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Analysis of the perception of occupational accident in mining and quarry sector towards safe and healthy working environment

Nur Azlina Abd Rahman^{1*}, Ahmad Rasdan Ismail² and Muhamad Arifpin Mansor¹

¹Faculty of Technology, Universiti Malaysia Pahang, 26300 Gambang, Pahang, Malaysia

²Faculty of Creative Technology and Heritage Universiti Malaysia Kelantan Beg Berkunci 01, 16300 Bachok, Kelantan, Malaysia

*Corresponding author

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A B S T R A C T

The occurrence of occupational accidents and incidents are increased in parallel of growth of the industries such as mining and quarry. The main objective of this study is to analyze data on the perception of occupational accident in the mining and quarry sector in Malaysia. The data were collected and were examined from the questionnaires on the level perception of accident investigation in mining and quarry sector. Statistics reported by the Department of Occupational Safety and Health (DOSH) were also be reviewed. The findings of this study prove that, the level of perception of workers towards occupational accident issues in mining and quarry sector is still in moderate level which is the mean was 3.28. Besides that, most of them shows that they are agree on any accident occurrence in their workplace which is about 51.7% and 25.9% of them are totally agree. Only 1.7% of them did not aware on any accident occurrence in their workplace. Employers and employees must have the responsibilities to prevent accident by adapt to the health and safety practices in the workplace.

Introduction

Nowadays, workplace accident occur every day and it became worst and known to be a major concerned in almost all types of industry. In Malaysia, each of the sectors has its own occurrence of accidents involving fatalities, injuries which include permanent disabilities and non-permanent disabilities. Most sectors such as manufacturing, construction and agriculture industry, there are highest recorded number

of accident reported. Hence, there are a lot of previous study highlighted the characteristics (1,2) causes (3,4) and the rate of accident in those sectors (5) but there have been lack of study for other sector such as mining and quarry sector.

In Malaysia, the number of occupational accident occurrence in mining and quarry sector still in good condition and is not too

serious when compared to other sector such as manufacturing , agricultural and forestry and construction sector which recorded the highest number of occupational accident in year 2013. However, based on the occupational accident statistics (6) by Department of Occupational Safety and Health (DOSH), Malaysia (Table 1), it is clearly shown that manufacturing, construction and agricultural, forestry, logging and fishing sectors which is known as the biggest sector which contributed to the largest economic growth gave the highest number of accident which caused death, non-permanent disability and permanent disability. Many research studies were highlighted to these three sectors on this statistical occupational accident. However, there is lack of study in mining and quarrying sectors which mining and quarrying also known as the bigger sectors which provide larger income to economic growth and it is also a risky occupational industry

Mining and quarrying industry have its own laws and policies that were enacted by the government as the steps to encourage mining such as introducing new mining and quarrying laws. The laws and policies that covered the mining and quarrying activities are the Mineral Development Act 1994, the State Mineral Enactment, the Mineral Development Act 525 of 1994 and the Quarrying Rules under the National Land Code. In the Mineral Development Act 525 of 1994, this Act defines the power of the Federal Government for inspection and regulation of mineral exploration and mining and other related issues.

Mining and quarry is not a higher ranking sector which always known to be the main contributor to the accident rate in industry yet mining remain as one of the most hazardous occupations. A study form Lirong. W. et al. (7) briefly describe the overview on the safety record of the mining industry.

Table.1 Occupational Accident Statistics by Sector

Occupational Sectors	Number of victims		
	Death (D)	Non Permanent Disability (NPD)	Permanent Disability (PD)
Manufacturing	47	1007	93
Mining and Quarrying	1	17	0
Construction	36	55	9
Agricultural, Forestry, Logging and Fishing	26	286	9
Utility	0	65	0
Transport, storage and Communication	7	54	1
Wholesale and Retail Trade	3	54	5
Hotel and Restaurant	0	7	1
Financial, insurance, Real Estate and Business Services	0	48	1
Public Services and Statutory Bodies	0	50	0

Sources: Department of Occupational Safety and Health (DOSH), Malaysia

There is a decreasing trend in the fatalities rate from 90 fatalities in 1999 to 53 in 2008. However this trend should not be considered as the indication of safety improvements in this industry because this is only temporary decrease in the number of fatalities because of the higher risk of this industry itself which will have higher possibility to accident occurrence. The analytical study of occupational accident is the initial key for illustrating and evaluating the evolutions of the rules and regulation in the mining and quarrying sector pertaining to the implementation of prevention rules.

As mentioned, preventive measures could be applied based on the analysis of occupational accident. Therefore, the major goal of this study is to analyze data on the perception of occupational accidents in mining and quarry industry in Pahang in order to get the clues that would support the strategies for the accident prevention toward safe and healthy working environment.

Materials and Methods

In the descriptive study, occupational accident is defined as an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work which results in one or more workers

incurring a personal injury, disease or death (8). The aim of this paper is to determine the perception among the workers on the accident investigation in mining and quarrying industry.

A questionnaire was used as a method for the data collection. The questionnaire consists of four parts which all this five part will present the level of safety practices that have been implemented by the quarry and mining. Part A comprises of the questions regarding the level of safety awareness at the quarry and mining, part B comprises of the questions on the level of perception of workers knowledge on safety and health at workplace, Part C is about perception of carrying out safety and health programme by workers at the workplace, and part D is about the accident investigation in the workplace.

Total 58 samples questionnaires were taken among the quarry and mining company throughout east coast Malaysia. So far this study method has been applied by using a set of Likert –type scales multiple choice items (9). The questionnaires were distributed to the subjects individually. Each company was given 50 questionnaires and were collected after 5 working days.

Table.2 Range of mean for safety and health practice

Scale	Lower range	Upper range	Range of mean	Level of practice
1	0	$\frac{2-1}{2} + 1 = 1.5$	0 – 1.5	Very low
2	$\frac{3-2}{2} - 2 = 1.5$	$\frac{3-2}{2} + 2 = 2.5$	1.6 – 2.5	Low
3	$\frac{4-3}{2} - 3 = 2.5$	$\frac{4-3}{2} + 3 = 3.5$	2.6 – 3.5	Moderate
4	$\frac{5-4}{2} - 4 = 3.5$	$\frac{5-4}{2} + 4 = 4.5$	3.6 – 4.5	High
5	$\frac{5-4}{2} - 5 = 4.5$	5	4.6 – 5.0	Very high

The awareness, knowledge and compliance of safety among workers in mining and quarrying industry will indicate the level of safety practice. The data was analyzed by computing the mean of each answer question. The computed mean from respondent's answer were categorized into the categorizing framework as Table 2. The range of mean that form the categorizing framework was calculated based on mid – point method (10). Statistical analysis was done using SPSS software (version 20.0).

Results and Discussions

Reliability measure: Questionnaire reliability was tested using Cronbach alpha (α) as shown in Table 3. Rodeghier (9) found that Cronbach alpha (α) is derived from the average correlations of all the items on the scale. Meanwhile, the reliability test is shown in the Table 4, out of 5 reliability measure have been done 3 had reliability above 0.7. One item had reliability measure at least 0.506. The result indicated that the reliability measures were high for the safety perception among the quarry and mining industry. Table 5 shows the means of safety and health practices in mining and quarry that have been studied in quarry and mining industry. Based on the Table 5 the overall of safety awareness among quarry and mines workers is 3.37 which is at the level of moderate which show that the safety awareness in this industry still not achieve the level of satisfaction. Lack of safety awareness among the quarry and mines workers can cause many problems to occur (11). This study result strengthen that safety awareness is very important in any work since lack of safety awareness may cause accident at workplace.

Based on the Table 5, safety knowledge of quarry and safety workers is 3.31 which also not achieve the satisfaction level.

Knowledge of safety is very important in order to create a safe working environment and increase the awareness of safety. Lacking of knowledge will cause to accident was said by Joy (12), many accident occurs at mines because the mineworkers were unaware of the rules, were aware but did not understand the rules, mistakenly applied the rules, ignored the rules and were poorly trained or lacked sufficient educational background. Another study from Neal et al.(13) believed that safety knowledge is the mediating factor which contributes in creating good safety environment at workplace.

Meanwhile for the safety implementation, the mean is 3.18 which shows that they have implement the element compulsory in Occupational Safety and Health Act (OSHA) 1994. These results reflect their level of compliance towards OSHA 1994 since the questions asked in section of implementation were referred to OSHA 1994. Mekos (14) in his study in Thessaloniki stated that insufficient in rules and regulations keep contributing accident at workplace. Besides, good safety implementation starts with complying with act and regulations (15).

Besides that, for the occupational accident, the mean is 3.28 which are in the moderate level. This results shows that, the workers in mining and quarry have moderate level of knowledge and perception toward the occupational accident issues in their workplace. As previous study claim that employee and employers must have sufficient knowledge and awareness about safety to avoid from any occupational accident (16). Furthermore, occupational accident may be higher if there is low awareness, knowledge and safety implementation in the workplace.

Table.3 Characteristic of the sample

Characteristics	Category	Frequency	Percentage (%)	Mean±SD
Gender	Male	42	72.4	1.28±0.451
	Female	16	27.6	
Age	< 20	1	1.7	31.78±9.030
	20 - 29	30	51.7	
	30 - 39	14	24.1	
	40 - 49	11	18.97	
	>50	2	3.4	
Education	SPM	28	48.3	2.24±1.315
	Sijil	4	6.9	
	Diploma	10	17.2	
	Ijazah	16	27.6	
Position	Employer	16	27.6	1.72±0.451
	employee	42	72.4	

Table.4 Reliability measures using Cronbach's α for tested factors

Tested factors	Cronbach alpha (α)
The level of safety awareness at the quarry and mining	0.829
The perception of workers knowledge on safety and health at workplace	0.506
The perception of carrying out safety and health programme by workers at the workplace	0.892
The level of perception of occupational accident in mining and quarry	0.748

Table.5 Means of all part of the questions

Questions	Means
Awareness	3.37
Knowledge	3.31
Safety implementation	3.18
Occupational Accident	3.28

Table.6 The percentage respondents' distribution on occupational accident of the workers at their workplace

	n	TD (%)	D (%)	NS (%)	A (%)	TA(%)	Mean	SD
I am aware of any accident occurrence in my workplace	58	1.7	3.4	17.2	51.7	25.9	3.97	0.858
I have experience minor and major injury in my workplace within these three month	58	44.8	22.4	17.2	12.1	3.4	2.07	1.197
There are procedures to explain on where and whom to report if any accident occurred	58	13.8	12.1	17.2	41.4	15.5	3.33	1.276
Any incident and accident occurred in my workplace was reported to the top management	58	1.7	1.7	12.1	44.8	39.7	4.19	0.847
Any incident and accident occurred was reported to the Department of Occupational Safety and Health (DOSH)	58	12.1	5.2	15.5	44.8	22.4	3.60	1.242
The top management at my workplace always announces the accident to all workers to make it as the lesson learned	58	1.7	15.5	17.2	44.8	20.7	3.67	1.033
There are first aider team in my workplace to assist during any emergency/ accident	58	12.1	19.0	22.4	34.5	12.1	3.16	1.225
There is a safety campaign conducted by this company to give awareness on accident prevention in workplace	58	15.5	24.1	25.9	29.3	5.2	2.84	1.167

Table 6 shows the analysis made on the perception towards occupational accident through their workplace. Most of them shows that they are agree on any accident occurrence in their workplace which is about

51.7% and 25.9% of them are totally agree. Only 1.7% of them did not aware on any accident occurrence in their workplace. For the next questions, 44.8% of them did not experience any minor and major injury and

only 12.1% agree that they have experience injury during work. However, the injury was just a minor injury which not causes any medical leave. From the distribution of the questionnaire, it is shown that, 41.4% agree on the availability of the procedure to explain on where and whom to report if any accident happen and only 13.8 % shows that they are not aware of the procedures. When accident occurs, about 44.8% of the workers report the accident to the top management, while 1.7% of them did not report to the top management. This might be because the accident was just a minor accident.

From the result also, 44.8% shows that they are agree to report any accident occurrence to the Department of Occupational Safety and Health (DOSH), while 5.2% disagree on the questions. There are also 44.8% of the respondents are agree that the top management at their workplace always announce the accident to all workers as the lesson learned. Meanwhile, 34.5% also agree that there are first aider team in their workplace during any emergency and accident. Other than that, about 29.3% agree that their company conducted a safety campaign to give awareness on the accident prevention in workplace and 15.5% did not agree on that statement. As the conclusion, from this study, most of the respondents were realizing on the issues of occupational accident in their workplace as the mean of all questions shows the moderate value.

Conclusion

Occupational accident in mining and quarry sector was in moderate level which still can be prevented. Therefore, most of the common occupational accident should be prevent with the cooperation from both employers and employee considering it as their responsibility to prevent accident at workplace. Employers are required to performed risk assessment for possible

accident that could occur and adapt necessary method to prevent accident in the health and safety procedures practiced by them. Employees then must strictly follow the health and safety measures adapted by their employers and health to avoid accident at workplace to ensure that they can run the operation effectively and efficiently.

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