches; also both quantitative and qualitative techniques were applied. This approach enabled the use of numerous data collection techniques, including interviews and questionnaires (Saunders *et al*, 2018; Creswell, 2019; Cohen *et al.*, 2014). Also the approach conserves the coherence of research and encompasses a vast array of variables and allows triangulation throughout the data validation procedure (Saunders *et al.*, 2018). The data collecting techniques was used individually or in combination.

The study took place in Tanzania coast line particularly Dar es Salaam and Zanzibar route alongthe Indian Ocean. The study preferred maritime dealing using marine transportation companies to extract data from the professional in the field. Thus, the most prominent passengers and cargotransporting companies in Dar-es Salaam-Zanzibar involved. In this context Azam Fast Ferries (AFF), Azam Link, and Zan Fast Ferries (ZFF) qualified to provide sample for the data collection due to having greater number of seafarers than other marine transporting line in the study area.

Population can be conceptualized as a set of entities that have one or more features in mutual thatare of interest to the study (Saunders et al, 2018). In this study, the population of study consisted informants including: on board crew members, Seafarers working on engine room department and seafarers working on deck department. According to Zanzibar Maritime Authority (ZMA) about 174 seafarers were working at engine and deck department (vessels crew members) in three opted marine companies operating Dar es Salaam - Zanzibar route.

Table 2: Respondents to be Selected for the Study

SN	Marine Trans Line	Population	Sample	%	Method	Key Informant	Method
1	Azam Fast Ferries (AFFs)	91	65	54	random	4	Purposeful
2	Zan Fast Ferries (ZFFs)	54	34	28	random	3	Purposeful
3	Azam Sea Link	29	22	18	random	2	Purposeful
4	Total	174	121	100			

Source: Researcher (2024)

Linear regression analysis was utilized to establish relationships between independent variables (human factors and human related challenges) and the dependent variable (maritime accidents). Through regression analysis, predictors with significant predictive power for maritime accidentswere identified and hypotheses were tested. Two regression equations were formulated: one focused on maritime accidents attributed to human factors, while the other addressed those related to human challenges. These equations were developed using the following standard (simple) linear regression equation is:

$$Y = \beta_0 + \beta_1 X + e \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (Eqn\ 2)$$

Where:
Y= is the dependent variable.
X= is the independent variable.
β_0=is the intercept (the value of Y when X is 0).
β_1=is the slope (the change in Y for a one-unit change in X).
e= is the error term (the difference between the observed and predicted values of Y).

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For multiple linear regressions with 'n' independent variables, the equation becomes:

$$Y = \beta_0 + \beta_1 X_1 + \beta_1 X_2 + \cdots \beta_1 X_3 + e \ldots\ldots\ldots\ldots\ldots (Eqn\ 3)$$

In this equation, X1, X2,…,Xn represent the independent variables (i.e proxies of human factors and human related challenges in this study), and β0,β1,…,βn are the coefficients or weights associated with each independent variable.

IV. RESULT AND DISCUSSION

This chapter presents results derived from the obtained field data. The chapter provides the background information of the respondents and the analytical results aligned with the study's objectives. Analytical techniques such as descriptive analysis, inferential statistics and contentanalysis were used to examine the collected data. Additionally, the chapter discusses the studyfindings.

The study targeted 121 participants who were selected randomly from the three marinetransportation lines. Each of whom received a similar copy of the questionnaires.

The response rate is given in the table 3.

Table 3: Response Rate

Marine Trans Line	Sampled	Filled	Not Filled
Azam Fast Ferries (AFFs)	65	59 (91%)	6 (9%)
Zan Fast Ferries (ZFFs)	34	31 (91%)	3 (9%)
Azam Sea Link (ASL)	22	18 (82%)	4 (18%)
TOTAL	121	108 (89%)	13 (11%)

Source: Field Data (2024)

Base on the findings illustrated in the table 3; 108 questionnaires were filled out and returned, resulting in a response rate of 89%. Saunders et al. (2009) said that a response rate of 50% or higher is deemed sufficient, while a response rate of 70% or more is considered excellent. Thus,the response rate in this research was regarded as a suitable response rate for the study.

A. Gender of Respondents

Respondents were requested to specify their gender as either male or female. The results aresummarized in Table 4.

Table 4: Gender of Respondents

Gender		Marine trans line			Total
		AFFs	ZFFs	ASL	
Female	Count	17	9	4	30
	%	26.2%	26.5%	18.2%	24.8%
Male	Count	48	25	18	91
	%	73.8%	73.5%	81.8%	75.2%
Total	Count	65	34	22	121
	%	100.0%	100.0%	100.0%	100.0%
Chi-square = 0.63DF= 2 P-value = 0.73					

Source: Field Data (2024)

The results in table 4 show that 75.2% of the respondents were male while 24.8% were female. The Chi-square results gave probability value (P-value) above 0.05 (P-value= 0.73) which indicates there was no significant difference between the selected three marine transportation lines (AFFs, ZFFs, and ASL) in terms of gender of respondents. In each of thethree selected companies, about three quarters were male and one quarter of the respondents were female. This indicates the dominance of men in the marine transportation sector.

B. Age Groups of Respondents

Respondents were instructed to select the age group that best represented their age. The results are presented in Table 5. The results indicate that nearly half (47.9%) of the participants fell within the age range of 31 to 40 years. A quarter (25.6%) of respondents was aged between 18 and 30 years, while 17.4% fell within the age bracket of 41 to 50 years. Additionally, 6.6% of participants were aged between 51 and 60 years, and 2.5% were above 60 years old. These results therefore indicate that majority (almost half) of the respondents were at the fourth decade of their life (31 to 40 years). Generation which is energetic, enterprise oriented people with family to care for.

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However, there was no significant difference (p-value = 0.18) between the three selected marine transportation companies in terms of age of their employees.

Table 5: Age Groups of Respondents

Age Groups		Marine Trans Line			Total
		AFFs	ZFFs	ASL	
18- 30 years	Count	11	14	6	31
	%	16.9%	41.2%	27.3%	25.6%
31- 40 years	Count	35	14	9	58
	%	53.8%	41.2%	40.9%	47.9%
41-50 years	Count	13	5	3	21
	%	20.0%	14.7%	13.6%	17.4%
51-60 years	Count	5	0	3	8
	%	7.7%	0.0%	13.6%	6.6%
61years and above	Count	1	1	1	3
	%	1.5%	2.9%	4.5%	2.5%
Total	Count	65	34	22	121
	%	100.0%	100.0%	100.0%	100.0%
Chi-square = 11.39 DF= 8 P-value = 0.18					

Source: Field Data (2024)

C. Highest Education Qualification of Respondents

This section, participants were asked to specify their highest level of education completed. The results are outlined in Table 6. The results presented in Table 6 revealed that 40.5% of the respondents held a bachelor's degree as their highest educational attainment. 27.3% of respondents reported possessing a college diploma, while 16.5% indicated having postgraduate qualifications. Moreover, 15.7% of the participants reported holding a college certificate as their highest level of education. These findings suggest that a significant proportion of employees within Tanzanian marine transportation companies attained bachelor's degrees as their highest educational qualifications. This may be explained by the fact that marine transportation courses and other related courses transportation in the country have been expanded in the level of tertiaryeducation.

Table 6: Highest Education Qualification of Respondents

Levels of Education		Marine Trans Line			Total
		AFFs	ZFFs	ASL	
College Certificate	Count	8	7	4	19
	%	12.3%	20.6%	18.2%	15.7%
College diploma	Count	18	10	5	33
	%	27.7%	29.4%	22.7%	27.3%
Bachelor degree	Count	24	15	10	49
	%	36.9%	44.1%	45.5%	40.5%
Postgraduate degree	Count	15	2	3	20
	%	23.1%	5.9%	13.6%	16.5%
Total	Count	65	34	22	121
	%	100.0%	100.0%	100.0%	100.0%
Chi-square = 5.89 DF= 6 P-value = 0.44					

Source: Field Data (2024)

Since level of education is connected to the level of understanding, the results thus indicate that majority of the respondents were well informed of the maritime transportation businesses and marine accidents, therefore their responses were reliable. Nevertheless, there was no significant difference among employees of the three selected marine transportation companies in terms of the education qualifications of their employees (p-value = 0.44).

D. Period of Service of Respondents

The respondents were asked to indicate the period of time they had been working in the marine transportation sector. The findings were as shown in Table 4. The results presented in Table 7 indicate that 37.2% of the respondents possessed 6 to 10 years of experience within the marine transportation sector. Additionally, 23.1% reported having 11 to 15 years of experience, 19.8% had experience levels below 5 years, 11.6% fell within the range of 16 to 20 years of experience,and 8.3% reported having more than 20 years of experience.

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Table 7: Period of Service of Respondents

Working experience		Marine trans line			Total
		AFFs	ZFFs	ASL	
Below 5 years	Count	11	8	5	24
	%	16.9%	23.5%	22.7%	19.8%
6-10 years	Count	24	14	7	45
	%	36.9%	41.2%	31.8%	37.2%
11-15 years	Count	14	9	5	28
	%	21.5%	26.5%	22.7%	23.1%
16-20 years	Count	10	2	2	14
	%	15.4%	5.9%	9.1%	11.6%
Above 20 years	Count	6	1	3	10
	%	9.2%	2.9%	13.6%	8.3%
Total	Count	65	34	22	121
	%	100.0%	100.0%	100.0%	100.0%
Chi-square = 5.05DF= 8 P-value = 0.75					

Source: Field Data (2024)

With these results, it can be noted that more than three-quarters (80.2%) of the respondents had been working in the marine transportation sector for more than six years. Hence, the study managed to obtain information from the experiences of people in the marine transportation business. There was also no significant difference between employees of the three selected companies in terms of their working experience in the marine sector (p-value = 0.75). ZFFs wasthe youngest company, started operations in Tanzania in 2018 but managed to hire highly experienced personnel, just like AFFs and ASL, which started operations in 2005 and 2011, respectively.

V. RESULT

This section, the researcher provided study results, derived from primary data obtained via questionnaires and interviews. The analysis of the study's findings was guided by specific research objectives. However, three different types of analysis were performed: (i) a descriptive analysis that employed mean and standard deviation to interpret the outcomes; (ii) multiple linearregression analysis was employed to establish a linear connection between independent and dependent variables, and (iii) thematic analysis for the content collected through interviews.

A. Occurrence of Maritime Accidents

Respondents were asked to express their levels of agreement regarding frequency of occurrence of maritime accidents in Tanzania, specifically along the Dar es Salaam-Zanzibar route. They utilized a scale ranging from one to five (1-has highly decreased, 2-has decreased, 3-has remained constant, 4-has increased, to 5-has highly increased) to indicate their perceptions. The results of this assessment were summarized in Figure 1.

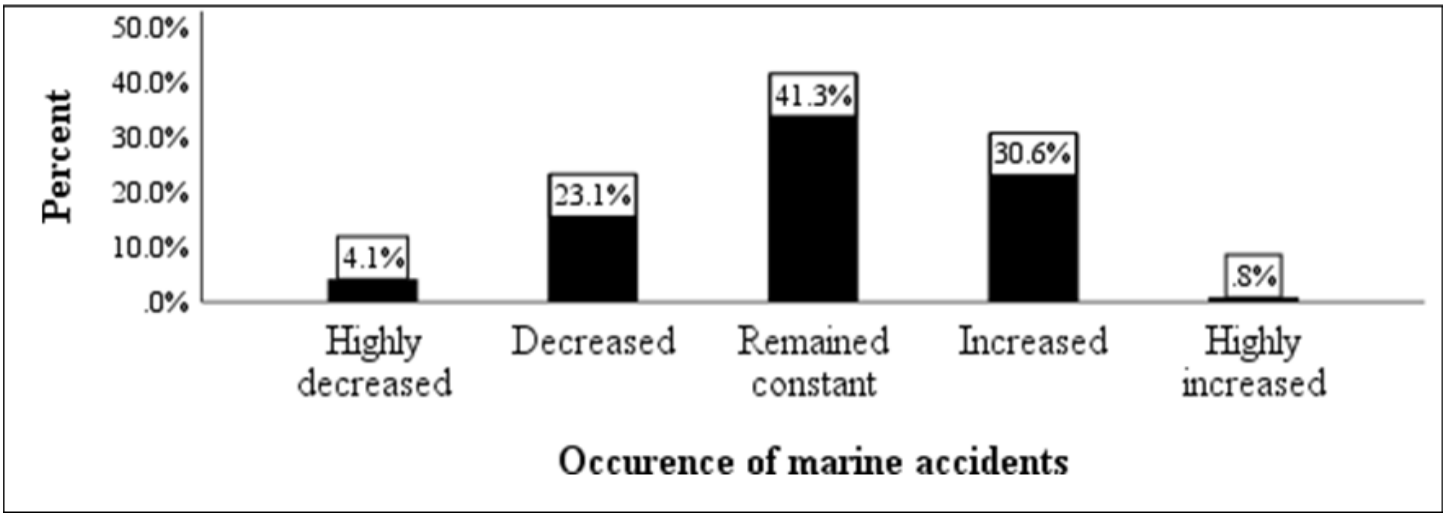

Fig 1: Increment of Maritime Accidents
Source: Field Data (2024)

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The results in Figure 1 revealed that more than one third (41.3%) of the respondents voted that the occurrence of marine accidents in Tanzania had remained constant. 30.6% voted the occurrence had increased, 23.1% voted it had decreased, and 4.1% voted it had highly decreased,while only 0.8% voted the occurrence had highly increased. Based on the findings, the study accepted that the frequency of the occurrence of maritime accidents in Tanzania had remained constant. Therefore, efforts needed to be made to lower the incidence of maritime accidents. This can be achieved by effectively understanding the main contributing factors in terms of studying individual human factors, the environment, and job-related factors that have been influencing maritime accidents in the country.

B. Individual Human Factors

The first specific objective of the study was to identify the most influential individual human factors contributing to maritime accidents among maritime professionals. The selected maritime professionals were required to indicate their level of agreement with the statements that aimed to capture human factors influencing maritime accidents in Tanzania. The Likely scale used ranged from 1-strongly disagree, 2-disagree, 3-moderate, 4-agree, and 5-strongly agree.

The obtained data were, firstly, subjected to descriptive statistics, as shown in Table 8, where the mean scores ranged from 1.00 to 1.80 and were considered to indicate factors with 'very low influence'. The mean scores from 1.81 to 2.60 indicated factors that have 'low influence'; 2.61 to 3.40 indicated factors with 'moderate influence'; 3.41 to 4.20 indicated 'high influential' factors;and a mean score between 4.21 and 5.00 indicated factors with 'very high influence.

The results in Table 8 show that, generally, individual human factors had low influence in causing maritime accidents (weighted mean 2.00). However, according to the order of priorities,factors that were noted to have such low influence were personnel performing maritime duties even when he/she was fatigued (mean 2.43), personnel failing to adhere to safety regulations and guidelines (mean 2.33), personnel failing to communicate with the crew team due to communication barriers (mean 2.26), personnel disobedient to the procedures intentionally in confidence of their skills, knowledge, and experience (mean 2.06), and personnel using illicit drugs and alcohol while performing maritime duties (mean 1.87). Other factors were reported to have very low influences. These were low skill levels and inadequacy training of maritime personnel (mean 1.80), inability of maritime personnel to make timely and sound decisions (mean 1.68), and personnel low level of awareness and understanding of the Tanzanian maritime environment (mean 1.60).

Table 8: Individual Human Factors Influence Maritime Accidents – Descriptive Statistics

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Fatigue	121	1	5	2.43	1.244
Fail to adherence to safety regulations	121	1	5	2.33	.961
Communication barriers	121	1	4	2.26	1.109
Disobedient to the procedures	121	1	5	2.06	1.105
Use of illicit drugs and alcohol	121	1	5	1.87	1.103
Low skill levels	121	1	5	1.80	.988
Inability to make timely and sound decisions	121	1	5	1.68	.829
Low experience	121	1	4	1.60	.780
WEIGHTED MEAN				**2.00**	

Source: Field Data (2024)

The researcher went ahead to perform multiple linear regression analysis in order to establish a model that predict occurrence of maritime accidents from environment and job factors (human related challenges). Table 9 shows model summary, Table 10 shows model fitness and Table 11 shows regression coefficients for the linear relationship between environment and jobfactors and frequency of occurrence of maritime accidents in Tanzania.

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Table 9: Human Related Challenges Influence Maritime Accidents – Regression Model **Summary**

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.712[a]	.508	.472	.626

a. Predictors: (Constant), Conflicting maritime regulations , Pressure friom the bosses, Communication failure from the shore operation , Unreliability of maritime equipment, Presence of obstacles , Density of sea traffic , Adverse weather condition , Excessive workload

Source: Field Data (2024)

Table 10 shows that F-statistics was 14.427 which is higher than the critical value of 3.916 meanwhile probability value was significant (p-value < 0.001). This indicated that the model wasfit and reliable in predicting occurrence of maritime accidents in Tanzanian. Therefore, the study accepted the second hypothesis (H2) that stated that "there is significant relationship between human related challenges of maritime professional and maritime accidents."

Table 10: Human Related Challenges Influence Maritime Accidents – Fitness of Regression Model

ANOVA[a]

	Sum of Squares	df	Mean Square	F	Sig.
Regression	45.165	8	5.646	14.427	<.001[b]
Residual	43.827	112	.391		
Total	88.992	120			

a. Dependent Variable: Occurence of marine accidents

b. Predictors: (Constant), Conflicting maritime regulations , Pressure friom the bosses, Communication failure from the shore operation , Unreliability of maritime equipment, Presence of obstacles , Density of sea traffic , Adverse weather condition , Excessive workload

Source: Field Data (2024)

Table 11 present results of multicollinearity and coefficient values of the model. It can be accepted that the model was free from multicollinearity problem since tolerance values of eachpredictor variable was above 0.1 and VIF was not above 10.

Table 11: Individual Human Factors Influence Maritime Accidents – Regression Model Coefficients

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	1.293	.245		5.270	<.001		
Presence of obstacles	.056	.070	.063	.791	.431	.687	1.457
Adverse weather condition	.112	.105	.113	1.068	.288	.395	2.533
Density of sea traffic	.170	.059	.231	2.870	.005	.678	1.474
Unreliability of maritime equipment	.019	.092	.018	.203	.839	.544	1.838
Pressure from the bosses	.141	.066	.173	2.127	.036	.667	1.499
Communication failure from the shore operation	.373	.062	.465	5.997	<.001	.732	1.367
Excessive workload	.145	.106	.151	-1.373	.173	.363	2.754
Conflicting maritime regulations	.147	.069	.192	2.113	.037	.534	1.874

a. Dependent Variable: Occurence of marine accidents

Source: Field Data (2024)

The results in Table 11 continued to show that there were four factors that significantly contributed to the maritime accidents. These were density of sea traffic in Tanzania (p-value = 0.005), pressures from the bosses (p-value = 0.036), communication failure between crew members and shore operators (p-value < 0.001) and conflicting maritime regulations (p-value 0.037). The remaining factors/challenges were noted to have no significant power to predict occurrence of maritime accidents in Tanzania since their probability values were greater than upper limit of 0.05. These were presence of obstacles that affect navigation (i.e rocks and so on),adverse weather condition, unreliability and low functionality of maritime equipment, and excessive workload due to shortage of staff.

Multiple linear regression equation that could be obtained from the model has been given as equation 4. The equation illustrate that if all human related challenges would be eliminated orheld at zero, occurrence of maritime accidents would be at a constant value of 1.293.

$$ACC = 1.293 + 0.056POB + 0.112AWC + 0.17DST + 0.019UME + 0.141PFB + 0.373CFO + 0.145EWL + 0.147CMR + e \quad (Eq\ 4)$$

Below are the meaning of the abbreviations used:POB= Presence of obstacles:

AWC= Adverse weather conditionDST= Density of sea traffic
UME= Unreliability of maritime equipment PFB= Pressure from the bosses
CFO= Communication failure between crew members and shore operatorsEWL= Excessive workload
CMR= Conflicting maritime regulations

VI. CONCLUSION

This study has shed light on the multifaceted nature of maritime accidents in Tanzania, particularly along the Dar es Salaam-Zanzibar route. Through analysis and exploration of various factors, including individual human factors, human-related challenges, and strategies for accidentreduction, several valuable key pieces of information have emerged. The study noted that the frequency of occurrence of maritime accidents had remained constant, but there was a possibilityof a higher occurrence if there were no effective interventions. Individual human factors that could significantly predict the occurrence of maritime accidents were noted to be the use of illicitdrugs and alcohol, fatigue while performing duties, communication

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barriers, and non-adherence to safety regulations. Human-related challenges (environmental and job conditions) that could significantly influence the occurrence of maritime accidents were noted to be the density of sea traffic, communication failures between crew members and shore operators, pressures from bosses, and conflicting maritime regulations. It was further noted that strict enforcement of maritime regulations, ensuring personnel remain well-informed about safety practices, enhancing communication channels, establishing a safe working environment, observing speed limits, and conducting regular vessel maintenance could significantly enhance safety practices within the maritime industry.

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