AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Business Management, Economics and Banking
ISSN (E): 2832-8078 Volume 20, | January, 2024

IMPACTS OF SAFETY INCENTIVE PROGRAMMES ON OCCUPATIONAL HEALTH AND SAFETY IN THE NIGERIAN OIL AND GAS INDUSTRY

Esitikot, E. L.
1Upstream Oil and Gas, ExxonMobil, Lagos, Nigeria.
Correspondence Author: esitikot@gmail.com

Obadimu, C. O.
Institute of Health, Safety, Security and
Environment Studies, University of Uyo, Uyo, Nigeria.

A B S T R A C T

Introduction: The oil and gas industry is known to place high premium on safety because any unsafe condition may have severe consequences that may translate to several loses and damage to the environment. Apart from accidents that may lead to loss of work hours and payment of compensations, environmental damages arising from unsafe practices may cost the oil and gas company several millions of dollars to clean up. Hence proactive safety measures are usually recommended. To curb unsafe behaviours, safety incentives are used to modify workers' behaviour to be more safety conscious by either rewarding safe behaviours and/or punishing unsafe behaviours. This study was carried out to ascertain if safety incentives promote proactive reporting of unsafe conditions among oil and gas industry workers in Nigeria as a means of enhancing their occupational health and safety.

Methods: A survey research design was used in the study with a correlational research strategy adopted. The sample consisted of 50 workers from the oil and gas industry drawn from both onshore and offshore with diverse job specifications and age.

Results: The null hypothesis stated for the study, which states that: implementation of safety incentives does not lead to proactive reporting of unsafe working condition among workers in the Nigerian oil and gas industry was upheld because the calculated Chi square value X_c^2 = 3.07 at df = 4 was less than the table value X_t^2 =

K E Y W O R D S

Effectiveness, Occupational Health, Proactive Reporting, Safety Incentives.

9.49. Also in support of the acceptance of the null hypothesis was a p value of 0.55 which was far above 5% or 0.05.
Conclusion: Based on the findings of the research, it was concluded that proactive reporting in the industry is not impacted by implementation of safety incentive programmes, unlike findings from some previous studies.

Introduction

Maintaining a safe work place for both employers and employees in the oil and gas industry is a top priority because the slightest accident may have severe impact on the health and safety of personnel, equipment and the environment.[1-3] To curtail accidents and the associated consequences, safety initiatives are developed within the industry based on policies and guidelines contained in each organisation's safety management systems. These initiatives and programmes are implemented by the appropriate departments to ensure the health and safety of personnel, equipment and compliance with international best practices in management of associated risk.[4] In spite of the presence of these programmes and initiatives targeted at a safe work environment, avoidable accidents with associated consequences still occur[5,6], mostly due to human error[7].

To minimize these errors to the barest minimum, firms develop working environment where workers' safety conscious behavior is fostered, managed, and rewarded[8] in the form of safety incentives. Safety incentive programs, which are an aspect of behavior-based safety management (BBSM), have garnered increased public awareness in the past few years.[9] Incentives are basically promises made with employees by the organization before the work operation starts, with an aim to motivate them to think smarter, work efficiently, meet performance standards, and within the given time frame.[10] These are future rewards that are contingent upon fulfilling a future condition.[11] Safety incentives seek to modify the behaviour of the employee, targeted at creating a culture of safety within the workplace.[12-14] The use of safety incentives is a typical behaviour modification approach adopted to drive improved safety performances[15,16] and counter natural incentive to unsafe behaviours.[17,13]

Incentive programmes are used to show appreciation to employees for working well and for reinforcing commitment;[18] to encourage higher levels of performance;[19,20] to improve an organisation's effectiveness by influencing individual and group behaviour;[21] and to act as an aid to recruitment and retention.[19] The goal of the incentive programme therefore, is to increase worker's awareness of safety issues and procedures, not necessarily to win prizes.[22,23] A number of organisations within the oil and gas sector use safety incentives as a typical behaviour modification technique.[12,14,15] Safety incentives therefore may be broadly defined as a reward techniques used to improve health and safety results.[17] They are considered as activators and are designed to reinforce safe behaviour and hence expected to reduce lost time due to accidents.[24,25] Implementation of safety incentives could be by any of several approaches such as combination of reward and punishment; combination of material incentives and spirit incentives; combination of positive incentives and negative incentives; just and equitable principles;[26] injury/illness-based programmes and/or behaviour-based programmes.[27]. Though implemented to portray an organizational culture that encourages safety and health, implementation of these incentives programmes have associated man hours and financial costs.[28] There is currently a great deal of debate on the ability of incentives to

improve effectiveness of occupational health, safety and risk management.[27] Advocates of safety incentives base their position on the premise that accidents are solely the result of unsafe acts[29,30], while opponents see safety incentives as bribing workers to act differently. Seeing behaviour as driven solely by consideration of consequences does not take into consideration that accidents are generally the result of some combination of unsafe conditions, improper processes or procedures, and inappropriate actions[31,32], thus attitudes, beliefs, and values can be the driving forces behind actions, not just consequences.[31] Incentives may only secure temporary compliance with directives, and only for as long as workers can see a direct connection between action and reward; in the long-term, this can have a toxic effect on behaviour within an organization.[31,33] It is observed that the majority of literatures on safety incentives lack scientific exactitude, with much of the debates being at the level of opinion rather than established research findings[34], with many employers in the dark whether their safety incentive programmes encourages occupational health and safety.[35] Also, past studies have provided evidence of safety incentives from industrialized countries, e.g., China, UK, USA[36], or rapidly developing countries, e.g., India[37], but safety literature from developing economics is scarce and limited[38]. The oil and gas industry is considered as a high risk organisation[39] which implies that there should be an existence of a positive relationship between safety climate and the safety behavior of employees within the industry[40]. An expected safety behaviour within such an industry should be adopting proactive safety. Although incidents in the workplace are often unpredictable, exercising proactive safety protocols not only decrease the probability of an accident occurring in the first place, they also make dealing with an incident much more manageable[41]. Being proactive therefore implies anticipating accidents, being prepared, minimizing response times, decreasing the number of injuries that occur in the workplace and as a result, reducing the number of worker's compensation claims.[42] In view of the attention and resources allocated to incentive programmes in the Nigerian oil and gas industry, it became expedient to establish whether these incentive programmes can lead to proactive safety behaviours. This study therefore seeks to find out if implementation of safety incentives can have any impact on increased proactive reporting of unsafe conditions. The null hypothesis for the study was stated thus:

H_0: Implementation of safety incentives does not lead to proactive reporting of unsafe working condition among workers in the Nigerian oil and gas industry.

METHODOLOGY

A survey research design was used in the study. A correlational research strategy was adopted with an attempt made to demonstrate that a relationship exist between the variables.[43] A multi-stage application of probability-based sampling method was used to select the samples. First, a clustered sampling method was used to select the organisations to be sampled. Secondly, within each cluster, a simple random sampling method was applied to select the study samples in a totally random fashion without replacement. This process was considered as a fair and unbiased process, giving equal chances of selecting the study participants. A questionnaire designed to obtain a fair representation of the perception of all categories of workers using a five-point Likert-type scale (Strongly disagree = 1; Disagree = 2; Neutral = 3; Agree = 4; Strongly Agree = 5) was used for the data collection process. The questions were phrased such that "Strongly disagree" indicated negative relationship between applicable variable whereas "Strongly agree" indicated a positive relationship. The 'Neutral'

option was given for those without sufficient information to justify an opinion; were indifferent to the subject; or thought the good and bad points were about equal.

A sample size of 50 was used for the study. Descriptive statistics and correlation were used to analyse the obtained data. Chi-square test of independence was adopted as it is commonly used to assess the probability of association or independence of facts or to test the hypothesis of no association between two or more groups, populations, or criteria.

RESULTS

A total of 50 workers participated in the survey. A 100% response rate against 90% target was achieved. Out of the 50 questionnaires, 17 had incomplete demographic data while four had a missing response to one of the questions; one had missing responses to 2 of the questions. Table 1 shows a summary of the demographic characteristics of all the respondents in the research. Characteristics that could not be identified due to missing data are grouped as undefined. 28% of the questionnaires returned had one missing data while 8% had 2 missing data. 4% had 3 missing data. About 79% of the missing data were demographic data (50% on job location; 14% on employment status; 7% on job level; 7% on work unit) while about 21% of the missing data were on responses to the questions. There was no missing data on age and sex. The reason for the missing data was due to non-response. A review of the missing data indicated randomness and hence no potential for a strong biasing influence on the research results. Also, Table 2 shows the summation of the respondents that agreed and strongly agreed to the different questions based on work level, work type and work group. This helps to check whether work level, work type and work group have any impact on effectiveness of safety incentive or disincentive programme.

While 84% of respondents agreed that safety incentives impacts on safety and health improvement, only 20% agreed that it impacted on proactive reporting, while only 12% perceived impact on injury reporting.

Table 3 shows the test of independence for the responses on how safety incentives contribute to proactive reporting (reporting of unsafe acts and conditions). This was to enable determination of the probability that the difference is not due to chance. Table 4 shows the computation of Chi-square critical value using the data in table 4.4, where: This is to enable test of the null hypothesis that implementation of safety incentive programme does not result in increase in proactive reporting.

Table 1: Summary of demographic Characteristics of the Respondents

Location	Numbers (%)	Work Type	Numbers (%)	Sex	Numbers (%)
Offshore	32(64.0)	Regular	36(72.0)	Male	49(98.0)
Onshore	4(8.0)	Contract	10(20.0)	Female	1(2.0)
Undefined	14(28.0)	Undefined	4(8.0)	Undefined	0(0)

Age	Numbers (%)	Work Unit	Numbers (%)	Job Level	Numbers (%)
21-30	6(12.0)	Operations	19(38.0)	Supervisor	14(28.0)
31-40	32(64.0)	Maintenance	27(54.0)	Technician	34(68.0)
41-50	9(18.0)	Others	2(4.0)	Others	2(4.0)
50+	3(6.0)	Undefined	2(4.0)	Undefined	0(0)

Table 2: Summation of Percentages of Respondents by Categories that Agreed and Strongly Agreed

S/N	Effectiveness of Safety Incentives	All	Technical	Supervisor	Regular	Contract	Operation	Maintenance
1	I report unsafe acts and conditions because of safety incentives.	20	25	6	19	21	16	22
2	I am committed to working safely so that my team or department can be rewarded.	26	31	13	22	36	16	30
3	If I am injured or involved in accident, I will not report it for fear of being punished.	12	11	13	11	14	11	15
4	Safety incentives is effective in improving safety and health at my work place.	84	83	81	86	79	84	81

Table 3: Test of Independence of Response on Impact on Proactive Reporting

Impact on Proactive Reporting - Actual Perception			
Score	**Supervisor**	**Technical**	**Total**
Score = 5	**0**	3	3
Score = 4	**1**	6	7
Score = 3	**0**	1	1
Score = 2	**8**	14	22
Score = 1	**5**	10	15
Total	**14**	34	48

Impact on Proactive Reporting - Expected Perception			
Score	**Supervisor**	**Technical**	**Total**
Score = 5	0.875	2.125	3
Score = 4	2.042	4.958	7
Score = 3	0.292	0.708	1
Score = 2	6.417	15.583	22
Score = 1	4.375	10.625	15
Total	**14**	**34**	48
P	**=**	**0.55**	

Table 4: Computation of Chi-Square Critical Value from Table 3.

Improvement in Proactive Reporting				
F_o	F_e	F_o-F_e	$(F_o-F_e)/F_e$	$(F_o-F_e)^2/F_e$
0	0.88	-0.88	-1.00	0.88
1	2.04	-1.04	-0.51	0.53
0	0.29	-0.29	-1.00	0.29
8	6.42	1.58	0.25	0.39
5	4.38	0.63	0.14	0.09
3	2.13	0.88	0.41	0.36
6	4.96	1.04	0.21	0.22
1	0.71	0.29	0.41	0.12
14	15.58	-1.58	-0.10	0.16
10	10.63	-0.63	-0.06	0.04
		X^2_o		**3.07**

DISCUSSION

Table 3 show the test of independence of the supervisors and technical workers responses on impact of safety incentives on proactive reporting. Generally in Chi-test, a probability (P) of 0.05 or less is considered to be significant. The greater the deviation of what is observed to what would be expect by chance, the greater the probability that the difference is not due to chance. Thus a small P-value indicates that the difference obtained is unlikely if there genuinely was no difference in the population. The test of hypothesis was based on the premise that if the calculated chi-square value (see Tables 4) is greater than or equal to the critical value, the null hypothesis is rejected. However, if the chi-square value is less than the critical value, the null hypothesis is accepted.[49]

The relationship between implementation of safety incentives and increase in proactive reporting was investigated by the null hypothesis, which postulated that: Implementation of safety incentives does not lead to proactive reporting of unsafe working condition among workers in the Nigerian oil and gas industry.

The following hypotheses postulated were tested: the alternate hypothesis was: Implementation of safety incentives leads to proactive reporting of unsafe working condition among workers in the Nigerian oil and gas industry.

From the result on Table 4, it is clear that the calculated Chi-square value X_c^2 = 3.07 is less than tabulated value of X_t^2 = 9.49 at df = 4. That is, (3.07 < 9.49). With this result, the null hypothesis was accepted while the alternate hypothesis was rejected. Also in support of the acceptance of the null hypothesis was a P-value of 0.55 which was far above 5% or 0.05 level. Findings of this study are in agreement with that of [31,32,33] who reported that safety incentives does not directly improve behaviour but at best only secure temporary compliance with directives, and only for as long as workers can see a direct connection between action and reward. They also showed that in the long-term. Incentives can have toxic effect on behaviour within an organization. Though the reasons for the lack of impact on proactive reporting by the oil and gas workers was not investigated, it could be in line with[31] argument that employees, subcontractors, and contractors are quick to learn the rules and how to manipulate the system, to minimize the changes needed while maximizing their gains, at the expense of the sponsor. Thus even with the high focus (94%) on rewarding and/or recognising proactive

reporting, this research shows that the incentive programme does not actually impact on proactive reporting.

Since proponent of safety incentives base their position on the premise that accidents are solely the result of unsafe acts[29,30], and skeptics see safety incentives as bribing workers to act differently. It could be that workers understand the notion that behaviour is not driven solely by consideration of consequences and that accidents are generally the result of some combination of unsafe conditions, improper processes, procedures and inappropriate actions[31,32] This might have contributed to the lack of significant effect of safety incentives on the attitudes, beliefs, and values of the workers towards proactive reporting of unsafe conditions. Thus, it seems that there is still some way to go in developing the right environment for optimum use of safety incentives in improving proactive reporting.[14] Also evident from the findings of the study is the fact that impact of incentives on proactive reporting of unsafe conditions tend to have a little more effect on technical workers compared to their supervisors. This in part may be due to their vast experience and routine exposure of the supervisors, making them to understand that behaviour is not driven solely by consideration of consequences. Though there were little disparities of the impact on regular and contract staff, this was a bit more pronounced between workers in operations and maintenance unit with the workers in maintenance unit tending to yield more towards the application of incentives in proactive reporting. This finding is in line with[8], who asserts that the effectiveness of any safety incentive programme has a significant relation with the work unit within the organisation.

CONCLUSION

On the impact of safety incentives towards proactive reporting of unsafe working conditions within the Nigerian oil and gas industry, this research establishes that proactive reporting in not impacted by implementation of safety incentive programmes, unlike the findings from some past researches. On the whole, the study also establishes that incentives improve general safety at work within the industry, but fails in the area of proactive safety management within the studied sector.

REFERENCES

1. Technical Response Planning, 2013. Oil and Gas Industry Workplace Safety Commitment. [online]. Available from: http://www.emergency-response-planning.com/blog/bid/58479/Oil-and-Gas-Industry-Workplace-Safety-Commitment. Accessed 19 January 2014.
2. O'dea and Flin, 2001. Site managers and safety leadership in the offshore oil and gas industry. Safety Science, 37 (2001), pp. 39-57.
3. WIPRO, 2013. Safety and Health Management System in Oil and Gas Industry. [online]. Available from: http://www.wipro.com/Documents/safety-and-health-management-system-in-oil-and-gas-industry.pdf. [Accessed 07 April 2014].
4. Ridley, J. and Channing, J., 2003. Safety at Work. Buterworth-Heinemann: London.
5. Hudson, P., 2000. Non-Adherence to Procedures: Distinguishing Errors and Violations. [online]. Available from: http://www.crm-devel.org/resources/paper/Non%20Adherence%20to%20Procedures%20&%20Violations%20Hudson.PDF. Accessed 08 April 2014.
6. HSE, 1999. Reducing error and influencing behaviour. Sudbury: HSE.
7. Shappell, S. A. and Wiegmann, D. A., 2000. Human Factors Analysis and Classification system

– HFACS. Virginia: United States Department of Transportation.
8. Leung MU, Chan IM, Yu J. Preventing construction worker injury incidents through the management of personal stress and organizational stressors. Accid Anal Prev 2012;(48):156e66.
9. Brandhorst, S.; Kluge, A. When the Tension Is Rising: A Simulation-Based Study on the Effects of Safety Incentive Programs and Behavior-Based Safety Management. Safety 2021, 7, 9. https://doi.org/10.3390/safety7010009
10. Ahmed, I and Faheem, A. How Effectively Safety Incentives Work? A Randomized Experimental Investigation. Saf Health Work 2021;12:20e27
11. Wilde GJ. Risk homeostasis theory: an overview. Inj Prev 1998;18(2):89e91.
12. Mcafee, R. B. and Winn, A. R., 1989.The use of incentives/feedback to enhance work place safety: A critique of the literature. Journal of safety research, 20(1), pp. 7-19.
13. HSE 2006. An Evaluation of Reward and Recognition Schemes in the area of Occupational Health and Safety. Sudbury: HSE
14. Health and Safety Executive, Human Factors in Reliability Group, Improving Compliance with Safety Procedures: Reducing Industrial Violations. Health and Safety Executive, U.K., (1995) 1-63.
15. GAO, 2012. Workplace safety and health - Better OSHA guidance needed on safety incentive programs. [online] Washington: United States Government Accountability Office. Available from: http://www.gao.gov/assets/590/589961.pdf [Accessed 16 Oct 2013].
16. FREEMAN, L. M., 1997. An assessment of employee attitude towards incentives programs in Central Texas municipalities with population of 20,000 and under. M.PA Thesis, Southwest Texas State University.
17. Haines III, V.Y., Merrheim, G. and Roy, M., 2001. Understanding reactions to safety incentives. Journal of safety research, 32(2001), pp. 17-30.
18. Harte, H. G. and Dale, B. G., 1995. Improving quality in professional service organizations: A review of the key issues. Managing Service Quality, 5(3), pp. 34-44.
19. Industrial Relations Services, 1999. Adding value through recognition schemes. Pay and Benefits Bulletin, 464, January.
20. Romero, J. and Kleiner, B. H., 2000. Global trends in motivating employees. Management Research News, 23(78), pp. 14-17.
21. Lawler, E. E. and Cohen, S. G., 1992. Designing pay systems for teams. ACA Journal, 1, pp.6-19.
22. Michigan Municipal Worker' Compensation Fund, 2014. Safety Incentive Programs. [online]. Available from: http://www.mml.org/insurance/shared/publications/s_and_h_manual/3G.pdf. Accessed 03 February 2014.
23. Alabama Municipal Insurance Corporation, 2014. Successful Safety Incentive Programs. [online]. Available from: http://www.amicentral.org/Loss%20Control/reference/Safety%20Incentive%20Programs.pdf. Accessed 03 February 2014.
24. Labar, G., 1997. Awards and incentives in action. Occupational Hazards, 59(1), pp. 91-92.
25. Laws, J., 1996. The power of incentives. Occupational Health & safety. 65(1), pp. 24-30.
26. Shu, Z., Xiuzhi, S. and Shu, Y., 2011. Safety incentives for labor workers in state-owned mine enterprises in China. Procedia Engineering, 269(2011), pp. 2230-2238.

27. Goodrum, P. M. and Gangwar, M., 2004. Safety incentives: a study of their effectiveness in construction. Professional Safety, July 2004, pp. 24-34.
28. Smith, S., 2012a. Safety Incentives: It's Not Just a Breakfast Anymore. EHSToday. [online]. Available from: http://ehstoday.com/safety/incentives/ehs_imp_35557. Accessed 19 January 2014.
29. Henrich, H. W., 1941. Industrial Accident. Preventian: A Scientific Approach, 2nd edn. McGraw-Hill: London.
30. Wagenaar, A. W. and Groeneweg, J., 1987. Accidents at sea: Multiple causes and impossible consequences. International Journal of Man-Machine Studies, 27(5–6), pp. 587–598.
31. Prichard, R., 2001. Safety incentive programs: A critical assessment. Insurance & Risk, April 2001. [online]. Available from: http://www.irmi.com/expert/articles/2001/prichard04.aspx. Accessed 03 February 2014.
32. Esitikot, E. L., 2013. Impact of behaviour-based safety on effectiveness of health and safety management. PgD. management report, Robert Gordon University.
33. Potter, D. and Potter, C., 2007. The truth about safety incentives. EHSToday. [online]. Available from: http://ehstoday.com/print/mag/truth_safety_incentives. Accessed 08 February 2014.
34. Marlow, P., 2003. Literature review on the value of target setting. Derbyshire: Health and Safety Laboratory
35. Simpson, A. G., 2012. Do safety incentives discourage workers from reporting injuries? Insurance Journal, May 10, 2012
36. Chan MW, Chan PC. Empirical study of the risks and difficulties in implementing guaranteed maximum price and target cost contracts in construction. J Constr Eng Manag 2010;(136):495e507. ASCE.
37. Hasan A, Jha KN. Safety incentive and penalty provisions in Indian construction projects and their impact on safety performance. Int J Inj Contr Saf Promot 2013;20(1):3e12.
38. Ahmed I, Shaukat MZ, Usman A, et al. Occupational health and safety issues in informal economic segment of Pakistan: a survey of construction sites. Int J Occup Saf Ergon 2017;24(2):240e50.
39. Øyvind Dahl, a, ∗ Trond Kongsvik. Safety climate and mindful safety practices in the oil and gas industry. Journal of Safety Research 2018
40. Ishtiaq M, Jehan N, Rehman ZU. Factors associated with occupational injuries in coal miners. J Med Sci. 2014; 22: 21–4
41. Aidoo H, Essuman A, Aidoo P, Yawson AO, Yawson AE. Health of the corporate worker: health risk assessment among staff of a corporate organization in Ghana. J Occup Med Toxicol. 2015; 10(30): 1–6
42. Ibrahim O, Paul N, Jare OHN. Effects of occupational safety and health hazards' exposure on work environment in the water service industry within Kisumu County-Kenya. Journal of Environmental Science, Toxicology and Food Technology. 2017; 11(5): 46-51.
43. Walliman N., 2005. Your Research Project, 2nd edn. Sage Publications: London.