Level of Satisfaction for Occupational Safety and Health Training Activities: A Broad Spectrum Industrial Survey

Muhammad Mujtaba Asad¹, Razali Bin Hassan¹, F. Sherwani², Nor Hida Ibrahim³, Qadir Mehmoood Soomro⁴

¹Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia, Parit Raja Batu Pahat, Johor.
²Faculty of Electrical and Electronics Engineering, Universiti Tun Hussein Onn Malaysia, Parit Raja Batu Pahat, Johor.
³Institut Pendidikan Guru Tun Hussein Onn Malaysia, Batu Pahat, Johor.
⁴OSHTC, Hyderabad, Sindh, Pakistan

E-mail: mujtabasad11@gmail.com

Abstract. The main objective of this research article is to identify the satisfaction level for occupational safety and health training activities among oil and gas drilling crew and staff. In this study, data has been gathered from reputed online oil and gas health and safety social and professional platforms through e-survey questionnaire. Similarly, for data analysis descriptive (Percentage %) and graphical statistical approach has been adopted for the interpretations of research findings by using SPSS 22.0 software. According to the overall findings of this paper, there is a sheer need of effective and sufficient training strategies for safety and health training activities at oil and gas extraction industries. As per respondents, there are also limited open source resources available by oil and gas companies for safety and health awareness and personal protection. Likewise, findings also indicated that, most of the participants of this online survey have reported about the communication gap between administration and drilling workforce for safety and health related issues and discussions which is one of the major causes of accidents and unexpected hazards at drilling sites.

Keywords: Safety and Health, Oil and Gas, Drilling, Training Activities

1. Introduction
Occupational safety and health awareness trainings are one of the effective preventive measures for several industrial hazardous activities [1]. According to previous researchers oil and gas drilling

¹ mujtabasad11@gmail.com
operations is considered as eight times more hazardous than construction industries due to the rate of life threatening injuries [2]. In oil and gas extraction operation, safety, chemical and ergonomic hazard are very common at on and offshore domains. But for the protection of drilling workforce all companies use to provide appropriate trainings to drilling crew prior to performing certain task such as handling drilling fluid training, chemical safety training, drilling pipes lifting training and well control training activities according to Occupational safety and health regulations [3]. As per OSHA US from Year 2003-2010, 823 drilling workers have been died during performing their tasks at oil and gas drilling section in United Stated of America [4]. According Caldwell, accidents usually occur during oil and gas extraction operation is due to lack of safety trainings, lack of communication and equipment maintenance. Correspondingly, in this paper researchers have conducted an online survey on renowned oil and gas safety and health online platforms and discussion forums for identifying the oil and gas drilling crew level of satisfaction regarding suitable safety training activities and safety resources from oil and gas.

2. Problem Statement

According to US Federal statistical report in year 2006-2010 more than 1200 oil and gas drilling crew were injured and 41 crew workers lost their lives in the Gulf of Mexico [5]. Likewise, in BP Deepwater Horizon explosion 11 fatalities and several injuries were reported due to insufficient emergency and well control monitoring trainings [6]. Likewise, in past few years due to the rapid industrial need for drilling crew at on and offshore sites some oil and gas industries recruited fresh and untrained drilling crew staff at on and offshore sites [6]. Therefore, the combined fatality rate for onshore and offshore oil and gas extraction was 27.1 per 100,000 full-time workers, compared with a rate of 3.8 for all U.S [7-8]. Hence, to examine the satisfaction level of drilling crew for safe and secure drilling operation this research have been conducted through online survey to provide a broad spectrum of safety and health training activities at oil and gas drilling sites in the perspective of workers contentment.

3. Objective

The aim of this study is to achieve following research objective:

a. To identify the drilling crew level of satisfaction for occupational safety and health training activities at oil and gas industries.

4. Methodology

In this study, data has been analyzed by using SPSS version 22.0 software to determine the percentage for every question item from distribute qualitative instrument. Descriptive method percentages (%) of every item has been used for analyzing the drilling crew level of satisfaction for sufficient health and safety training activities. According to Asian marketing research, the Internet based data collection from distant respondent is determined to be the most sufficient and reliable (Asia Marketing Research, Internet Usage, Population Statistics, & Facebook Information, 2012). Data for this study has been collected from 75 health and safety experts through different online oil and gas drilling (offshore and onshore domains) forums.

5. Results and Findings

In this study, demographic results have been illustrated as per respondent’s industry, origin, gender and designation as oil and gas health and safety professional. Likewise identification of level of satisfaction of drilling crew for safety training activities has been reported in percentage.
5.1 Study Respondents Based Gender

Respondents of this study are 75 health and safety practitioners and crew from oil and gas drilling industries. The collected data has been analyzed by using Statistical Packages for Social Sciences (SPSS 22). In table 1 shown the number of respondents and percentage based on respondent’s gender. For this study, 68 respondents were male which carrying 91%. Meanwhile, only 7 female respondents were involved in this study which is equal to 9%.

| Gender  | Number of Respondent | Percentage (%) |
|---------|----------------------|----------------|
| Male    | 68                   | 91             |
| Female  | 7                    | 9              |
| Total   | 75                   | 100            |

5.2 Study Respondents Based on Origin

Similarly, table 2 shows the number of respondents and percentage based on respondent’s origin. For this study 12 respondents were from Europe, 17 from Asia, 03 from North America and 41 from Middle East which is carrying highest overall percentage 55%.

| Origin             | Number of Respondent | Percentage (%) |
|--------------------|----------------------|----------------|
| Europe             | 12                   | 16             |
| Middle East        | 41                   | 55             |
| Asia               | 17                   | 22             |
| North America      | 3                    | 4              |
| Australia          | 2                    | 3              |
| Total              | 75                   | 100            |

5.3 Study Respondents Based on Designation

Likewise, table 3 shows the number of respondents and percentage based on respondent’s designation. In this study, 20 respondents were safety officers, 11 were manger, 10 were supervisor and 34 were drilling crew which is carrying highest percentage 45%.

| Designation       | Number of Respondent | Percentage (%) |
|-------------------|----------------------|----------------|
| Drilling Crew     | 34                   | 45             |
| Safety Officer    | 20                   | 27             |
| Manager           | 11                   | 15             |
| Supervisor        | 10                   | 13             |
5.4 Study Respondents Based on Type of Industry
Lastly, table 4 shows the number of respondents and percentage based on respondent’s type of industry. For this study, 34 respondents were working in offshore oil and gas industry and 41 were working in onshore oil and gas industry which is carrying the highest percentage 55%.

Table 4. Sprinkling of Respondents Based on type of Industry

| Industry | Number of Respondent | Percentage (%) |
|----------|----------------------|----------------|
| Offshore | 34                   | 45             |
| Onshore  | 41                   | 55             |
| Total    | 75                   | 100            |

5.5 Response on Encouragement for Safety Training
Participant of this study responded on first query of questionnaire which was about “Did safety manager encourage their employees to attend outside safety training programs regarding drilling hazards?” 75% of them said that safety manager didn’t encourage their employees to attend outside safety training programs regarding drilling hazards as shown in table 5.

Table 5. Table for Safety Manager Encouragement for Training

| Did safety manager encourage their employees to attend outside safety training programs regarding drilling hazards? | Response | Number of Respondent | Percentage (%) |
|-------------------------------------------------------------------------------------------------------------|---------|----------------------|----------------|
| YES                                                                                                         | 19      | 25                   |
| NO                                                                                                          | 56      | 75                   |
| Total                                                                                                       | 75      | 100                  |

5.6 Response on Updated Safety Material Provided
Research participant responded on second query of questionnaire which was about “Did you company provide you updated material for safe drilling operation?” 79% of them said that the company didn’t provide updated material for safe drilling operation as indicated in table 6.

Table 6. Table for Updated Safety Material Provided

| Did you company provide you updated material for safe drilling operation? | Response | Number of Respondent | Percentage (%) |
|------------------------------------------------------------------------|---------|----------------------|----------------|
| YES                                                                    | 16      | 21                   |
5.7 Response on Conducting Safety Meeting with Employees
Study participants responded on third query of questionnaire which was about “Did your supervisor conduct safety meetings with employees?” 88% of them said that the supervisor didn’t conduct safety meetings with employees as specified in table 7.

Table 7. Table for Conducting Safety Meeting with Employees

| Response | Number of Respondent | Percentage (%) |
|----------|----------------------|----------------|
| YES      | 09                   | 12             |
| NO       | 66                   | 88             |
| Total    | 75                   | 100            |

5.8 Response on Safety Talk
Participants responded on fourth query of questionnaire which was about “Did safety officer talk to their employees at least once a quarter regarding safety and health issues during drilling process?” 73% of them said that the safety officer didn’t talk to their employees at least once a quarter regarding safety and health issues during drilling process as shown in table 8.

Table 8. Table for Response on Safety Talk

| Did safety officer talk to their employees at least once a quarter regarding safety and health issues during drilling process? | Number of Respondent | Percentage (%) |
|-----------------------------------------------------------------------------------------------------------------|----------------------|----------------|
| YES                                                                                                               | 20                   | 27             |
| NO                                                                                                                | 55                   | 73             |
| Total                                                               | 75                   | 100            |

5.9 Response on Organizing Hazard Assessment Program
Participants responded on fifth query of questionnaire which was about “Has your organization developed an effective ergonomics program that includes hazard assessments and supervisory and employee training?” 53% of them said that the organization didn’t developed an effective ergonomics program that includes hazard assessments and supervisory and employee training as indicated in table 9.

Table 9. Table for Organizing Hazard Assessment Program

| Has your organization developed an effective ergonomics program that includes hazard assessments and supervisory and employee training? | Number of Respondent | Percentage (%) |
|-------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|
5.10 Response on Demonstration of Safety Regulation

Respondents of this study responded on sixth query of questionnaire which was about “Did your safety officer demonstrate international health and safety rules and regulation during training?” 83% of them said that the safety officer didn’t demonstrate international health and safety rules and regulation during training as shown in table 10.

| Did your safety officer demonstrate international health and safety rules and regulation during training? | Response | Number of Respondent | Percentage (%) |
|------------------------------------------------|----------|----------------------|----------------|
| YES                                             | 13       | 17                   |                |
| NO                                              | 62       | 83                   |                |
| Total                                           | 75       | 100                  |                |

Table 10. Table for Demonstration of Safety Regulation

5.11 Response on New Worker Training

Participants responded on seventh query of questionnaire which was about “Did supervisor conduct/coordinate new employee safety orientation training?” 92% of them said that the new employees didn’t get any safety orientation training specified in table 11.

| Did supervisor conduct/coordinate new employee safety orientation training? | Response | Number of Respondent | Percentage (%) |
|--------------------------------------------------------------------------|----------|----------------------|----------------|
| YES                                                                      | 6        | 8                    |                |
| NO                                                                       | 69       | 92                   |                |
| Total                                                                    | 75       | 100                  |                |

Table 11. Table for New Worker Training

5.12 Response on Use of Multimedia Technology for Training

Participants responded on eighth query of questionnaire which was about “Does your company use any multimedia technology for safety training?” 55% of them said that that company didn’t use any multimedia technology for safety training as shown in table 12.

| Does your company use any multimedia technology for safety training? | Response | Number of Respondent | Percentage (%) |
|---------------------------------------------------------------------|----------|----------------------|----------------|
| YES                                                                  | 34       | 45                   |                |

Table 12. Table for Use of Multimedia Technology for Training
5.13 Response on E-Learning Resources
Participants responded on ninth query of questionnaire which was about “Did your company provide updated E Learning resources for health and safety awareness to drilling crew?” 68% of them said that that company didn’t provide updated E Learning resources for health and safety awareness to drilling crew as shown in table 13.

| Response | Number of Respondent | Percentage (%) |
|----------|----------------------|----------------|
| YES      | 24                   | 32             |
| NO       | 51                   | 68             |
| Total    | 75                   | 100            |

Table 13. Table for E-Learning Resources

5.14 Response on Attending Safety Programs
Participant of this study responded on tenth query of questionnaire which was about “Did drilling crew attend all required safety training programs?” 77% of them said that the drilling crew didn’t attend all required safety training programs as indicated in table 14.

| Response | Number of Respondent | Percentage (%) |
|----------|----------------------|----------------|
| YES      | 17                   | 23             |
| NO       | 58                   | 77             |
| Total    | 75                   | 100            |

Table 14. Table for Attending Safety Programs

5.15 Response on Coordinate Regulatory Compliance Training
Health and safety practitioners responded on first query of questionnaire which was about “Did supervisor coordinate regulatory compliance training activities?” 72% of them said that the supervisor didn’t coordinate regulatory compliance training activities as indicated in table 15.

| Response | Number of Respondent | Percentage (%) |
|----------|----------------------|----------------|
| YES      | 21                   | 28             |

Table 15. Table for Coordinate Regulatory Compliance Training
5.16 Response on Vestibule Training Based Safety System
Participants responded on twelfth query of questionnaire which was about “Did your company provide you vestibule training based safety system for drilling process?” 75% of them said that the company didn’t provide vestibule training based safety systems for drilling process. as shown in table 16.

**Table 16. Table for Vestibule Training Based Safety System**

| Did your company provide you vestibule training based safety system for drilling process? | Response | Number of Respondent | Percentage (%) |
|----------------------------------------------------------------------------------------|----------|----------------------|----------------|
| YES                                                                                    | 19       | 25                   |
| NO                                                                                     | 56       | 75                   |
| Total                                                                                  | 75       | 100                  |

5.17 Response on Training Program Include Inspections
Health and safety drilling crew responded on first query of questionnaire which was about “Does the safety training program include inspections of different area?” 87% of them said that the safety training program didn’t include inspections of different area as specified in table 17.

**Table 17. Table for Training Program Include Inspections**

| Does the safety training program include inspections of different area? | Response | Number of Respondent | Percentage (%) |
|------------------------------------------------------------------------|----------|----------------------|----------------|
|                                                                        | YES      | 10                   | 13             |
|                                                                        | NO       | 65                   | 87             |
| Total                                                                  | 75       | 100                  |

5.18 Response on Conducting Training on Accident Investigation
Health and safety professionals responded on fourteenth query of questionnaire which was about “Is your company currently conducting training on accident investigation during drilling?” 57% of them said that the company currently conducting training on accident investigation during drilling as indicated in table 18.

**Table 18. Table for Conducting Training on Accident Investigation**

| Is your company currently conducting training on accident investigation during drilling? | Response | Number of Respondent | Percentage (%) |
|--------------------------------------------------------------------------------------------|----------|----------------------|----------------|
|                                                                                           | YES      | 32                   | 57             |
|                                                                                           | NO       | 43                   | 43             |
5.19 Response on Receive Annual or Refresher Training
Health and safety practitioners responded on first query of questionnaire which was about “Do employees receive annual and/or refresher training when required by a particular OSHA standard?” 64% of them said that the employees receive annual and/or refresher training when required by a particular OSHA standard as shown in table 19.

| Response | Number of Respondent | Percentage (%) |
|----------|----------------------|----------------|
| YES      | 27                   | 36             |
| NO       | 48                   | 64             |
| Total    | 75                   | 100            |

6. Conclusion

According to the overall result analysis of health and safety training activities in drilling process shows that, there is a lack of professional safety training and updated useful E-learning material for reducing workplace risk and hazards in oil and gas industries. From the result shown in figure 1, it’s understandable that many of oil and gas safety officials ignore the safety detail demonstration of safety precautions during well drilling, and resultantly many accidents and critical injuries has been reported. Based on the response from this research, there is also lack of effective training programs and learning resources for drilling crew safety awareness. As per the response from participants, clarify that the safety providers need to motivate and encourage their employees to attend safety training programs regarding drilling hazards with vestibule training based safety system exposure.

![Figure 1. Overall Results](image-url)
Acknowledgment

This paper was partly sponsored by the Centre of Graduate Studies (CGS) of Universiti Tun Hussein Onn Malaysia (UTHM).

References

[1] Demirkesen S, Arditi D. Construction safety personnel's perceptions of safety training practices. International Journal of Project Management. 2015 Jul 31;33(5):1160-9.

[2] Akinremi TA, Anderson R, Olomolaiye A, Adigun L. Risk Management as an Essential Tool for Successful Project Execution in the Upstream Oil Industry. In Abu Dhabi International Petroleum Exhibition and Conference 2015 Nov 9. Society of Petroleum Engineers.

[3] Witter RZ, Tenney L, Clark S, Newman LS. Occupational exposures in the oil and gas extraction industry: State of the science and research recommendations. American journal of industrial medicine. 2014 Jul 1;57(7):847-56.

[4] Caldwell B, Hinton J. Data Drilling: Changing the Way the Oil and Gas Industry Manages Safety and Risk. In SPE E&P Health, Safety, Security and Environmental Conference-Americas 2015 Mar 16. Society of Petroleum Engineers.

[5] Norazahar N, Khan F, Veitch B, MacKinnon S. Human and organizational factors assessment of the evacuation operation of BP Deepwater Horizon accident. Safety science. 2014 Dec 31;70:41-9.

[6] Asad MM, Hassan RB, Soomro QM, Sherwani F. Development of KBES with Hazard Controlling Factors and Measures for Contracting Health and Safety Risk in Oil and Gas Drilling Process: A Conceptual Action Plan. The Social Sciences. 2017;12(3):584-94.

[7] Abualfaraj N. Identifying Potential Exposure Pathways and Estimating Risk from Marcellus Shale Gas Development. Drexel University; 2016.

[8] Mendes PA, Hall J, Matos S, Silvestre B. Reforming Brazil's offshore oil and gas safety regulatory framework: Lessons from Norway, the United Kingdom and the United States. Energy Policy. 2014 Nov 30;74:443-53. Retrieved from: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6216a2.htm
Corrigendum: Level of Satisfaction for Occupational Safety and Health Training Activities: A Broad Spectrum Industrial Survey

J. Phys. Conf. Ser 1049 (2018) 012021

Muhammad Mujtaba Asad¹, Razali Bin Hassan¹, F. Sherwani², Nor Hida Ibrahim³ and Qadir Mehmood Soomro⁴

¹ Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia, Parit Raja Batu Pahat, Johor.
² Faculty of Electrical and Electronics Engineering, Universiti Tun Hussein Onn Malaysia, Parit Raja Batu Pahat, Johor.
³ Institut Pendidikan Guru Tun Hussein Onn Malaysia, Batu Pahat, Johor.
⁴ OSHTC, Hyderabad, Sindh, Pakistan

Page 2:
In the 2. Problem Statement the following text appears:

“According to US Federal statistical report in year 2006-2010 more than 1200 oil and gas drilling crew were injured and 41 crew workers lost their lives in the Gulf of Mexico [5]. Likewise, in BP Deepwater Horizon explosion 11 fatalities and several injuries were reported due to insufficient emergency and well control monitoring trainings [6]. Likewise, in past few years due to the rapid industrial need for drilling crew at on and offshore sites some oil and gas industries recruited fresh and untrained drilling crew staff at on and offshore sites [6]. Therefore, the combined fatality rate for onshore and offshore oil and gas extraction was 27.1 per 100,000 full-time workers, compared with a rate of 3.8 for all U.S [7-8]. Hence, to examine the satisfaction level of drilling crew for safe and secure drilling operation this research have been conducted through online survey to provide a broad spectrum of safety and health training activities at oil and gas drilling sites in the perspective of workers contentment.”

This should read:

“According to US Federal statistical report in year 2006-2010 more than 1200 oil and gas drilling crew were injured and 41 crew workers lost their lives in the Gulf of Mexico [6]. Likewise, in BP Deepwater Horizon explosion 11 fatalities and several injuries were reported due to insufficient emergency and well control monitoring training [5]. Likewise, in past few years due to the rapid industrial need for drilling crew at on and offshore sites some oil and gas industries recruited fresh and untrained drilling crew staff at on and offshore sites [6]. Therefore, the combined fatality rate for onshore and offshore oil and gas extraction was 27.1 per 100,000 full-time workers, compared with a rate of 3.8 for all U.S [7-8]. Hence, to examine the satisfaction level of drilling crew for safe and secure drilling operation this research have been conducted through online survey to provide a broad spectrum of safety and health training activities at oil and gas drilling sites in the perspective of workers contentment.”