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Factors Affecting Safety Action in JOB Pertamina-Medco E&P Tomori Sulawesi

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Abstract

Increasing oil and gas production is one of the main concerns for companies engaged in oil and gas mining. Human behavior related to safety is an approach to analyze what is needed to make the safe action more possible and reduce risky behavior. Therefore, research is conducted on the factors that influence safe behavior so that these factors can be more optimized. This research is a quantitative study with a cross-sectional design. The population in this study amounted to 291 people. Data retrieval is done randomly with a sample of 130 respondents conducted using the simple random sampling method. Bivariate analysis was carried out by the chi-square test. Based on the results of the study, it was found that 63.8% of workers behaved safely, and 36.2% of workers behaved unsafely. Factors that do not affect safe behavior are knowledge, attitude, perception, motivation, age, length of work, availability of PPE, safety regulations, safety promotion, and training. Whereas, the factors that are proven to influence safe behavior are the supervisory role and the role of co-workers. Therefore, the researcher suggested that supervisors play an active role and be monitored regularly and consistently. In addition, care for co-worker needs to be improved through the Safety Observation program.

Keywords: Workers, Oil and Gas Mining, Safe Action, Supervision

Introduction

Increasing oil and gas production is one of the main concerns for companies engaged in oil and gas mining. In order to fulfill the government request through the Special Task Force for Oil and Gas Business Activities (SKK Migas), one effort to increase oil and gas production is by drilling new wells that are considered potential to be produced.

Occupational health and safety are prevention efforts from accidents and protect workers from machines, and work equipment that can cause traumatic injury (Suma'mur, 2012).

Incidents are the culmination of risks that are often not addressed because of a faulty monitoring mechanism (HSE, 2006). The Esso Longford gas explosion and accident at BP Texas City are events

where the death and injury rates are given more attention than the process safety indicators, which causes failure to track important deviations from the parameters associated with the process. Likewise, the zero lost time injury (LTI) at Longford makes the wrong perception that the main hazards in the facility are well managed, which leads to the supervision of clear process hazards (Øien et al., 2011).

Based on the Malaysian HSE research in Borg, the incidence ratio of accidents with a ratio of 1:12:60, where every 60 near miss can result in 12 minor injuries or 1 serious injury (Bernard, 2012).

As we have seen, unsafe acts and unsafe conditions have a greater

influence on the occurrence of accidents. The careful and safe behavior of workers is needed to avoid accidents due to unsafe acts because the approach to workers can be made if the machine is difficult to control. In addition, Galler (2010) estimates that 85% of accidents are the result of unsafe act contributions. This study aims to identify factors related to safe action in JOB Pertamina Medco E & P Tomori Sulawesi.

Method

This type of research is observational analytic. The type of

design used is Cross-sectional. This research was conducted at JOB Pertamina Medco E & P Tomori Sulawesi and carried out in April 2018. The population of this study was 291 field workers. The sample used totaled 130 people.

In this study used observation sheets and questionnaire data collection instruments to measure the factors that influence safety action in the oil and gas industry. The analysis in this study uses the logistic regression test method.

Result

A. Internal Factors

Table 1 The Distribution of respondent based on internal factors

No	Safety Action				Total N	P-Value	
	Internal Factors	Unsafe N	Safe %	Safe n			Safe %
1 Knowledge							
	Low	37	64	21	36	58	0.00001
	High	10	14	62	86	72	
2 Attitude							
	Negative	27	42	37	48	64	0.158
	Positive	20	30	46	70	66	
3 Perception							
	Negative	40	70	17	30	57	0.00014
	Positive	7	10	66	90	73	
4 Motivation							
	Low	39	81	9	19	48	0.0001
	High	8	10	74	90	82	
5 Age							
	≤30.9 yrs	30	38	48	62	78	0.5023
	>30.9 yrs	17	33	35	67	52	
6 Length of work							
	≤ 5 yrs	20	30	47	70	67	0.1229
	> 5 yrs	27	43	36	57	63	

B. External Factors

Table 2 The Distribution of respondent based on external factors

No External Factors	Safety Action				Total N	%	P-Value
	Unsafe		Safe				
	n	%	n	%			
1 Availability of PPE							
Unavailable	24	42	33	58	57	100	0.2120
Available	23	31	50	69	73	100	
2 Safety Regulations							
Unavailable	28	62	17	38	45	100	0.000
Available	19	22	66	78	85	100	
3 Safety Training							
Rare	25	43	32	57	57	100	0.1061
Often	22	30	51	70	73	100	
4 Health Promotion							
Rare	36	64	20	36	56	100	0.0001
Often	11	15	63	85	74	100	
5. Role of Supervisor							
Unsupportive	34	69	15	31	49	100	0.000
Supportive	13	16	58	84	81	100	
6. The role of co-workers							
Unsupportive	37	64	21	36	58	100	0.000
Supportive	10	14	62	96	72	100	

Discussion

The study result found internal factors related to the safety action are factors of knowledge, perception, and motivation. Whereas attitude, age, and duration of work are not factors related to the safety action. Education is the result of knowing occurs after people carry out the sensing process of the object being observed. Positive behavior affects the amount of information used as a result of sensing certain objects. In addition, the level of behavior affects a person cognitive domain in terms of remembering, understanding, and applying information that is mastered. It also effects in processing, synthesis, and development of objects (Notoatmojo, 2010).

The study result shows that the higher the knowledge, the higher the

responsibility of the respondent, and the lower one knowledge, the less it is for respondents to behave safely. This also shows that the narrow level of knowledge in the production section affects safe behavior.

This is a way of identifying individuals or interpreting things, perceptions that occur where individuals regulate and impart their meaning in their environment while giving them to behave as they feel. (Notoamojo, 2010). Motivation is a process in which a person needs to carry out activities that lead to achieving certain goals (Munandar, 2001).

Work motivation is carried out by each individual and greatly affects the quality of work. If adequate facilities, organization, and good management, good work procedures, without high

work motivation, it is difficult to produce good results. Motivation to do work in accordance with the processes needed to fit the company goals and to guarantee for the workers themselves.

B. External Factors

From the results of the study, it was found that external factors related to the safety process are safety regulations, health promotion, supervisory roles, and the role of coworkers. At the same time, the availability of PPE and training is not a factor related to the safety process.

Regulations are written documents that document standards, norms, and policies for expected behavior (Geller, 2010).

In general, HFACS (Human Factor analysis and Classification system) classifies unsafe acts into Errors and violations. Mistakes are representations of a persons' mental and physical activities that fail to achieve something desired. Violations, on the other hand, refer to the intention to ignore the prescribed guidelines or rules for carrying out certain tasks (Wiegman *et al.*, 2017).

Nonetheless, regulations are a form of writing so that in its implementation regular and consistent supervision is needed so that compliance with regulations can increase throughout the workforce

According to Kondarus (2012). Safety promotions or K3 promotions are a form of the effort carried out to encourage and strengthen awareness of workers and behavior about K3 so that they can protect workers, property, and the environment. OHS promotion programs are effective if there are changes in attitudes and behavior towards workers.

Observation in the field, there are several media used to communicate work safety, including pocketbooks that contain the dangers that exist in the work area and behavior that should be to

maintain the safety of himself and others, safety signs that can help improve safety and health and use to reduce the bad habits that are often found, and safety promotion is also done by communicating the dangers carried out by supervisors, namely the head of each subsection of the line to workers before work, this is done to remind workers of the importance of maintaining safety and behaving safely as well as obeying the rules that are supposed to be; also, it communicates accidents that occur so as not to happen again

Geller (2010) mentions the existence of the role of a manager in work behavior. Both are directly related to ongoing individual targets. The supervisor (supervisor) has a crucial position in influencing the knowledge, attitude, and habits of each employee in an area of responsibility. The supervisors know better than others about the attention of individuals, leave notes, work habits, deeds, work skills. Supervisors also monitor worker performance, which is important for the success of the program.

In supervising workers, a supervisor has responsibilities and authority, such as fostering and motivating workers to carry out their duties properly and completed on time to increase the productivity of the company and, of course, without neglecting the aspect of safety.

All members involved in the organization must be able to provide oversight of the operations of the company. If this supervisory function is not implemented, the basic causes of an incident will arise, which can disrupt the activities of the company. Therefore, the role of co-workers is important in maintaining and supervising safety in its work area. Often workers behave unsafely because other colleagues also behave in this way (Germain, 2010).

The involvement of all workers is also needed to improve the

implementation and supervision of safe behavior. The researcher also suggested that awards or rewards be held as an award to exemplary workers in behaving safely. As previously explained, appreciation is a positive consequence given to individuals or groups to develop, support, and maintaining expected behavior.

Conclusion

This study concludes that Internal factors related to safety action are knowledge, perception, and motivation. Whereas attitude, age, and length of work are not factors related to the safety action. At the same time, external factors related to safety action are safety regulations, health promotion, supervisory roles, and the role of co-workers. In contrast, the availability of PPE and training is not a factor related to the safety action.

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Differences in Levels of Prostate Specific Antigen and Insulin-like Growth Factor 1 in GSTP1 Gene Polymorphism among Workers

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Abstract

Cadmium (Cd) is classified as a carcinogen in humans (IA). In addition to causing lung cancer, the incidence of prostate cancer due to Cd exposure based on epidemiological research has also increased. This study aims to identify the GSTP1 genotypic frequency distribution and its correlation with PSA and IGF-1 levels in Cd exposed and unexposed workers. The research design used was cross sectional in 23 exposed groups (weld workers) and 40 unexposed groups (office employees) with a total of 63 people. The measurement of PSA and IGF-1 levels was carried out using the ELISA method and identification of the GSTP1 gene polymorphism using the PCR-RFLP method. Data analysis using Mann-Whitney and Spearman correlation test. The results showed that there was a relationship between PSA levels and IGF1 ($p < 0.01$, $r = 0.515$) in all subjects. The results of identification of GSTP1 gene polymorphism were obtained as ile/ile genotypes as much as 30.2% and ile/val as much as 69.8%. There were no differences in PSA and IGF1 levels between ile/ile and ile/val genotypes ($p > 0.05$). There was a relationship between PSA and IGF1 ($p < 0.01$, $r = 0.569$) in the group of Cd exposed workers and no differences in PSA and IGF1 levels between the ile/ile and ile/val genotypes ($p > 0.05$). There was a relationship between PSA and IGF1 ($p < 0.05$, $r = 0.342$) in the unexposed group of workers and no differences in PSA and IGF1 levels between ile/ile and ile/val genotype ($p > 0.05$).

Keywords: PSA, IGF-1, GSTP1 gene polymorphism, worker

Introduction

Cadmium (Cd) is thought to cause prostate cancer because in addition to the kidneys and liver, Cd is also accumulated in the prostate and testes. Several studies has found the association between Cd and prostate cancer deaths (Julin *et al.*, 2012; Lin *et al.*, 2013). Prostate Specific Antigen (PSA) can be used to detect early stage prostate cancer, clinical and monitoring after therapy with a limit of 4 ng / ml. Prostate specific antigen is a protein that is normally secreted exclusively by the prostate gland to help nourish sperm. However, if there is an increase in PSA levels above the normal level detected, it can be ascertained that there is a problem in the prostate. These problems can include malignancy (prostate cancer) or benign abnormalities (prostatitis

and benign prostatic hyperplasia). After the use of PSA examination in the clinical world there was an increase in detection of prostate cancer by about 81% compared to before which only uses rectal examination (Baade *et al.*, 2009).

Cd causes prostate cancer through several mechanisms, the initiation of malignant transformation, the nature of Cd as a substance that has activities such as androgen, antiapoptotic and mitogenic (Aimola *et al.*, 2012; Arriazu *et al.*, 2013; Lacorte *et al.*, 2011). The antiapoptotic and mitogenic mechanism of Cd as cause of prostate cancer can be assessed with the Insulin Growth Factor1 (IGF1) indicator. Men with the highest quartile IGF1 levels have a 2.6 risk of prostate cancer (Chokkalingam *et al.*, 2001).

Prostate cancer growth is affected by the presence of oxidative stress and reactive oxygen species. One of the genes involved in carcinogen detoxification and antioxidant activity is Glutathione S-transferase P1 (GSTP1) (Qadri *et al.*, 2011). The presence of a polymorphism in this gene will cause a decrease in the elimination of carcinogens and may increase IGF1 and PSA levels. The aim of the study was to determine the differences PSA and IGF1 levels on the GSTP1 gene polymorphism in the Cd exposed group and unexposed group.

Method

This study was part of Cd carcinogenesis study on worker with cross sectional design. The research was carried out in 8 months (January to August 2015) and was located in Purwokerto and Banyumas City, Banyumas District, Central of Java, Indonesia. The subjects of the research came from two groups of workers. The Cd exposure group were 23 welding workers and the group of workers unexposed to Cd were 40 office workers. Samples were selected by consecutive sampling in accordance with the inclusion criteria, which were males over 30 years of age and having worked in the workplace for a minimum of 6 months. The exclusion criteria was acquiring an acute illness (elevated body temperature) during the last 4 months.

Blood samples were collected from the median cubital vein. Prior to blood sampling, the subjects were asked to fast for 10 hours and not to have sexual intercourse during 2x24 hours. PSA and IGF-1 levels were determined using human Elisa kit (Sunred Biotechnology Company, Ltd, Shanghai), based on the principle of the double-antibody sandwich technique, and assayed on an Elisa Reader 270 (Biomeureux, France).

The exon 5 polymorphic site in GSTP1 locus (Ile105Val) was detected by restriction fragment length polymorphism (RFLP) of PCR-amplified fragments. The primers used were: P105F: 5'-ACC CCA GGG CTC TAT GGG AA-3' and P105R: 5'-TGA GGG CAC AAG AAG CCC CT-3'. PCR was carried out in a 30- μ L volume containing about 50 ng genomic DNA template, 200 μ M of each

dNTP, 200 ng of each primer, 1.5 mM MgCl₂, 1X PCR buffer (50 mM KCl, 10 mM Tris-HCl, pH 8.3), and 1 U Taq DNA polymerase (Promega, Southampton, UK). After an initial denaturation step of 10 min at 95°C, the samples were processed through 30 temperature cycles of 30 s at 94°C, 30 s at 55°C, and 30 s at 72°C. A final extension step of 72°C for 10 min was performed. The 176-bp PCR products (20 μ L) were digested for 2 h at 37°C with 2 U Alw26I (Fermentas Inc., Vilnius, Lithuania). The detection of the different alleles was carried out by horizontal 4% agarose gel electrophoresis with ethidium bromide, along with a 100-bp DNA ladder (Figure 1) (Qadri *et al.*, 2011).

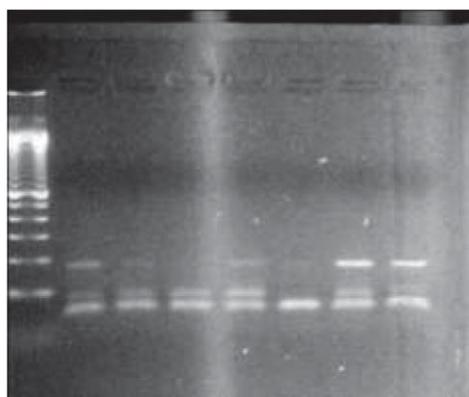


Figure 1. PCR-restriction fragment length polymorphism analysis of the GSTP1 Ile105Val polymorphism. The consensus sequence corresponding to the GSTP1 Iso allele was not cut, whereas the Val sequence corresponding to the GSTP1 Val allele was cleaved to yield two fragments (91 and 85 bp). Lane 6 = Wild-type homozygote (GSTP1 Ile/Ile); lanes 2-5 and lanes 7-8 = heterozygote (GSTP1 Iso/Val); lane 1 = 100-bp DNA ladder.

Data analysis to determine differences between groups was by means of the MannWhitney test, because the data were not normally distributed. Data analysis to determine whether there was a correlation, was done using the Spearman correlation test.

Results

The mean age of exposed group was $40,31 \pm 6,47$, unexposed group was $38,50 \pm 7,60$ and the all subjects was $39,10 \pm 7,01$ years (Table 1).

Table 1. Subjects characterization

Group	Age (yr)
All workers (n=63)	$39,10 \pm 7,01$
Exposed workers (n=23)	$40,31 \pm 6,47$
Unexposed workers (n=40)	$38,50 \pm 7,60$

The results of GSTP1 gene polymorphism were obtained as ile/ile genotypes 30.2% and ile/val 69.8% in all subjects, ile/ile genotypes 52.2% and ile/val 47.8% in exposed workers, ile/ile genotypes 17.5% and ile/val 82.5% in unexposed workers (Table 2).

Table 2. GSTP1 polymorphism distribution

GSTP1 polymorphism	Ile/ile	Ile/val
All workers (n=63)	19 (30,2)	44 (69,8)
Exposed workers (n=23)	12 (52,2)	11 (47,8)
Unexposed workers (n=40)	7 (17,5)	33 (72,5)

There were no differences in PSA and IGF1 levels between the ile/ile and ile/val genotypes ($p > 0.05$) in the all subjects, group of Cd exposed workers and unexposed workers (Table 3 and 4).

Table 3. Differences of PSA level

	Ile/ile	Ile/val	P
All workers (n=63)	$3,05 \pm 1,15$	$3,17 \pm 4,11$	0,095
Exposed workers (n=23)	$3,63 \pm 1,00$	$2,82 \pm 1,37$	0,406
Unexposed workers (n=40)	$2,06 \pm 0,58$	$2,64 \pm 3,17$	0,873

Table 4. Differences of IGF1 level

	Ile/ile	Ile/val	P
All workers (n=63)	$6,54 \pm 3,63$	$11,3 \pm 25,09$	0,952
Exposed workers (n=23)	$7,75 \pm 3,95$	$4,99 \pm 2,29$	0,065
Unexposed workers (n=40)	$4,46 \pm 1,74$	$9,46 \pm 17,97$	0,144

There was a relationship between PSA and IGF1 in the all subjects ($p < 0.01$, $r = 0.515$), Cd exposed workers ($p < 0.01$, $r = 0.569$) and unexposed workers ($p < 0.05$, $r = 0.342$) (table 5).

Table 5. IGF1 and PSA correlation

	p	r
All workers (n=63)	0,000*	0,515
Exposed workers (n=23)	0,005*	0,569
Unexposed workers (n=40)	0,031*	0,342

*significan $p < 0,05$ (two-tailed)

Discussion

This study investigated the differences in levels of IGF1 and PSA levels on the GSTP1 gene polymorphisms between Cd exposed workers and unexposed workers. Since, the polymorphism in GSTP1 gene will decrease elimination of carcinogens, which can increase risk of prostate cancer. Insulin-like growth factors (IGF-I, IGF-II) and their binding proteins (IGFBP-1-6) play a key role in cell proliferation, differentiation and apoptosis, suggesting possible involvement in carcinogenesis. Meta-analysis confirms that raised circulating IGF-I is positively associated with prostate cancer risk (Rowlands *et al.*, 2009).

We tried to confirm that glutathione S-transferase (GST) polymorphisms could enhance oxidative stress on Cd exposed and unexposed workers. In our current study, we investigated 23 Cd exposed workers and 40 unexposed workers. We found the frequency of the ile/ile genotypes 30.2% and ile/val 69.8% in all subjects, ile/ile genotypes 52.2% and ile/val 47.8% in exposed workers, ile/ile genotypes 17.5% and ile/val 82.5% in unexposed workers. The range of Ile allele frequency was 0.47–0.86 in Africans, 63–76% in Europeans, 67–92% in Asians and 59–84% in Indians. The range of Val105/Val105 allele was 14–53% in Africans, 23–37% in Caucasians, 8–33% in Asians and 16–41% in Indians (Sharma *et al.*, 2014). Qadri *et al.* found the frequency of the three different genotypes of *GSTP1 Ile105Val* in Kashmir ethnic population, i.e., Ile/Ile, Ile/Val and Val/Val, to be 52.4, 33.3 and 14.3% among prostate cancer cases, 48.5, 37.5 and 14% among benign prostate hyperplasia cases and 73.8, 21.3 and 5% in the control population. There was a significant association between the *GSTP1 Ile/Val* genotype and the advanced age group among the cases and conclude that *GSTP1 Ile/Val* polymorphism is involved in the risk of prostate cancer development (Qadri *et al.*, 2011).

Circulating levels of IGF-I and its main binding protein, IGF binding protein 3 (IGFBP-3), have been associated with risk of several types of cancer. Whereas higher IGF-1 levels were associated with increased

prostate cancer risk. The associations were primarily driven by lower-grade and non-advanced prostate cancer (Cao *et al.*, 2015). There is no difference level of IGF1 between the ile/ile and ile/val genotypes in the all subjects, group of Cd exposed workers and unexposed workers. These findings were consistent with Henningson *et al.* in healthy women from breast cancer high-risk families (Lima *et al.*, 2008).

In this study, there is no difference level of PSA between the ile/ile and ile/val genotypes in the all subjects, group of Cd exposed workers and unexposed workers. These were consistent with Lima *et al.* in the Brazilian population. There was no association between GSTP1 genotypes and possible clinical factors of risk or any parameter of tumour aggressiveness at diagnosis or during follow-up such as PSA (13). Meta-analysis by Wei *et al.* showed that GSTP1 Ile105Val polymorphism might not be significantly associated with overall prostate cancer risk (Wei *et al.*, 2013).

IGF-1 modulates cell growth and survival, and is thought to be important in tumor development. The association between IGF-1 and prostate cancer risk is well established. Our study found there was correlation between IGF-1 and PSA. IGF-1 has been shown to stimulate the proliferation of human prostate epithelial cells in culture and to be necessary for normal growth and development of the rat and mouse prostate. Epidemiological studies have established a link between high circulating serum IGF-1 levels and the risk of later developing advanced prostate cancer, and overexpression of IGF-1 in the prostate basal epithelial layer of transgenic mice results in prostate adenocarcinoma that is similar to human disease. Thus, IGF-1 action appears to be important for prostate cancer initiation (Roberts, 2004).

Conclusion

Hence, in this study, we observed that IGF-1 and PSA in Cd exposed or unexposed workers was not affected by their glutathione S-transferase (GST) polymorphisms.

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Ability to Identify Occupational Health and Safety (OHS) Hazards in Small Sized Enterprises Workers in Cimanggis District, Depok City, West Java

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Abstract

Background: The high number of SMEs players in Depok has an impact on high employment. A large number of workers in SMEs that have not been maximized in applying safety and health aspects in the workplace has the risk of causing several problems such as minor injuries, ergonomic problems, old and insecure equipment, lack of workers' knowledge and poor work environment conditions. **Objective:** This study aims to assess the ability of workers to recognize OHS hazards in SMEs assisted by Cimanggis District Health Center, Depok City, West Java. **Methods:** This study used a cross-sectional design carried out on 36 SMEs assisted by Cimanggis Health Center, Depok City, West Java. In each of the selected SMEs, one worker was then interviewed using the ODK Collect application to assess characteristics, knowledge, attitudes, behavior, and assessment of the ability to recognize OHS hazards in SMEs. **Results:** The results of the study showed that only 41.7% of SMEs were able to recognize OHS hazards properly. In addition, the results show that there are more who have good knowledge (53%), poor attitudes (64%) and bad behavior (61%). Female workers, workers who have working hours of more than 8 hours per day, and SMEs workers with low occupational risks are found to be better in their ability to recognize OHS hazards. **Conclusion:** The ability to recognize OHS hazards for SMEs workers assisted by Cimanggis District, Depok, West Java is still very slight (under 50%). For this reason, it is necessary to intervene in OHS aspects in SMEs so that these hazards can be minimized

Keywords: OHS, SMEs, Hazard, Workers

Introduction

Small and medium enterprises (SMEs) have an important and strategic role in national economic development (Sarwono, 2015). Based on data from the National Development Planning Agency, the Central Statistics Agency, and the United Nation Population Fund, predict the number of micros, small and medium enterprises (SMEs) in Indonesia in 2018 as many as 58.97 million people. With the high level of SMES actors, the impact on employment is also high. The large number of workers in SMEs has the risk of causing occupational health and safety (OHS) problems to workers. Minor injuries, ergonomic problems, old machine tools, lack of workers' knowledge and poor work environment conditions are OHS problems in SMEs (Manothum and Rukijkanpanich, 2010; Unnikrishnan *et al.*, 2015).

The results of research in Shiraz, Iran, only 26.3% of SMEs provided Personal Protective Equipment (PPE) and 0.4% of SMEs that were equipped with a good exhaust ventilation system. Odd posture is the most common bad working condition (81.5%) (Olsen *et al.*, 2010). In Thailand, there are 4.2 million workers who have suffered injuries or accidents. As many as 2.8 million workers were injured by sharp objects, 332,000 workers were injured due to machinery/equipment in the workplace and 65,000 workers were exposed to chemicals (Manothum and Rukijkanpanich, 2010). The ILO conducted a study on 6,000 SMEs Workers in Indonesia to look at monitoring levels of exposure to noise levels, dust exposure, ergonomic hazards, chemical hazards, vibration hazards, and heat stress. The results showed that many workers in Indonesian SMEs were exposed to high levels of noise (Eroglu S *et al.*, 2012).

In studies that have been conducted, it was found that SMES owners and managers had poor knowledge about the health effects of chemicals used and lack of knowledge about laws and OHS management. Annual health checks conducted in SMEs are still low and occupational health training is not even done at all (Olsen *et al.*, 2010).

The number of SMEs in Depok City is currently around 1,000 business people, with the highest number of SMEs being culinary and fashion (J. Marques, 2019). Depok City Health Office conducts health education covering individuals, families, groups, and communities (Dinkes Kota Depok, 2016). One form of health education conducted is forming a pilot SMES, but OHS aspects have never been trained. Looking at the various risks and dangers that can arise in SMEs in Cimanggis Subdistrict, which are pilot SMEs in Depok, the assessment of the ability of workers to recognize OHS hazards in SMEs needs to be done.

Work accidents in SMEs can be reduced by simple steps such as hazard assessment, good maintenance, training, and appropriate personal protective equipment (PPE) (Eroglu S *et al.*, 2012). Workers in SMEs prefer to use a participatory approach to address OHS problems. The participatory approach encourages stakeholder participation in decision-making processes and problem-solving through the use of participatory processes. The strength of the participatory approach consists of focusing on economic and achievable management goals, effective problem-solving methods, and community-based approaches. The participatory approach helps motivate workers to participate in the problem-solving process (Eroglu S *et al.*, 2012).

Methods

This study used a cross-sectional design conducted at 36 SMEs assisted by Cimanggis Health Center, Depok City, West Java. 36 of these SMEs consisted of Tofu Factory, Tempe Factory, Kikil Factory, Welding Workshop, Bakery / Cake Shop, Gypsum craftsman and Meat Shop. In each SMEs one worker was chosen for the next interview using the ODK Collect application to measure knowledge, attitudes, behavior, and assessment of the ability to recognize the dangers of OHS in SMEs. The hazards measured in this study are noise, dust, light, temperature, vibration, electricity, handling, posture, and chemical hazards. Workers are asked to mention any hazards that may occur in the SMEs where they work, then they will be verified by trained officers whether or not the danger exists in the SMES. The ability to recognize hazards is said to be good if workers can mention a minimum of 80% of the danger according to the results of the verification of trained officers.

Results

Table 1 shows the characteristics of the respondents studied. There were 36 SMEs studied consisting of 5 tofu factories, 1 meat shop, 2 gravel factories, 5 fermented soybean cake factories, 14 welding workshops, 1 wood craftsman, 6 food SMEs, 1 Gypsum craftsman, and 1 clothing convection. From each SMES one person was chosen as the respondent. The total respondents of 36 people consisted of 81% men and 19% of women aged 20-60 years. The age category is based on the median, below the median ≤ 37 and above the median ≥ 38 . The education level of the respondents is divided into 2 parts for the level of high school education and above is categorized as higher education and for under high school is categorized as low. There were 56% highly educated, 69% worked ≤ 8 hours per day and 81% worked above > 40 hours/week. only 42% of respondents were able to recognize the dangers of OHS well. In addition, the results show that more people have good knowledge (53%), less good attitudes (64%) and bad behavior (61%).

Table 1 Characteristics of Respondents from the study (n=36)

Characteristics of Respondents	n	%
Gender		
Man	29	81%
Woman	7	19%
Age		
≤ 37	18	50%
≥ 38	18	50%
Education		
High	20	56%
Low	16	44%
Working hours (Daily)		
≤ 8 hours	25	69%
> 8 hours	11	31%
Working hours (Weekly)		
≤ 40 hours	29	81%
> 40 hours	7	19%
Working Period (in months)		
< 48 months	15	42%
> 47 months	21	58%
Job status		
Permanent	35	97%

Characteristics of Respondents	n	%
Not fixed	1	3%
Knowledge		
Not good	17	47%
Well	19	53%
Attitude		
Not good	23	64%
Well	13	36%
Behavior		
Not good	22	61%
Well	14	39%
Job Risk		
High	21	58%
Low	15	42%
Ability to Recognize Danger		
Able	15	42%
Less fortunate	21	58%
Types of SMEs		
Tofu factories	5	14%
Fermented soybean cake Factories	5	14%
Gravel factories	2	6%
Meat shop	1	3%
Cake Shop	6	17%
Gypsum craftsmen	1	3%
Convection clothing	1	3%
Wood craftsman	1	3%
Welding workshop	14	39%

Table 2. The results of the study show that female workers have a chance of 13.3 times better at recognizing hazards in the workplace compared to men. Workers who work less than 8 hours a day (not at risk) have a chance of 14.3 times better at recognizing hazards in the workplace than workers who work more than 8 hours a day. SMES workers with high occupational risk have a chance of 61.75 times better at recognizing hazards in the workplace compared to workers with low employment risks.

Table 2. Characteristic Distribution of SMES Workers by age by recognizing hazards at work

Characteristics of Workers	Not able to recognize hazards at work		Able to recognize hazards at work		<i>P-value</i>	<i>Odds Ratio (95% CI)</i>
	N	%	N	%		
Age category based on median						
Below the median (≤ 37 year)	12	66,7	6	33,3	0,499 ^a	2,000 (0,520-7,691)
Above the median (≥ 38 year)	9	50,0	9	50,0		
Gender						13,333
Women	1	14,3	6	85,7	0,013 ^{b*}	(1,393-127,577)
Man	20	69,0	9	31,0		3,667
Education						
Low	12	75,0	4	25,0	0,140 ^a	(0,874-15,384)
High	9	45,0	11	55,0		
Job status						
Not fixed	1	100,0	0	0,0	1,000 ^b	-
Permanent	20	57,1	15	42,9		

Characteristics of Workers	Not able to recognize hazards at work		Able to recognize hazards at work		<i>P-value</i>	<i>Odds Ratio (95% CI)</i>
	N	%	N	%		
Knowledge						0,410
Not good	8	47,1	9	52,9	0,337 ^b	(0,106-1,594)
Well	13	68,4	6	31,6		
Attitude						0,813
Not good	13	56,5	10	43,5	1,000 ^a	(0,203-3,257)
Well	8	61,5	5	38,5		
Behavior						1,750
Not good	14	63,6	8	36,4	0,644 ^a	(0,449-6,825)
Well	7	50,0	7	50,0		
Working period						0,703
Below the median (≤47)	8	53,3	7	46,7	0,864 ^a	(0,184-2,695)
Above the median (≥48)	13	61,9	8	38,1		
CO hour / day category 40 hours						0,492
Risk (> 40 hours)	16	55,2	13	44,8	0,674 ^b	(0,082-2,966)
No risk (≤40 hours)	5	71,4	2	28,6		
CO hour / day category 8 hours						14,3
Risk (> 8 hours)	19	76,0	6	24,0	0,002 ^{b*}	(2,4-83,3)
Not at risk (≤8 hours)	2	18,2	9	81,8		
Job Risk						61,750
High	19	90,5	2	9,5	0,0001 ^{a*}	(7,691-495,791)
Low	2	13,3	13	86,7		

Discussion

Of the 36 SMEs, two SMEs have begun to apply the OHS aspect, while many SMEs have been found to have not applied OHS aspects. Some obstacles to SMEs not applying the OHS aspect are the lack of interest from the management of SMEs, the main focus of SMEs is pursuing production and lack of knowledge of the dangers that cause injury or illness.

Based on the results of research on female workers in SMEs better in terms of recognizing hazards at work, this is because female workers are more tidy, disciplined and thorough. In other studies regarding the characteristics of SMES workers based on gender, it was found that women were better able to improve soft management skills and decision-making processes and enhance creativity and innovation (Woodhams and Lupton, 2009). While the results of research on workers who work under 8

hours/day are not pursued by production targets and have more adequate rest periods. The research illustrates the situation of SMES workers in Thailand, that Overtime is considered important for workers in SMEs because they want to have more income. Workers with work over 8 hours on average around 11 hours are a group of workers who do not have adequate rest periods that can cause accidents (Kongtip et al., 2008). This study shows that workers with high employment risks such as welding workshops are more careful in their work and some workers already use PPE. In a study in Uganda's Jinja city, it was found that 5 out of every 10 welders could implement OHS well (I. Oluwole et al., 2018).

The limitation of this study is that the number of SMEs studied was only 36 SMEs. The method of data collection is done by interview. With interviews, respondents are expected to better

understand the purpose of the questions and the data produced can describe the conditions of knowledge, attitudes, and behavior of OHS in SMEs. In addition to interviews, we also discussed the dangers of OHS in SMEs. These hazards include awkward postures, high-level noise exposure, dust, chemical hazards, electrical hazards, radiation, and psychological hazards. In addition to the dangers, we also explain PPE has an important role in protecting workers from work-related injuries and illnesses.

SMEs workers show a positive attitude towards OHS issues in their workplaces. A positive attitude shows participatory workers to understand OHS further in their workplace. Behavior-based safety (BBS) theory of positive attitudes toward safe behavior can be encouraged by offering advice, inspiration, and guidance on how to eliminate risk behavior through safety awareness. A well-planned and implemented behavioral safety system such as BBS can instill awareness of the labor safety system and cause fewer accidents, incidents, accidents, and property damage. (Manothum and Rukijkanpanich, 2010; Unnikrishnan *et al.*, 2015).

After interviews and stimuli regarding the aspects of OHS caused a lot of awareness development about the importance of implementing OHS. In some SMEs, the application of the OHS aspects can be applied directly such as the cleanliness of the work environment, making rules for work and using PPE that are more appropriate. The data we have obtained is given again to SMEs to make recommendations to each SMEs. In the future, we intend to return to the UKM studied to be followed up.

Conclusion

The main results of this study are a description of the knowledge, attitudes,

and behavior of workers in the SMEs towards OHS which have not been good. In some SMEs simple repairs can be immediately carried out such as the cleanliness of the work environment, making rules and using PPE.

SMEs with the highest risk are welding workshops. OHS risk improvement for SMEs is a result of high working hours, excessive production, working environment conditions, and old technology. Minor injuries are an OHS problem that often occurs and the work does not appear to be a serious problem. Research on SMEs needs to be done to increase awareness of the importance of implementing OHS.

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Risk Analysis of Job Stress Among Balinese Crew of Cruise Ships

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Abstract

Job stress can appear in all fields of work. Job stress not only occurs from the environment at work but also can be caused by the psychological condition of the workers. Working on a cruise ship demands higher patience to serve the guests in various activities and handle complaints. Moreover, work on cruise ships causes the workers separated from their families for a long time period, which can increase their mental pressure. The aim of this research is to describe the job stress of workers at a cruise ship. This research was conducted in January-June 2017. In an attempt to examine and understand this research, the researcher used a quantitative research method with a cross-sectional design and descriptive approach. The sample of this research was 111 participants with an affordable population are crew members who only come from Bali Province. Researchers used a convenient sampling technique and questionnaire as research instruments. The result shows that 60,36% of respondents experience job stress in moderate categories and 12.61% in the higher categories. The proportion of job stress in the higher categories was: mostly male (16.67%); at galley station (20.00%); working >5 years (14.71%); age group 11-20 years (25.00%); duration of work >11 hours (16.07%); and the level of fatigue is very tired (100%). The data, bivariate analyzed by using Kendall's tau-b correlation test with significance level is 0.05, showed a significant correlation between job stress and fatigue level ($p = 0.001$, $r=0,41$). Recommendation to solve these problems are: First, workers need to conduct stress management to minimize the impact of job stress. Second, companies need to pay attention to the workload and complaints of workers so it can develop a sustainable plan, particularly related to job stress.

Keywords: Job Stress, Cruise Ships, Fatigue

Introduction

A cruise ship is a passenger ship that used for transportation on the sea, mainly for leisure purposes. The cruise ship is often equated with floating hotels or resorts that can move thru the ocean (Sudiarta, 2011). In general, there are 14 types of work stations on a cruise ship. Most of the Indonesian workers work in Hospitality, Food and Beverage, and Housekeeping stations (Bakti, 2014). Working in a cruise ship attracts the majority of the Indonesian population, mostly because it offers a

large amount of salaries. The salaries range from USD 600 to USD 3000 per month, depending on the job position. 70% of people who work on a cruise ship come from low-income countries (Argyo, 2011; Terry, 2011). Working on a cruise ship does not all look perfect. Some problems can threaten the safety and health of the workers. All workers have undergone Basic Safety Training (BST) course (Syahid, 2016). Having a BST certificate does not guarantee workers free from safety and work-related health problems. Workers are

required to work 10 to 13 hours a day in a week; even waiters can work for 16 hours a day. Working on a cruise ship required patience, especially when handling complaints from guests with a rude attitude. Workers must be tough being miles away from the family for a long time. Another work problem that also exists in a cruise ship environment is workers jump from a ship due to not be able to work under pressure (Argyo, 2011). Excessive work hours and high workload can emerge work stress. The study of the International Labor Organization (2008) showed the increase of mental disorders cases, namely, one in ten people experienced anxiety, stress, loss of enthusiasm, even depression. The impact of this work stress costs more than 200 US dollars losses each year.

A similar study of job stress in tourism also found in Winata et al. research with a focus on job stress of hotel employees in Surabaya, where the stress level of workers in this category is quite high with an average of 3.15. Research conducted by Aditya states that housekeeping workloads on hotels in Surabaya, about 46.15% of respondents have a very high workload. Besides this research, there was also news published in several online media related to cruise ship workers. Between 2014-2017 there is some news related to work problems in cruise ships. Okezone News February 21, 2014, wrote, "A cruise ship worker from Bali throws out himself from the ship where he works". Nusa Bali December 1, 2016, wrote, "Cruise ship workers go berserk, allegedly experiencing mental disorders". Bali Otonom February 7, 2017, wrote "Depression, cruise ship worker hang himself". The results of the research and published news can be strong evidence that workers in the tourism sector, especially in cruise ships, have a high risk of experiencing job stress.

Bali is a well-known province in Indonesia for its tourism, where the majority of people employed in the tourism sector by 30.36% of the total working population (Bali Provincial Statistics Agency, 2016). Sadia's research states that the labor population from Bali, who worked on Mediterranean Shipping Company cruises in 2010, was 1806 people with an average growth during 2005-2010 is 24.32%. Based on BP3TKI Denpasar data in 2016, from the total of the Balinese workforce who work abroad, 60% are workers who work in the cruise ship sector. The data shows that working on a cruise ship is one of the most sought-after employment choices by Balinese workers. The high number of cruise ship workers from Bali does not rule out the possibility that Balinese workers are also facing job stress on cruise ships (Sadia, 2011).

Based on these facts and situations, given the importance of reducing the risk of job stress by developing a conducive work and organizational culture (Kurniawidjaja, 2010), the authors are interested in researching job stress on cruise ship workers from Bali. This study aims to find out the description of job stress on cruise ship workers.

Methods

This research is a quantitative descriptive study with a cross-sectional design, conducted on cruise ship workers from Bali Province during January-June 2017.

The population of this research is all workers, and the affordable population are cruise ship workers dispatched by agencies or schools from Bali Province, there are 5156 people based on BP3TKI Denpasar data. The calculation of sample size is done by using the estimated proportion formula in the population, with the precision 10%, so

the minimum required sample is 94 people. With the inclusion criteria is cruise ship workers from Bali have been working at least one year and willing to fill out a questionnaire.

Sample selection was made by using a convenient sampling technique. Convenience sampling is sampling based on the availability of elements and the ease of getting them. Samples are taken or selected because the sample is in the right place and time. Convenience sampling is also often referred to as incidental sampling. Researchers use this technique sampling with consideration of the limitations of time and accessibility of the sample. A research instrument is a questionnaire form. The collected data analyzed descriptively using the Stata 12 Program. The analysis method is a univariate analysis and bivariate analysis using the Kendall's tau-b Correlation.

Results

Data collection conducted in six weeks. The number of cruise ship

workers who received questionnaires was 362 people, and those who responded to the survey were 118 people; thus, the response rate of this research data collection was 32.60%. Of 118 people who filled out the questionnaire, seven people had to be excluded, so the total sample included in this study were 111 people. This amount exceeds the minimum sample requirement, which is need 94 respondents.

Demographic and Work Characteristics of Respondents

Demographic characteristics of respondents in this study: age, sex, working period, and educational background are presented in Table 1. Most of the respondents were in the age between 21-30 years (63.96%) with the average age was 28 years old ($SD \pm 5, 9$), the respondents were mostly male (75.68%), the working period was less and until five years (69.37%) and educational background was Bachelor/ Associate Degree in Tourism (59.46%).

Table 1. Demographic Characteristics and Job Characteristics of Respondents

Characteristics of Respondent	Number	(%)
Group of Age (year)		
11-20	4	3,60
21-30	71	63,96
31-40	32	28,83
41-50	4	3,60
Sex		
Male	84	75,68
Female	27	24,32
Working periode		
>5 years	34	30,63
≤5 years	77	69,37
Education		
High School/Vocational in Tourism	25	22,52
High School/Vocational in Non Tourism	13	11,71
Bachelor/Associate in Tourism degree	66	59,46
Bachelor/Associate in Non Tourism degree	7	6,31
Duration of Work		

Characteristics of Respondent	Number	(%)
≤11 Hours	55	49,55
>11 Hours	56	50,45
Work Station		
Beauty Salon	5	4,50
Casino	2	1,80
Cruise Staff	4	3,60
Engineering	3	2,70
Food and Beverage	48	43,24
Galley	20	18,02
Hotel Operation	8	7,21
Housekeeping	21	18,92

For the work characteristics of respondents are the duration of work and work stations (presented in Table 1). Most of the respondents had a duration of work per day for more than eleven hours, with an average of 11,23 hours a day, and the most extended duration of work was thirteen hours/day. Regarding work stations, most respondents worked in the Food and Beverage Station (43.24%), while the lowest was in Casino Station (1.80%).

Job Stress and Subjective Job Fatigue

The results of job stress measurements with job stress analysis questionnaires and subjective job fatigue with KAUPK2 questionnaire can be seen in Table 2. The results of job stress measurements showed that most of the stress level of the respondents were in moderate category (60.36%), higher than workers which their job stress level are in the low and high category. In the fatigue variable, the level of subjective fatigue was in the tired category (79.28%) outright as the highest proportion.

Table 2. Job Stress and Subjective Fatigue of Respondents

Variable	Number (%)	
Job Stress Level		
Low	30	27,03
Medium	67	60,36
High	14	12,61
Subjective Job Fatigue Level		
Not Tired	14	12,61
Tired	88	79,28
Very Tired	9	8,11

Distribution of Job Stress Based on Characteristics of Respondents

Distribution of job stress based on demographic characteristics (sex, group of age, working period, and educational background) of respondents were

analyzed by using cross tables and the results presented in Table 3. The higher distribution of job stress was on respondents in a group of age 11-20 years, around 25%. Based on sex, the proportion of job stress was higher for

males (16.67%). Judging from the length of work, the highest proportion of job stress occurs in groups with a contract period of more than five years, which is equal to 14.71%.

Respondents spread into eight stations, which had their assignments with a duration of work was more than eleven hours and less until equal to eleven hours. The distribution of job stress based on job characteristics is

presented in Table 3. The distribution of job stress mostly occurs in respondents with a duration of work for more than eleven hours (16.07%). Based on job stress that occurs in the eight stations, the proportion of work stress distribution with high category occurs mostly in Galley station (20.00%), second place was Food and Beverage station (16.67%) and third was Housekeeping (9, 52%)

Table 3. Distribution of Job Stress Based on Demographic and Job Characteristics of Respondents

Characteristics of Respondent	Job Stress Low	Medium	High	Number (%)
Group of Age (year)				
11-20	0 (0,00%)	3 (75,00%)	1 (25,00%)	4 (100%)
21-30	14 (19,72%)	48 (67,61%)	9 (12,68%)	71 (100%)
31-40	13 (40,63%)	15 (46,88%)	4 (12,50%)	32 (100%)
41-50	3 (75,00%)	1 (25,00%)	0 (0,00%)	4 (100%)
Sex				
Male	27 (32,14%)	43 (51,19%)	14 (16,67%)	84 (100%)
Female	3 (11,11%)	24 (88,89%)	0 (0,00%)	27 (100%)
Working period				
>5 years	13 (38,24%)	16 (47,06%)	5 (14,71%)	34 (100%)
≤5 years	17 (22,08%)	51 (66,23%)	9 (11,69%)	77 (100%)
Duration of Work				
11 Hours	15(27,28%)	35 (63,63%)	5 (9,09%)	55(100%)
>11 Hours	16(28,57%)	31 (55,36%)	9 (16,07%)	56(100%)
Work Station				
Beauty Salon	0 (0,00%)	5 (100%)	0 (0,00%)	5 (100%)
Casino	0(0,00%)	2 (100%)	0 (0,00%)	2 (100%)
Cruise Staff	1(25,00%)	3 (75,00%)	0 (0,00%)	4 (100%)
Engineering	1 (33,33%)	2 (66,67%)	0 (0,00%)	3 (100%)
Food and Beverage	14 (29,17%)	26 (54,17%)	8 (16,67%)	48 (100%)
Galley	7 (35,00%)	9 (45,00%)	4 (20,00%)	20 (100%)
Hotel Operation	2 (25,00%)	6 (75,00%)	0 (0,00)	8 (100%)
Housekeeping	5 (23,81%)	14 (66,67%)	2 (9,52%)	21 (100%)

Fatigue can trigger job stress, especially when physical conditions are exhausted. It will disrupt concentration and cause a decrease meant of physical abilities. The following distribution of job stress based on subjective fatigue of the respondents is presented in Table 4. Distribution of job stress based on the level of subjective job fatigue shows a higher proportion in the very tired category (100%).

Table 4. Distribution of Job Stress Based on Subjective Job Fatigue Level

Characteristics of Respondent	Job Stress			Number (%)
	Low	Medium	High	
Subjective Job Fatigue Level Not Tired				
Tired	6 (42,86%)	8 (57,14%)	0 (0,00%)	14 (100%)
Very Tired	24 (27,27%)	59 (67,05%)	5(5,68%)	88 (100%)
	0 (0,00%)	0 (0,00%)	9 (100%)	9 (100%)

Bivariate Analysis of Job Stress Toward Characteristics of Respondents and Subjective Job Fatigue

The chosen bivariate analysis method in this study was the Kendall's tau-b Correlation Test because the dependent variable is ordinal, and the independent variable is categorical. This test does not require data to be distributed normally, and variables must not linear. The result of the Kendall's Correlation Test b-data is presented in Table 5. Based on Kendall's t-correlation Correlation Test with a significance level of 0.05, the result showed that job stress was related to variables of subjective job fatigue ($p = 0.001$) and variable of a group of age ($p = 0.007$). In bivariate analysis between job stress and

subjective job fatigue variables, the result was $r = 0.41$, which means there was a moderate positive correlation between job stress and subjective job fatigue. The higher the fatigue level of the respondents, the higher the potential stress of work experienced will be. The bivariate analysis between job stress and a group of age variables obtained a value of $r = -0.24$, which means there was a weak negative correlation between job stress and a group of age. The younger the age of the respondent, the higher the potential to experience job stress. As for the variables of sex, working period, and duration of work, there was no correlation with the occurrence of job stress.

Table 5. Correlation of Analysis Kendall's tau-b Toward Demographic Characteristics of Job Stress, Job Characteristics, and Subjective Job Fatigue

Characteristics Respondent	P-Value	R-Value
Sex	0,580	0,05
Subjective Job Fatigue Level	0,001	0,41
Working periode	0,253	-0,11
Group of Age	0,007	-0,24
Duration of Work	0,604	-0,05

Discussion

Characteristics of Respondents and Subjective Job Fatigue

Respondents of cruise ships from Bali Province, mostly male. According

to the research of Pertiwi, the number of male workers is more than women, because there is a tendency for men to be the main income earners in the family. The lowest age of the respondent was 19 years old, and the highest age is 48 years old. World Health Organization states

that the range of productive working age are between 15-64 years old, so workers on cruise ships from Bali Province are all in the productive category. Regarding the educational background, the majority of workers had university/ college degrees. Based on the major, most of the workers had a degree in tourism. The majority of cruise ship companies are looking for a workforce that has at least had a high school / vocational school diploma and had skills according to the type of work on each cruise. The average length of the working period was 5 years. According to Adiwinata et al., the workers who have a long working period (> 10 years), have higher job satisfaction and productivity, compared to a group working period <10 years (Nilan and Artini, 2013; Adiwinata, 2014).

Based on the duration of work each day, the worker works for 11 hours on average. All workers work above 8 hours per day; this is against Indonesia Law Number 13 of 2003 about Manpower, which states that working hours in a day are 8 hours per day and 40 hours in one week for five working days a week. Most workers were in the Food and Beverage station. According to a study conducted by Oka, most Balinese workers work on the Food and Beverage station, such as bars, restaurants, and waitresses. Most respondents experienced fatigue in the tired category. According to Nilan et al., the work environment in a cruise ship demands high concentration.

Based on the study of the proportion of job stress, the result shows in the medium category. The job stress is in category moderate to large. This finding indicates that job stress is higher than other jobs in the service sector and mostly occurs in subordinates workers (Nilan and Artini, 2013; Oka *et al.*, 2015; Wolff *et al.*, 2013).

The concept of stress, according to Cooper (1976), is a dynamic model of

job stress, where it explained that the source of stress is in the environment, which influences individual characteristics and also impacts on both individual symptoms and biopsychosocial symptoms such as in organization. World Health Organization (WHO) develops job stress models, according to Cooper and Davidson (1987). It described that stress manifestations specifically occurred from situations and conditions related to work problems such as workload, work routine, career development, interpersonal relationships with co-workers, organizations within the company, and others. It referred to as occupational stress (Cooper *et al.*, 2001).

The age proportion of workers who experience job stress is in group 11-20 years old. This is allegedly related to young workers who lack work experience compared to older workers. According to Wijono, young workers are often disappointed with their work because they are not challenged and given adequate responsibilities. There is a significant relationship between age and job satisfaction (Wijono, 2010). The lowest job satisfaction is found in young employees. The management must pay more attention to guidance young workers by increasing the quality and quantity of their competencies. Based on the results of Kendall's tau-b Correlation Test, the group of age is related to the occurrence of work stress. The younger the age, the higher potential for workers to experience job stress.

In terms of sex, the proportion of job stress is mostly men. This is related to what was conveyed by Wijono, that state sex can influence the reaction of stress. This is mainly influenced by the different tempers and characteristics of each sex (Wijono, 2010).

Work period \leq five years of experience job stress more if compared with those

who had a working period > 5 years. A short or long working period can trigger stress, and a large workload could exacerbate it. Long work hours makes workers feel tired of their work routines, while short working periods also can cause stress if the given workload is too heavy and does not match their abilities (Munandar, 2001). Enrichment of insight, motivation, work rotation can be used as a way to minimize this problem.

A total of 16.07% of respondents with a duration of work > 11 hours experienced high job stress. The length of work time that must be lived due to high workload results a lack of leisure time for workers to interact with their family and society. Long work schedules and lack of time to socialize are potential factors causing work stress (Kamal, 2007; Cox *et al.*, 2000).

Job stress mostly occurs in the galley station. According to Mangnguluang *et al.*, hazards in complex kitchen parts include having to deal with glassware and metal-based equipment; besides that, they also got exposure from food and beverage making machines, stoves. Therefore patience and concentration are needed (Mangnguluang *et al.*, 2015). The impact of workers prone to gain job stress. Based on Suma'mur, the work station is where officers carry out daily activities in accordance with the tasks assigned by the company, which is very likely a high-risk job to occur and as a major influence of the risk of accidents due to work (Suma' mur, 2009).

Work exhaustion is a condition that is characterized by feelings of fatigue that can reduce alertness that affects work productivity. The proportion of respondents' subjective job fatigue wares mostly in the tired category. Workloads that are often overtime trigger work fatigue. Moreover, irregular sports and rarely medical check-ups accelerate the

occurrence of work fatigue for workers, so the risk of job stress is higher (Argyo, 2011). Based on the results of Kendall's Correlation Test, work fatigue is related to job stress. If the level of work fatigue is higher, so the potential for workers to experience job stress also higher. The research of Sholihah and Fauzin also states that fatigue is in direct relations with job stress. Wadsworth says that seafarers who do their work on sea tours are at risk of experiencing job stress due to the fatigue that they felt. The longer the trip of work, the greater the potential of stress. Fatigue not only decreases performance and decreases safety, but can increase mental health risks which are known as risk factors for chronic disease in the future (Sholihah Q and Fauzia, 2013; Wadsworth *et al.*, 2006; Smith *et al.*, 2006).

Conclusion

Based on the results and discussion, conclusions that can be taken:

- a. The situation of job stress and subjective job fatigue of the respondents were mostly in moderate stress category and fatigued subjective work in fatigue level.
- b. Analysis of the Kendall's tau-b Correlation Test, shows that there is significant relation between work fatigue and group of age with the occurrence of job stress. The higher the fatigue, the higher potential for job stress will be and the lowest age of the worker, the higher job stress they will experience.

Recommendation

The suggestions based on the research results obtained in this study are:

1. Workers need to do stress management to minimize the impact of work stress by carrying out positive activities that are

- entertaining and refreshing their minds
2. To the Universities/ Colleges/ Cruise ship agents, they must provide good theoretical and practical training to manage mental health.
 3. Companies also must pay attention to the workload by balancing the number of hours of rest and hours for work. Provide regular training to improve knowledge related to safety and health at work.
 4. Management needs to pay attention to the complaints of workers, so they can develop sustainable programs related to work stress and mental health.

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Inclusion of Construction Occupational Health and Safety Management System (OHSMS) Components in Building Construction Project

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Abstract

Building construction projects are required to have the Occupational Health and Safety Management System (*Sistem Manajemen Kesehatan dan Keselamatan Kerja*, OHSMS) due to its high-risk nature. For this purpose, the Ministry of Public Works and People's Housing of the Republic of Indonesia has issued the Circular Letter Number 66/SE/M/2015 on Costs for Implementing Construction Occupational Health and Safety Management System (OHSMS) in the Field of Public Works. The purpose of this study is to present a detailed description of OHSMS implementation in several building construction projects by using the Ministry's Circular as the reference. This study is a descriptive study on 30 building construction projects implemented in Indonesia from 2017 to 2019 as the unit of analysis. Data were collected using a questionnaire which was developed based on the content of the Circular of the Minister of Public Works and People's Housing Number 66/SE/M/2015. This questionnaire was then distributed to respondents using the purposive sampling technic.

The OHSMS implementation subcomponents that are most frequently included in the work agreement of building construction projects are work procedure manual development, OHS induction, safety net, protective helmet, worker insurance (BPJS *ketenagakerjaan dan kesehatan kerja*), OHS expert and/or OHS officer, first aids kit, prohibition sign, and portable fire extinguishers. The least frequently included subcomponents are the provision of worker identity cards (KIP), poster, fall restraint, life jacket, Certificate of OHS Steering Committee (*Panitia Pembina Keselamatan dan Kesehatan Kerja*, P2K3), medical officer, fogging solution, traffic strip light, OHS flag, and internal audit and inspection programs. A total of 30 building construction projects have implemented OHSMS by including the details of the construction OHSMS implementation, as stated in the Minister of Public Works and People's Housing Circular Number 66/SE/M/2015 in their work contract.

Keywords: Building Construction, Circular of the Minister of Public Works and People's Housing Number 66 the Year 2015, OHSMS

Introduction

Indonesia is currently undergoing massive infrastructure development to support the economic growth and equitable distribution of social welfare. One of the industries that play a role in

this infrastructure development is the construction industry. Construction work has unique characteristics due to the different work locations for each project; limited time to finish the construction work that includes civil,

architectural, mechanical, electrical, and various other finishing works; weather influence; and the involvement of a large number of workers with different educational backgrounds. The construction industry is one of the industrial sectors that contribute significantly to the number of occupational accidents. According to the International Labor Organization (2015), there are at least 60,000 fatal accidents in the construction sector worldwide. Fatal accidents occur every ten minutes, in which one out of six of these accidents takes place at a construction site.

Based on *BPJS Ketenagakerjaan* data, there were 110,285 cases of occupational accidents in 2015, 101,367 in 2016, 123,041 in 2017, 173,105 in 2018, and 77,295 in 2019 in Indonesia. Furthermore, data from the Ministry of Public Works and People's Housing in 2017 suggested that the biggest contributor to occupational accidents in Indonesia is the construction sector, with an average contribution of around 32% annually (Parampara, 2018). Therefore, construction companies are required to give protection to their workers by implementing Occupational Safety and Health (OHS) measures to fulfill the right of the workers based on the Law of the Republic of Indonesia Number 1 of 1970 on Work Safety.

The cause of work-related accidents in the construction sector may stem from various factors, starting from the design planning to management and the construction workers themselves. Other factors affecting occupational accidents are occupational safety and health training; top management commitment; work environment; worker awareness; OHS regulations and procedures; availability of safety and health signs at work; work communication; and level of work experience (Waruwu and Yuamita, 2016). A study conducted by Piri et al.

(2012) for construction workers showed that 67% of respondents stated that there no cost is incurred to attend OHS-related training. This study also proves that when more workers participate in OHS-related training, occupational accidents among construction workers can be reduced. According to Vasconcelos and Junior (2015), occupational accidents in construction projects for shopping center construction are caused by organizational factors at work that reflects the lack and failure in the management of construction sites, operational procedures, and design.

To prevent work accidents, companies have to implement an Occupational Safety and Health Management System. Since 2014, the Government of Indonesia, through the Regulation of the Minister of Public Works and People's Housing of the Republic of Indonesia Number 05/PRT/M/2014 on Guideline for Construction Occupational Safety and Health Management System (*Sistem Manajemen Kesehatan dan Keselamatan Kerja*, OHSMS) in the Field of Public Works, has required construction companies to implement the OHSMS in their Public Works Construction projects. Details of the implementation of the construction OHSMS program are outlined in the Circular of the Minister of Public Works and People's Housing Number 66/SE/M/2015 on Costs for Construction Occupational Safety and Health Management System (OHSMS) Implementation in the Field of Public Works. The government expects that this regulation can be used as a guideline for companies to include OHS-related components in the work contract for construction works.

This study sought to identify the OHSMS management activity components/ subcomponents of the

Circular of the Minister of Public Works and People's Housing Number 66/SE/M/2015 that are included in the work contract for a building construction project. The purpose of this study is to assess the inclusion of the OHSMS activity details in these work contracts.

Method

This study is a descriptive study with 30 construction projects implemented in Indonesia from 2017 through 2019 as the unit of analysis. Data used were primary data collected using a questionnaire that was developed based on the Circular of the Minister of Public Works and People's Housing

Number 66/SE/M/2015. Questionnaires were distributed to respondents using the purposive sampling technic. This sampling technic is based on particular considerations made by the researchers. Respondents consisted of all employees of the construction companies (contractors), including the Operational Director, OHS General Manager, Head of Project, Site Manager, OHS Manager/Officer, Contract Manager, Cost Estimator, Quantity Surveyor, and Supervisory Consultants or similar position. Before being distributed, the questionnaire was first validated by 5 experts in the field of construction OHS.

Results

The positions of the respondents who participated in completing the questionnaire are listed in table 1.

Table 1. Position of Respondent

No.	Position	total
1	Head of Project	1
2	Site Manager	3
3	Contract Manager	1
4	OHS Manager	4
5	OHS SPV	8
6	OHS/Safety Officer	12
7	Quantity Surveyor	1

Respondents with the positions stated in table 1 were people who understand the OHS-related content of the building construction work contract. In this study, the questionnaire was completed by 30 respondents from 30 different building construction projects. The OHSMS activity implementation components and subcomponents analyzed in the construction work contract are presented in Table 2 below.

Table 2. Details of Construction OHSMS Activity Implementation

No.	Component and Subcomponent	Number (Project)
1.	Contract OHS Plan (<i>Rencana K3 Kontrak, RK3K</i>) Preparation	
	a. Development of Manuals, Procedures, Work Instructions, Work Permits, and Forms	29
	b. Provision of Worker Identity Card (<i>Kartu Identitas Pekerja, KIP</i>)	20
2.	OHS Dissemination and Promotion	
	a. OHS Induction (Safety Induction)	29

	b. OHS Briefing (Safety Briefing); Safety Talk and/or Tool Box Meeting)	28
	c. OHS training	23
	d. OHS simulation	25
	e. Banner	28
	f. Poster	20
	g. OHS Information Sign	24
3.	Work Protective Equipment	
	a. Safety Net	29
	b. Life Line	27
	c. Safety Deck	22
	d. Guard Railing	23
	e. Restricted Area	25
4.	Personal Protective Equipment	
	a. Safety Helmet	30
	b. Goggles, Spectacles	26
	c. Face Shield	23
	d. Breathing Apparatus	8
	e. Ear Protection (Ear Plug, Ear Muff)	21
	f. Breathing and Mouth Protection (Masks)	21
	g. Safety Gloves	28
	h. Safety Shoes	29
	i. Full Body Harness	28
	j. Life Vest	4
	k. Safety Vest	24
	l. Apron/Coveralls	13
	m. Fall Arrester	19
5.	Insurance and Permit	
	a. BPJS <i>Ketenagakerjaan dan Kesehatan Kerja</i> (Work Insurance)	30
	b. Certificate of Equipment Use Worthiness	25
	c. Operator License	26
	d. Certificate of OHS Steering Committee (<i>Panitia Pembina Keselamatan dan Kesehatan Kerja, P2K3</i>)	21
6.	OHS Personnel	
	a. OHS Expert and/or OHS Officer	29
	b. Response Officer	22
	c. First Aid Officer	26
	d. Flagman	16
	e. Medical Officer	15
7.	Health Care Facility	
	a. First Aid Equipment (First Aid Kit, Stretcher, Oxygen Cylinder, Wound Kit, Bandage, etc.)	29
	b. First Aid Room (Patient Bed, Stethoscope, scale, Sphygmomanometer, etc.)	21
	c. Fogging Equipment	16
	d. Fogging Solution	14

8.	Signs	
	a. Direction Sign	26
	b. Prohibition Sign	27
	c. Warning Sign	26
	d. Obligation Sign	22
	e. Information Sign	25
	f. Temporary Work Sign	20
	g. Warning Light Stick	21
	h. Traffic Cone	23
	i. Rotary Lamp	19
	j. Traffic Strip Lamp	13
9.	Other Equipment Related to OHS Risk Control	
	a. Fire Extinguisher	28
	b. Siren	20
	c. OHS Flag	19
	d. Evacuation Route	25
	e. Emergency Lamp	20
	f. Inspection and Internal Audit Program	19
	g. Incident Reporting and Investigation	21

Most construction projects have included all subcomponents of the construction OHSMS activities listed in the minister circular details in their work contract.

Discussion

Based on the Circular of the Minister of Public Works and People's Housing Number 66/SE/M/2015, the extend of the construction OHSMS activity components and subcomponents included in the work contract should be adjusted to the result of the OHS risk level calculation in each building construction project. This aims to reduce the level of hazard risk and the number of occupational accidents that might happen in a construction project. A total of 29 building construction projects include manual, procedure, work instruction, work permit, and form development in the work contract. Manuals and procedures provide guidelines to workers on how they should perform their job, ensuring that all works are performed according to the applicable regulations, which will then produce the expected results as stated in the project goal. Work instruction,

permits, and forms are a form of documentation of the work process. The subcomponent of providing Worker Identity Card (KIP) is included in 20 building construction work contracts. The OHS dissemination subcomponent in the OHS dissemination and promotion component that is the most widely included in the work contract for a construction project is the OHS induction subcomponent. Based on a study conducted by Latief et al. (2017), the OHSMS cost components that are associated with occupational accidents is the provision of worker identity card and OHS induction.

All building construction projects include the safety helmet subcomponent in the work contract, showing that the safety helmet is personal protective equipment that must be used by all workers while they are in and working in the building construction project area. The safety helmet serves to protect

the head from impacts and falling objects, as well as to minimize injuries. Only four-building construction projects include life vest subcomponent in the work contract. The company provides life vests as personal protective equipment in case of flooding in building construction projects located in a flood-prone area.

National Insurance for Workers and Occupational Health (BPJS *Ketenagakerjaan dan Kesehatan Kerja*) is the insurance that is required by the law to be provided by the company to its workers. Thus, all construction projects include this subcomponent in their work contract. In the implementation of construction projects, the type of insurance from the BPJS used is the BPJS for Construction in which the premium is based on the contract value.

A total of 29 building construction projects include the OHS expert/OHS officer subcomponent in their work contract. Based on the Regulation of the Minister of Public Works Number 05/PRT/M/2014, the construction project with high hazard potentials must employ a construction OHS expert during the construction work. In contrast, those projects with low hazard potential must have a construction OHS officer. Only 15 building construction projects include the medical officer subcomponent in their work contract. The medical officer referred to here includes doctors and nurses. Twenty-nine building construction projects include first aid equipment subcomponent (First aid kit, stretcher, oxygen tank, wound kit, bandages, etc.) in their work contract. First aid equipment is the essential equipment needed for the first response in the event of an occupational accident.

Prohibition sign is the most frequently included subcomponent in the sign component of the construction work

contracts. A prohibition sign is a sign/symbol/writing that provides information related to actions that are not allowed to be done by people in the area. The traffic strip light is the least frequent subcomponent to be included in the building construction work contract, with only 13 projects including this subcomponent. In building construction projects, traffic strip lights are used as a marker and barrier for construction areas at night or in areas with poor lighting.

Twenty-eight building construction projects include the Fire Extinguisher subcomponent in their work contract. A fire extinguisher is one of the essential equipment for putting out fires. There are various works in building construction projects that have the potential to cause fires, such as welding, cutting, electrical installation work, and waterproof membrane installation. The OHS flag and the internal inspection and audit program are subcomponents of the other OHS-related risk control component that is the least included in the work contract, with only 19 building construction projects including these two subcomponents. The OHS flag is used to indicate that a project has implemented OHSMS. According to Tarwaka (2014), inspection is carried out to identify sources of health hazards associated with tasks, production processes, particular areas, and hazardous materials, and should be performed by involving personnel with special technical expertise. In other words, inspection is one way to prevent occupational accidents and/or diseases. Internal audit is an activity that involves independent assessment by an internal organization unit with the aim of testing and evaluating various operations performed by the organization.

Conclusion

Based on the results of this study, it can be concluded that all building construction projects that are used as the unit of analysis in this study have implemented the provisions in the Circular of the Minister of Public Works and People's Housing Number 66/SE/M/2015. The majority of the building construction projects include all the subcomponents of construction OHSMS implementation activities as detailed in the circular in their work contract. The limitations of this survey-based study come from the fact that this study only includes 30 building construction projects implemented in Indonesia during 2017-2019 and that no building classification is used as a consideration in the analysis. All building construction projects included as the unit of analysis in this study are projects related to the Ministry of Public Works and People's Housing. The regulation used as the reference in the inclusion of construction OHSMS components in building construction projects only applies within the scope of work of the Ministry of Public Works and People's Housing and has no legal force to be applied to the entire construction industry. However, this study provides an overview of which subcomponents of the construction OHSMS activity implementation that are included in the building construction work contract. This result may be different from the results of other studies due to differences in the location of the study, the type of building construction project, and the regulation used.

The government is expected to be able to make a regulation on the construction of OHSMS activity components that are comprehensive and applicable for the construction industry as a whole to prevent overlapping regulations. With the availability of such

regulation, construction companies can focus on complying with one regulation.

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