

Performance, productivity, and safety & health among employee of oil & gas company in Qatar

Ahmad Syarnubi, Riayadi Andemon Sembiring, Tri Siswaya, Rida Zuraida*

Industrial Engineering Department, Faculty of Engineering, Bina Nusantara University, Jakarta, Indonesia 11480

Corresponding author : rzuraida@binus.ac.id

Abstract. Productivity in some case has relation with safety and health work condition in the company. The nature of the work in some industries are more risky compared to other industries, and oil& gas Company is one of them especially for their field worker. Actually, most of company is very strict in safety supervision because the consequences can be fatal, however som accidents may still experience by workers. The company is not only concern about the safety but also set high performance and productivity on their employee. Employee awareness of how important of those three factors could help company to achieve the goal. In this study, how performance, productivity, safety and health at workplace perceived by operator and supervisor/manager at oil & gas company in Qatar is discussed, and their correlation was measured. A questionnaire consist of 45 questions related to performance, productivity, safety and health, was applied to caputer the perception of oil & gas company's employee who located at 4 sites. There are 212 participants involved in the survey (155 operators, and 57 supervisors/manager). Based on their answer, the study showed that performance and productivity level of the employee can be categorize as high (82% and 85%), while the safety and health level at the company is perceived in good condition (by 86% employee). Using multiple linear regression, significant correlation productivity and performance with safety and health condition is found ($p < 0.05$). In addition, Two Way ANOVA conducted to see the differences perception among age group and years-of-duty group. It revealed the differences exist based on $p < 0.1$. This study showed that employee for each site (Dukhan, Ras Laffan, Doha, and Offshore Umm Said) realizes how the importance of performance, productivity, and safety in work even though the perception may differ among the group.

Keywords: performance, productivity, occupational safety and health, oil & gas company employee

1. Introduction

Performance and productivity of employee become an important part of a company because both are related to the work (output). Both of it requires effort from employees and the company itself to achieve good performance and productivity. The others important aspect besides an effort is occupational safety and health condition. One oil and gas company in Qatar realized that assessment based on how employee perceived it can be useful to improve current conditions. Safety behavior claimed a positive association with safety climate [1]. In a high-risk work environment such as offshore, safety can affect performance, and productivity. Safety behavior become one of effort to



maintain the high performance and productivity by reducing an unexpected accidents, since less accidents means less interruption for operation.

Work performance can define as quality and quantity of work that achieved by an employee in performing in accordance with the responsibilities given to him [2]. Even though it's relatively difficult to measure directly [3] organization have a huge interest in it and develop tools to accommodate the purpose. Work performance can be confused with productivity since both of them often discuss at once [4], yet the company who keep it measure surely will have benefit in long-term. Productivity is the ratio between a measure of output and a measure of input. What the input and output in many circumstances should define by the company [4]. In oil and gas company daily operation, performance and productivity cannot be apart with safety and health topic. Discussion of those topics can be seen in the different direction and measure quantitatively and/or qualitatively.

Every organization specify their objectives and develop a strategy to make sure it achieved. Utilizing the resources including people as the most important one and others kind resources is the way how an organization can survive. Employees are performing different jobs in an organization but the activities that performed by each employee should synchronize to achieve the company objectives. Measurement how the activities in the right track related to performance and productivity. Work productivity is simpler in concept than work performance [3], the differences are including the causal variables and indicators.

Human as a center of discussion for the topics, not really easy to measure. Thus to accompany quantitative measurement, the perception of the certain condition should be considered. In this study how performance, productivity and health & safety perceived by an employee at one of Oil & Gas Company in Qatar is present. This study tried to define the correlation between those aspects and find out whether the demographic (such as age and work period of the employee) affected the perception. Key set of properties on this study tried to fulfill [4] such as objectivity, thus the measurement involving supervisor/manager and measurement conduct at employee level which has similar tasks. Research at oil & gas company in Norwegian showed that the employers developed a good formal health & safety management but gave less attention to daily operation especially on safety representatives [5]. In this research, employee perception related to health and safety in their daily operation also measured.

2. Subject and methods

2.1. A questionnaire

To gather the information for the study, a questionnaire distributed to employee. It consists of 3 parts which measure employee opinion of (1) how they perform in operation daily (2) how productivity their self lately and (3) safety and health. The questionnaire developed based on work performance and productivity theory [3][4][6] and occupational safety and health policy [7][8][9]. Perception of how the employee values their quality, quantity, reliability, attendance, and ability to work as a team is the measurement of work performance. While work output, standard achievement, and time management was a measure to define work productivity. For safety and health perception, an understanding of occupational safety and health and incident/accident prevention is measure. For all 40 questions, Likert scale 1-5 is applied to measure the opinion (1: strongly disagree- 5: strongly agree).

2.2. Participants

Participants in this study are the employee at oil & gas company in Qatar who come from 4 different work locations with total employee 450. Based on confidence level 95%, 212 participants involved in the survey (155 operators, and 57 supervisors/manager; 99% male and 1% female; Age 30-59 years old; work period 1-20 years).

2.3. Analysis

Participant's perception calculated to define whether they perceived the performance & productivity as low, medium or high. It calculated using the equation below [8]:

$$X < (\mu - 1.0 \sigma) \quad : \text{low} \quad (\text{E.1})$$

$$(\mu - 1.0 \sigma) \leq X < (\mu + 1.0 \sigma) \quad : \text{medium} \quad (\text{E.2})$$

$$(\mu + 1.0 \sigma) \leq X \quad : \text{high} \quad (\text{E.3}) \text{ with } X = \text{total answer}$$

To define correlation between work performance, work productivity and health & safety, multiple regression was conducted. The further analysis done to find out whether the demographic (such as age and work period of employee) affected the employee's perception on safety & health variable. Based on *p-value* 0.05 and 0.1 the significant different level was interpreted.

3. Result and analysis

3.1. Result

Based on the questionnaire result, work performance and productivity classify into 3 categories: high, medium, and low. The work performance measurement result showed that there is 86.32% of employee valued their performance as as high, 11.32% as medium and only 2.36% is low. This result indicated that most of the employee value their work quality, quantity, reliability, absence, and ability to work as a team was high (see Table 1). Most of the employee agree to strongly agree about their ability to perform a certain action according to the statement in the questionnaire.

Table 1. Work performance perception result

Indicator	Statement	strongly disagree %	disagree %	quite agree %	agree %	strongly agree %
Quality	Finish the job based on work standard and SOP	2.4	1.4	8.0	50.5	37.7
	Finish the job quickly and correctly according to deadline	2.4	1.4	10.4	56.6	29.2
	Revision or counsel from superiors was very rare	1.4	4.2	11.8	59.4	23.1
Quantity	Able to finish all the given tasks	2.4	1.9	16.0	54.7	25.0
	Achieve all the job target	2.4	0.5	10.4	56.6	30.2
	Able to finish the job well and on time	2.4	0.9	10.8	54.7	31.1
Reliability	Skills and work ability meet the organization's requirement	2.8	0.5	7.5	55.7	33.5
	Able to involve in most organization activities	1.4	3.3	21.2	47.6	26.4
	Able to complete the tasks and responsibilities of the organization	1.9	0.5	8.5	56.1	33
Attendance	The attendance of work hours follow organization rule	1.4	1.4	6.6	46.7	43.9
	Able to attend for any emergency situation of organization	1.9	2.4	13.2	50.5	32.1
	Willing to cover an absent co-worker	3.8	2.4	14.2	53.8	25.9
Work as a team	Able to work as a team and build good relationships with co-worker and superiors	2.4	1.4	5.2	51.4	39.6
	Able to work as good team player	2.4	1.4	2.8	45.8	47.6
	Able to coordinate with various	1.9	2.4	4.7	52.4	38.7

parties that related with
organization

Note: Source of questionnaire Bernardin & Russel (1993), IZA Labor (2016) and Koopmans et al (2011)

Work productivity measured using 15 questions about work output, standard achievement, and time management. The result showed that most employees perceived their productivity as medium to high. There are 82.08% employees with total answers categorized into high productivity, 15.57% as medium and only 2.36% as low. This result can interpret that most employee productivity was high. Most of the employee agree to strongly agree with their ability to perform a certain action according to the statement in the questionnaire (see Table 2).

Table 2. Work productivity perception result

Indicator	Statement	strongly disagree %	disagree %	quite agree %	agree %	strongly agree %
Work output	All the job was done as requested	2,8	0.9	7.1	43.4	45.8
	The job was finish under current resources	2.8	8.5	25.5	41	22.2
	As much as any work. the job was finished	7.1	17	26.4	31.1	18.4
	Willing to help any colleagues when it needed	2.4	1.4	6.6	52.8	36.8
	Able to learn fast and adapt with new condition or tasks	1.4	2.8	9.4	50.9	35.4
Standard achievement	Well receive of input and suggestion regarding their work result	1.9	2.4	11.3	45.8	38.7
	Expert on the job	2.4	0.9	6.1	40.6	50
	Tasks complete according to organization standard	1.9	1.4	3.8	53.8	39.2
	Follow quickly the nature of new tasks and complete it as requested	1.4	0.9	11.3	60.4	25.9
	Work precise. accurate and fast	1.9	0.9	11.3	54.2	31.6
Time management	Attend and be in the workplace according to the specified working hours	2.4	0.9	5.2	36.8	54.7
	Able to provide services according to the time specified	1.9	1.9	8	48.1	40.1
	Able to complete work on time	1.9	0.9	12.3	46.2	38.7
	New tasks does not affect the speed of the completing tasks	2.8	10.8	28.3	41.5	16.5
	Distance to workplace does not affect to present in the office on time	5.2	2.8	16	37.7	38.2

Note: Source of questionnaire Bernardin & Russel (1993), IZA Labor (2016) and Koopmans et al (2011)

Safety and health related to policy and incident/accident prevention measured using 10 questions. The result showed that most employees perceived the application of OSH at company is medium to

high. There are 86.32% employees with total answers categorized into high, 9.91% as medium and only 3.77% employee perceived the OSH application at company is low. The categorization is carried out based on E1-E3. The result of questionnaire can see at Table 3:

Table 3. OSH in the company

Indicator	Statement	strongly disagree %	disagree %	quite agree %	agree %	strongly agree %
Health & Safety Policy	The organization specify occupational safety and health policies and ensure the commitment to the implementation of OSH management system	2.4	1.9	4.7	39.2	51.9
	The organization plans the implementation of occupational safety and health in accordance with the policy	2.8	0.5	6.1	41.5	49.1
	The organization applies effective occupational OSH policies by developing the capabilities and supporting mechanisms needed to achieve policies, objectives and the targets.	2.8	1.4	8.5	46.2	41.0
	The organization measures, monitors, and evaluates OSH's performance and takes corrective and preventive actions	2.8	2.8	6.1	45.3	42.9
	The organization regularly reviews and improves the implementation of the OSH management to improve OSH's performance	3.3	0.9	8.0	42.9	44.8
Prevention Incidents/ Accident	The organization reduces unsafe working conditions continually	3.3	1.4	9.0	45.3	41.0
	The organization reduces unsafe work behavior	3.8	1.4	8.5	47.2	39.2
	The organization chooses workers who have a good work attitude	2.8	2.4	17	41	36.8
	The organization conducts OSH training regularly	2.8	5.2	12.3	44.3	35.4
	The organization conducts OSH inspections and motivate employee continuously	1.9	2.8	14.2	45.8	35.4

Note: source of questionnaire Ridley, J. 2008 & Sedarmayanti 2009

3.2. Analysis

Multiple linear regression conducted to test the hypothesis in the study. Hypothesis testing is conducted to determine the effect of dependent variables (occupational safety and health) on independent variables (employee performance and work productivity). The analysis result F of 152.292 that significant at p value = 0.05. It can be concluded that there is a significant influence between all independent variables (employee performance and work productivity) with the dependent

variable (occupational health and safety). This shows that employee performance and work productivity together affect worker safety and health.

Partial effect between the variables of employee performance and work productivity on occupational safety and health conducted using t-test. The test showed that partially employee performance variables have a significant influence on occupational health and safety (t value =6.900) while the variable work productivity has no influence on occupational health and safety (t value = 1.054). Based on *unstandardized coefficients* the following linear regression equation is formed:

$$Y = a + \beta_1 X_1 + \beta_2 X_2$$

$$Y = 4,185 + 0,530 X_1 + 0,081 X_2$$

From the equation above, it can be concluded the influence of independent variables, employee performance (X1) and work productivity (X2) on occupational health and safety (Y), are:

- If the employee's performance (X1) is positive with the assumption that work productivity (X2) is fixed then work safety and health (Y) will be positive, or vice versa.
- If work productivity (X2) is positive with the assumption of employee performance (X1) then occupational safety and health (Y) will be positive, or vice versa.

Data of incident and accident in 2017 collected from 4 different work locations showed zero data for fatality, still near miss, damage/loss and road traffic accident happens quite often (Table 5).

Table 4. Incident and accident frequency (2017)

Descriptions	Work location			
	Dukhan	Ras Laffan	Doha and Offshore	Umm Said
Fatality	0	0	0	0
Near Miss	72	69	53	58
Damage / Loss	36	30	27	32
Road Traffic Accident	35	24	8	30

Further analysis carried out to define whether age and year-of-duty affected the employee's perception on safety & health variable using two way ANOVA. The result showed there were significantly influence of both demographic aspect to safety & health perception (R squared = 62%). The age and year-of-duty partially have effect on occupational safety and health (p value <0.1). This result suggested that to minimize incident and accident frequency, those factors should be considered by the company. The treatment such as refreshment training, work rotation, review employee leave policy and others may applied to overcome the problem.

3.3. Study limitation

This study gives strong result about the relationship between performance, productivity and Safety & Health based on employee perception. The number of the participant was sufficient according to the total number employed at the company. However, comparison with accident/incidents of similar company should be used to generalize the result.

4. Conclusion

Self-perception of employee performance based on aspects of quality, quantity, reliability, attendance, and work as a team show a high level of 86.32%. Perceptions of work productivity based

on the aspect of work output, standard achievement and time management also showed a high level with a percentage of 82.08%. Similarly, occupational safety and health based on OHS management aspects and prevention of workplace accidents also shows a high level of 82.08%.

The relationship between employee performance, work productivity, and occupational safety and health were indicated a significant influence between all independent variables (employee performance and work productivity) with the dependent variable (occupational safety and health). Partially, employee performance variables have a significant influence on occupational health and safety while the variable work productivity has no influence on occupational health and safety.

Factors that need to be considered to improve occupational safety and health condition are age factor and the operator/technician years-of-duty. Based on the two-way ANOVA test, the results showed those factors have an influence on occupational safety and health. The technician or operator who works in the field should be in a healthy and fit physical condition to carry out the duties and responsibilities properly. Regularly employee's fitness for duty assessment will help company to determine whether the employee in good condition to perform their tasks, especially for a certain age group. Assessment of motivation level among employee with certain duty-period also suggested before company formulating improvement of working condition.

References

- [1] Dahla Ø and Kongsvik T 2018 Safety climate and mindful safety practices in the oil and gas industry *J. Safety Research*, Vol **64** 29-36
- [2] Bintoro, Daryanto 2017 *Manajemen penilaian kinerja karyawan* (Management of employee performance appraisal) Publisher Gava Media, Yogyakarta Indonesia
- [3] Koopmans L, Bernaards CM, Hildebrandt VH, Schaufeli WB, de Vet HCW, and van der Beek AJ 2011 Conceptual frameworks of individual work performance a systematic review *JOEM* Vol. **53**
- [4] Sauermann J 2016 Performance measures and worker productivity Choosing the right performance measures can inform and improve decision-making in policy and management *IZA World of Labor* : 260
- [5] Hovdena J, Lieb T, Karlsenc J E, and Alteren B 2008 The safety representative under pressure. A study of occupational health and safety management in the Norwegian oil and gas industry *Safety Sci.* Vol **46** (3) 493-509
- [6] Bernardin J H., Russel JEA 1993 *Human Resources Management: An Experimental Approach* Gramedia Pustaka Jakarta Indonesia
- [7] Sedarmayanti 2009 *Tata kerja dan produktivitas kerja* (Work standardization and productivity) Publisher Mandar Maju Bandung Indonesia
- [8] Ridley, J. 2008. *Keselamatan dan kesehatan kerja (Ikhtisar)* (Occupational safety and health a summary) Erlangga Jakarta Indonesia
- [9] Goetsch D.L., 2008 *Occupational safety and health for technologists, engineers, and managers*, 6th Edition, Pearson