International Journal of Engineering Technology and Scientific Innovation

ISSN: 2456-1851

Volume:03, Issue:04 "July-August 2018"

AN APPRAISAL OF MARITIME SAFETY MANAGEMENT PRACTICES AND ORGANIZATIONAL SAFETY PERFORMANCE IN NIGERIA MARITIME DOMAIN: THE CASE OF BOURBON INTEROIL NIGERIA LIMITED

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ABSTRACT

Over the years, the International maritime Organization (IMO) has developed several maritime safety management practices, regulations and codes at the global level for adoption by signatory coastal states and implementation by maritime operators to ensure safety of navigation and related maritime operations. The coastal states too have made many local safety rules and regulations to supplement domesticated IMO rules. However, the challenge in the full implementation of these safety instruments in the maritime sector particularly in Nigeria remains with the lack commitment of adequate financial resources to invest in these basic safety regulations and practices and training, since most of the safety management practices require employee training in order to yield desired result. The lack of commitment to investing in safety management practices has being linked by previous literature to poor knowledge of the level of returns on investment in safety management practices by indigenous operators who view

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financial resources spent on safety practices as an expenditure. The study was therefore carried out to appraise the maritime safety management practices and organizational safety performance in Nigerian maritime domain using bourbon interoil Nigeria limited and the International Safety management Code(ISM code) as case studies. It was cast to compare the safety performance of the pre and post ISM training periods at Bourbon and the overall performance of the organization. A mix method was used to carry out the research adopting both historical and survey data while the trend analysis and independent sample t-test statistical tools were used to analyze the data. It was found that; the trend of accident and accident induced losses show a significantly declining trend in the post ISM training period. The independent sample t-test showed that a significant difference exists between the pre and post ISM training periods. The performance of the organization in the post ISM training period is greater by 32.7%. Recommendations were given on the basis of the research findings.

Keywords: Safety Culture, Marine Vessel, Safety Policy and Strategy, Maritime Industry

1.0 INTRODUCTION

Safety can be explained as the state and condition of protection of a subject matter (object) from risk and danger of accidental damage and loss. Safety is the assurances that the investment capital, the infrastructural capital, the human capital, the working capital, the environment and other input and output resources of an organization are in a condition where they are not threatened by risks of unexpected damages, loss and adverse effects; and can thus be referred to as being protected from danger. The marine industry is filled with such hazards that form major threat sources to the safety of marine adventure and maritime operations, thus the marine insurance Act(1906) as amended uses the term “perils of the sea” to refers to these sets of hazards and unsafe conditions that could jeopardize maritime operations and investments rendering them unsafe. For example; key principles which motivates and spur investors to increase investment in particular maritime economic ventures and regional geographical sea areas is the certainty of safety and security of initial capital investments. The certainty that an initial investment will not be lost to or unnecessarily and unacceptably diminished by safety and security risks brew confidence in the investors and is a sure motivational factor that will ensure good and improved performance(Wang, 2002). Safety as far as the maritime industry is concerned has no alternative; recall that this is the major reason for the formation of the International Maritime Organization(IMO); the United Nations(UN) agency responsible for global regulation and control of maritime safety practices among member nations and the development of safety and security instruments for member maritime nations.

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The establishment of the national maritime safety agencies and commissions by coastal states such as the Nigeria maritime Administration and safety agency (NIMASA) is a proof that there exist no alternative to safety. Michelle (2015) note that correlation exists between the maritime safety management practices of an organization and organizational performance and productivity. Correlation in this case is a term used to denote the existence of relationships between the two variables which further investigation could reveal the nature of the relationship. The measurement of the existence of relationship is an indication that such related variables could have influence on one another or either in such a two variable relationship could be influencing the behaviour of each other. Further investigation on correlated variables enables the understanding to be made of the nature of relationship; a positive correlation or negative correlation. A correlation between organizational performance measured in terms of output and productivity over a given period and the safety management practices will be an indications that a relationship exist between the output performance of the organization and the safety management practices and may serve as basis form performance improvement assuming that increased application or implementation of particular safety management practices improves organization performance (Michelle, 2015; Wang, 2002). Thus the actual motivation for safety management practices in organizations is based on this understanding that improving the safety performance of the organization using the system will improve her productivity since a correlation exists between safety practices and organizational productivity and since reduction in occupational injury and death among staff has man-hour and economic implications which are quantifiable in labour economics just as elimination of industrial accidents eliminates economic costs and losses associated with accidents such that the organization stands to gain more in these situations. Reduction and/or elimination of industrial accidents, personal injury and death and the associated losses can only be achieved through the implementation of safety management practices by organization (Marc-Antoine and CRUZ, 2017).

Zohar (1980) notes that Safety management (SM) is an organizational function, which ensures that all safety risks are identified, assessed and satisfactorily mitigated. Safety management practices(SMP's) are therefore the tools, programmes and instruments with which organization's identify, assess, mitigate, eliminate, control and regulate safety risks and threats to the advantage of the organization. The implementable regulatory instruments adopted by organization and implemented to ensure safe and sustainable operations. According to Zohar (1980) management's commitment to safety is a major factor affecting the success of an organization's safety programs. The commitment of management of an

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organization to safety is however evidenced in the quality of investment in and rate of implementation of safety management practices (SMP's). In other words, the degree of success or failure of an organization's safety programs can be attributed to management commitment to investment in safety. Over the years, the International Maritime Organization (IMO, 2008) and many other national safety administration agencies of coastal states have developed various safety management programmes for the maritime industry. For examples; the international convention on safety of life at sea, (SOLAS,1973) made key provisions for safe construction of vessels and safe operation of the vessels. Other major IMO conventions that produced major maritime safety safety management instruments include: the international convention on loadlines (LL) 1966, the international convention for safety of fishing vessels, international regulations for the prevention of marine pollution from ships (MARPOL 73/78), international regulations for the prevention of collision at sea, among others(Anderson, 2017). The Imo has also issued many safety codes for adoption and implementation as safety management practices in maritime organization. Some of the IMO safety codes include: the international safety management code, (ISM code, 1993), the formal safety assessment (FSA), code for safe practices for ships carrying timber deck cargoes, code for safety of diving vessels, international gas carrier code, code for safety of fisher men and fishing vessels, code for the safe construction of offshore drilling units (MODU, 1979), among others (Ömer , Yusuf and Svetak, 2018).

The International safety Management Code (ISM code, 1993) which is intended to ensure that all maritime companies and their vessels must undergo regular audits to ensure that a safety management system is in place. Lappalanen and Tapaninen (2009) note that the overwhelming objective of the code is to ensure or ascertain safety at sea, the prevention of human injury or loss of life and the deliberate avoidance of damage to the environment (specifically the marine environment and properties). Numerous shipping disasters, ineffective communication, pollution incidents, reports which highlighted crew negligence, sloppiness throughout the company or plain inexperience gave rise to the ISM code(Lappalanen and Tapaninen, 2009). The current challenge however is the seemingly poor attitude of particularly indigenous maritime companies in the Nigerian maritime domain towards investment in safety management practices. Many of these organizations seem to consider funds committed to implementation of safety management practices as unrecoverable finances expenditure rather than safety investments which will yield returns. The returns of investment in safety can be accessed in the output performance of the organization and savings in loss of man hours, injuries, deaths, equipment damages etc. which can quantifiable in economic

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terms as aforementioned mentioned. Measuring the correlations between organizational performance and safety management practices thus reveals the nature of relationship existing between both variables for decisions on how output performance can be improved based on this relationship (Withington; 2006). Crew performance after training in ISM code in limiting human error related problems is ought to improve in order that organizational performance will improve, but knowledge of the nature of improvement in crew performance after training in ISM and the relationship with organizational performance is currently shrouded in obscurity, thus limiting the correctness of management decision as regards the implementation SMPs, particularly ISM code. In order to measure the difference in safety performance of the organization in the pre and post safety management practices training periods, this study adopted the ISM code safety management practice and the as implemented by BOURBON INTEROIL NIGERIA LMITED , an upstream oil and gas maritime services company operating in the Nigeria offshore oil fields.

2. OBJECTIVES OF THE STUDY

The main objective of the study is to appraise the maritime safety management practices and organizational safety performance in Nigeria maritime domain using the International safety management Code (ISM code) and Bourbon Interoil Nigeria Limited as case study. The specific objectives of the research include:

- To determine the trend of maritime accident in the post ISM code training period.
- To compare the safety performance of maritime workers in the organization in the pre and post ISM code training periods.

3. RESEARCH QUESTIONS

- IS the trend of maritime accident significantly increasing in the post ISM code training period?
- Is there any significant difference in the in the safety performance of the organization in the pre and post ISM code periods?

4. METHODOLOGY

The study used a mixed method in which the survey and historical research design methods were adopted. The study adopted a historical research design in order to address first objective. It obtained time series historical data on post ISM code reported accidents from bourbon inter oil Nigeria limited annual safety report bulletin (Bourbon, 2016). The historical accident data covers a 10 year period from 2006 to 2015. The data was analyzed using trend analysis. The data for second objective of the research were collected through the survey method in which questionnaires were used as research instruments and administered to a randomly selected

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operational and higher level management members of staff of BOURBON INTEROIL NIGERIA LIMITED at the office in Onne, Oil and gas Free, Port-Harcourt, river state Nigeria. The questions were administered to 40 employee respondents to rate safety performance of the organization in the pre and post ISM code implementation periods on a performance scale calibrated to be between 10% and 100%. This they did in consideration of the reported cases of maritime and occupational accidents that occurred in the organization over the period. A total of 33 respondents responded to the questions. The data collected were analyzed using the statistical method of independent sample t-test to compare the safety performance of the organization in the pre and post ISM code training periods to determine if significant differences exist between them. The SPSS statistical software was used for the analysis.

4.1 Trend Analysis

Trend analysis is a attempt at spotting a pattern using time series data. Trend analysis is often used to predict future events, it could be used to estimate uncertain events in the past based on historical data. It equally serves determining whether or not the occurrence trend of an event if increasing or decreasing over the time period covered. In this case, the ordinary least square estimation method of regression where time is the independent variable; and the report accident cases between 2006 and 2015 in BOURBON INTERIOL NIGERIA LMITED were dependent on time, and as such are used as the dependent variables. Trend of the occurrence of accident in the post ISM period was thus measured as shown

$$\mathbf{Y_t = \sigma + \beta X + \varepsilon.}$$

Y_t = Reported accident cases over the period t.
X = Time(independent variable) in years
σ = Constant
β = Coefficient.
ε = error term.

4.2 Independent Sample T-test.

A t-test helps you compare whether two groups have different average values. A t-test determines whether a difference exists between two groups' averages. The independent sample t-test measures the existence of a difference between the averages of two groups which are independent of each other. That is; two unrelated groups. Such a difference if it exists between the two groups is more likely to be meaningful and real if

(i) The difference between the averages is large,

(ii) The sample size is large, and

(iii) Responses are consistently close to the average values and not widely spread out (the standard deviation is low).

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The t-test's statistical significance and the t-test's effect size are the two primary outputs of the t-test. Statistical significance indicates whether the difference between sample averages is likely to represent an actual difference between the groups. The independent sample T-test was used to compare the pre and post ISM code training period safety performance of the organization to deduce if a significant difference exists between the two groups. Symbolizing the pre ISM training safety performance as X_1 and the post IS code safety performance as X_2, the SPSS version 20 software was used to analyze the data obtained using the independent sample t-test statistical tool.

5 RESULT AND DISCUSSION

Table1.0: Trend of Post ISM code Training Reported Maritime Accidents

Descriptive Statistics

	Mean	Std. Deviation	N
accident	2.4167	1.44338	10
time	6.5000	3.60555	10

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.847[a]	.718	.690	.80420

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.621	.495		9.337	.000
	time	-.339	.067	-.847	5.043	.001

Source: Authors calculation.

The results indicates that an average of 2.42 accidents occurred each year between 2006 and 2015 following the implementation of ISM safety management practice with a standard deviation of 1.44. The model showing the accident trend following the

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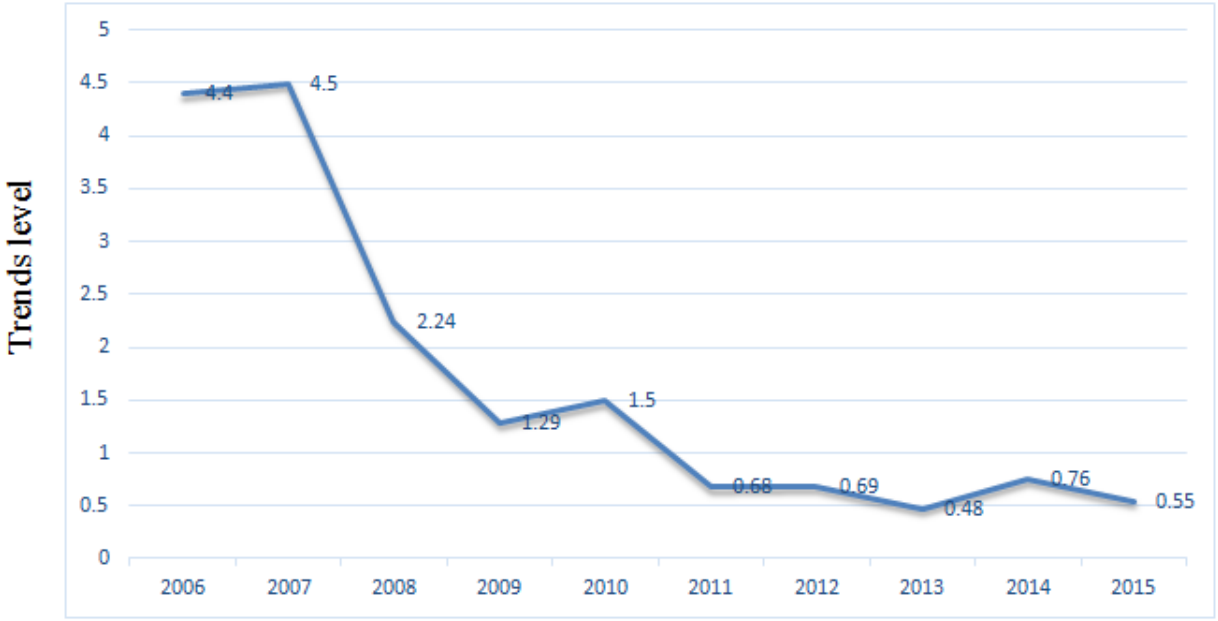
implementation of safety management practices is: $Y_t = 4.62 – 0.33X + 0.067$. The negative coefficient indicates that there is a decreasing trend in marine accidents over the period. The t-stat of 9.33 and t-table of 2.23and a p-value of 0.00 indicate a significantly decreasing trend in accidents, evidencing the positive effects of the implementation of safety management practices on safety performance of the organization. The figure below is a geometric representation of the declining trend of reported marine accident cases in the company over the period.

Figure 1: Geometrical Presentation of Average Annual Reported Marine Accident Cases Over the Period (2006 -2012).



Source: Trend

The trend graph in figure 1 further supports the result of the trend analysis that accident trend following the implementation of ISM code marine safety management practices follows a declining trend over the period.

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Table2: Comparing the Safety Performance rating of the organization in the Pre And Post Ism Code Training Periods.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre ISM Training safety performance	52.2727	33	15.66699	2.72727
	Post ISM Training safety performance	85.0000	33	6.49519	1.13067

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Post training safety performance - pre safety performance	32.72727	16.10953	2.80431	-38.43946	27.01508	11.670	32	.000

Source: SPSS.

The result of the analysis shows that the average rating of the pre-ISM training safety performance of the organization by the 33 respondents is 52.3% with a standard deviation of 15.67% while the average safety performance of the organization in the post ISM code training period is 85.00% with a standard deviation of 6.4%. This indicates that almost all the respondents rated the post ISM training period higher. The paired differences table shows a difference of 32.72% performance in favour of the post ISM training period with a standard deviation of 16.10%. The t.test show a t-value of 11.67, t-table of 2.54 and p-value of 0.00 at 32 degrees of freedom. Thus, there is a significant difference between the pre-ISM training period and the post ISM code training period. By implication, overall company performance and output is expected to be higher with higher socioeconomic returns as less economic wastages and accident associated injuries and deaths is recorded. Investment in maritime safety management practices is therefore seriously recommended particularly for indigenous operators whose poor record of investment in safety training

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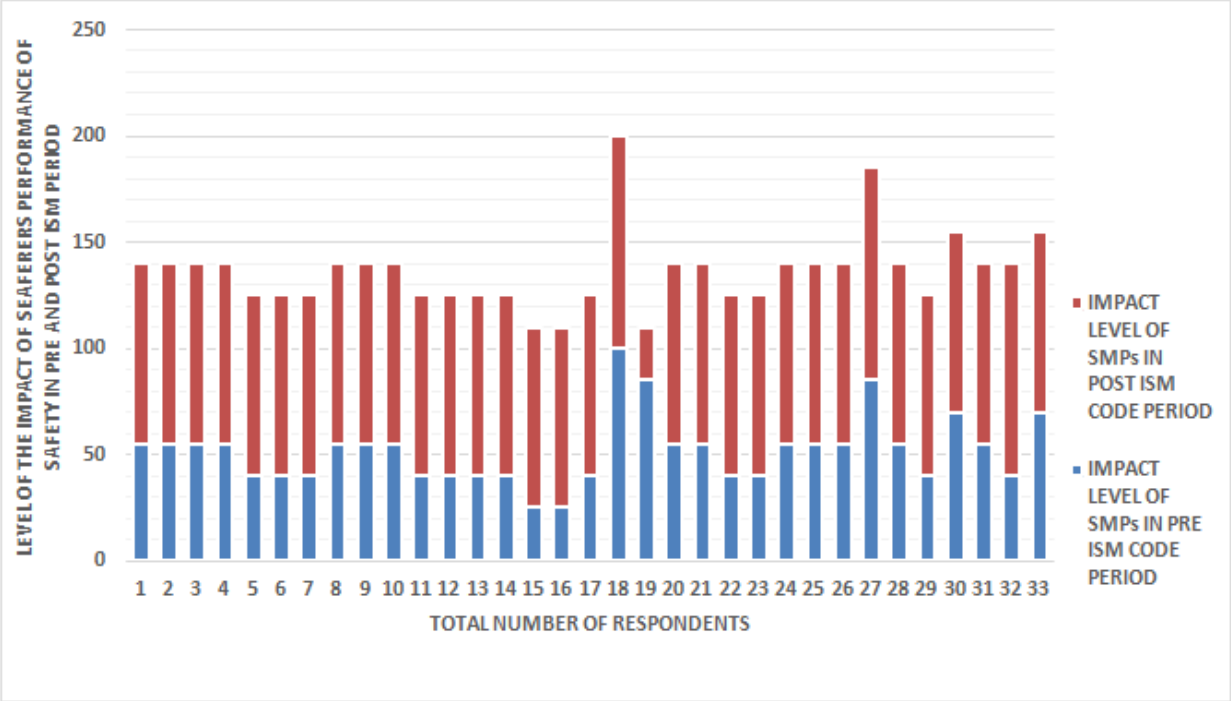
and management practices has resulted to losses and lack of confidence in the capacity to handle multinational oil and gas contracts in the Nigeria maritime sector; even in the face of government drive to develop the local content in the sector through participation of indigenous companies. The figure below is a presentation of the safety performance rating of the 33 respondents using a bar-chart.

Figure 2: Comparison of the safety performance rating of Bourbon Interoil Nigeria Limited using a Bar-Chart.



Source: Authors presentation.

6. ANSWERS TO RESEARCH QUESTIONS

(1) IS the trend of maritime accident significantly increasing in the post ISM code training period?

The result of the analysis indicates that the trend of maritime accident in the post ISM code training period is significantly declining over the period covered in the study. The model showing the trend of maritime accident over the period is: $Y_t = 4.62 – 0.33X + 0.067$.

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(2) Is there any significant difference in the in the safety performance of the organization in the pre and post ISM code periods?

The result of the study indicates the existence of a significant difference in the safety performance of the organization in the pre and post ISM code training eras. The difference is 32.72% performance in favour of the post ISM training period with a standard deviation of 16.10%.

7. CONCLUSION

The implementation of the ISM code maritime Safety management practice be the organization has improved her safety performance by 32.7% and brought a significantly declining trend in the reported cases of maritime accident over the period covered in the study.

8. RECOMMENDATIONS

Base on the findings of the research, it is recommended that maritime organizations particularly indigenous offshore oil and gas services companies should treat financial commitments in adopting and implementing safety management practices as investment in expectation of returns rather than as expenditures that yield no returns. The formal view will certainly motivate and stimulate commitment to safety training and retraining while the later view will cause a decline in the rate of commitment to safety training to the detriment of the organization and the general society. In order to improve and optimize her performances, organizations must adopt and implement in full not only the ISM code as used in this case study, but all major maritime safety regulation.

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Appendix 1

S/N	PRE ISM Training SAFETY PERFORMANCE(X_1) %	POST ISM Training SAFETY PERFORMANCE(X_2) %	AVERAGE RATING		(X_1-X_2)
			PRE-ISM CODE %	POST-ISM CODE%	
1	55	70	52.3	85	15
2	55	85	52.3	85	30
3	40	85	52.3	85	45
4	55	85	52.3	85	30
5	55	85	52.3	85	30
6	55	85	52.3	85	30
7	55	85	52.3	85	30
8	55	85	52.3	85	30

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9	**55**	**85**	**52.3**	**85**	**30**
10	**55**	**85**	**52.3**	**85**	**30**
11	**55**	**85**	**52.3**	**85**	**30**
12	**55**	**85**	**52.3**	**85**	**30**
13	**55**	**85**	**52.3**	**85**	**30**
14	**40**	**85**	**52.3**	**85**	**45**
15	**40**	**85**	**52.3**	**85**	**45**
16	**25**	**100**	**52.3**	**85**	**75**
17	**40**	**70**	**52.3**	**85**	**30**
18	**100**	**100**	**52.3**	**85**	**0**
19	**85**	**70**	**52.3**	**85**	**-15**
20	**55**	**85**	**52.3**	**85**	**30**
21	**40**	**85**	**52.3**	**85**	**45**
22	**40**	**85**	**52.3**	**85**	**45**
23	**25**	**85**	**52.3**	**85**	**60**
24	**25**	**85**	**52.3**	**85**	**60**
25	**55**	**85**	**52.3**	**85**	**30**
26	**55**	**85**	**52.3**	**85**	**30**
27	**85**	**100**	**52.3**	**85**	**15**
28	**55**	**85**	**52.3**	**85**	**30**
29	**40**	**85**	**52.3**	**85**	**45**

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30	**55**	**85**	**52.3**	**85**	**30**
31	**55**	**85**	**52.3**	**85**	**30**
32	**55**	**85**	**52.3**	**85**	**30**
33	**55**	**85**	**52.3**	**85**	**30**
	$\Sigma(X_1) = 1725$	**$\Sigma(X_2) = 2805$**			**$\Sigma D=1080$**

Source: Field Survey.

