The Overview of Mental Workload of Health Safety and Environment Workers in Oil and Gas Industry

Gambaran Berat Beban Kerja Mental Pekerja Industri Minyak dan Gas

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ABSTRACT

Introduction: PT. Pertamina RU IV Cilacap is a national oil and gas industry that has the largest refinery in Southeast Asia that manages raw materials for other refinery units in Indonesia to be reprocessed into fuel. The size of the refinery can illustrate the complexity of the system run by this unit. The HSE Unit in this company has a great responsibility to maintain the worker safety in the refinery. It is necessary to measure mental workload on HSE workers. This is because if the mental workload is not monitored, it can cause fatality, in this case, work accidents as a result of lack of supervision from HSE workers and mental PAK related to HSE workers resulting in excessive mental workload or property loss as an outcome of excessive mental workload. So, it is important to portray the HSE mental workload because of its responsibility to secure the health, safety and environmental issues. The purpose of this study was to describe the heavy mental workload on PT. Pertamina RU IV Cilacap. **Method:** This research was a quantitative descriptive designed study. Data were obtained by conducting interviews and using the NASA-tlx questionnaire on 71 respondents. **Results:** As many as 35 respondents had heavy mental workloads and 31 respondents had very heavy mental workloads. **Conclusion:** HSE workers at PT. Pertamina RU IV Cilacap has a heavy mental workload and even tends to be very heavy.

Keywords: mental workload, NASA-tlx, oil and gas industry

ABSTRAK

Pendahuluan: *PT. Pertamina RU IV Cilacap adalah industri minyak dan gas nasional yang memiliki kilang terbesar di Asia Tenggara yang mengelola bahan baku untuk unit kilang lainnya di Indonesia untuk diolah kembali menjadi bahan bakar. Ukuran kilang dapat menggambarkan kompleksitas sistem yang dijalankan oleh unit ini. Unit HSE di perusahaan ini memiliki tanggung jawab besar untuk menjaga keselamatan pekerja di kilang. Perlu untuk mengukur beban kerja mental pada pekerja HSE. Ini karena jika beban kerja mental tidak dipantau, hal itu dapat menyebabkan kematian, dalam hal ini, kecelakaan kerja sebagai akibat dari kurangnya pengawasan dari pekerja HSE dan PAK mental yang terkait dengan pekerja HSE yang mengakibatkan beban kerja mental yang berlebihan atau kerugian harta benda sebagai akibatnya beban kerja mental yang berlebihan. Jadi, penting untuk menggambarkan beban kerja mental HSE karena tanggung jawabnya untuk mengamankan masalah kesehatan, keselamatan dan lingkungan.Tujuan penelitian ini adalah untuk menggambarkan berat beban kerja mental pada pekerja HSE PT. Pertamina RU IV Cilacap.* ***Metode:*** *Penelitian ini memiliki rancang bangun deskriptif kuantitatif. Data didapatkan melakukan wawancara dan menggunakan kuesioner NASA-tlx pada 71 responden.* ***Hasil:*** *Sebanyak 35 responden memiliki bebanP-0 kerja mental yang berat dan 31 responden memiliki beban kerja mental yang sangat berat.* ***Simpulan:*** *Pekerja HSE PT. Pertamina RU IV Cilacap memiliki beban kerja mental yang berat bahkan cenderung sangat berat.*

Kata kunci: *beban kerja mental, industri migas, NASA-tlx*

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INTRODUCTION

PT. Pertamina RU IV Cilacap is a State-Owned Enterprise engaged in the oil and gas mining industry. Operational activities in this unit are processing imported and domestic crude materials into fuel oil, non-fuel fuels and petrochemicals

 doi: 10.20473/ijosh.v9i2.2020.154-162
Received December 20, 2019, received in revised form May 04, 2020, Accepted August 03, 2020, Published: August 2020

which are marketed domestically and abroad. Being in Java with the highest fuel demand among other islands in Indonesia, makes Pertamina RU IV Cilacap as the largest operational unit with a production capacity of 348,000 barrels/day. This operational unit is also the biggest and has the most number of products. RU IV Cilacap was designed to meet 34% of national fuel needs or 60% of fuel consumption on the Java Island. Another fact is that RU IV Cilacap is the only unit that produces asphalt and lube oil, as well as the basic ingredients for making fuel, so that this unit becomes the supplier of basic oil in other refinery units.

PT. Pertamina RU IV Cilacap is a company with the largest oil processing unit in Indonesia, so that in processing oil there are many aspects needed in its operations. One of them is K3 (Occupational Safety and Health) aspects, especially for workers who work in the refinery area. The refinery area is an area that has a lot of potential hazards, so the implementation of a risk control hierarchy starting from eliminating hazards to using PPE equipment must be applied. The purpose of doing this was to avoid and reduce work accidents and occupational diseases when working in the field. The HSE Department is the department that carries out identification, supervision and monitoring of the application of OSH in all Cilacap RU IV operations, so that the responsibilities held by the HSE Department are very heavy.

The HSE Department consists of several sections including Safety, Occupational Health, Environment and Fire & Insurance. Based on data held by HSE Pertamina RU IV Cilacap, workers in the Safety section have high workload figures, especially the safetyman.

The HSE Department has a big workload responsibility; this can have an impact on Occupational Diseases. One aspect of occupational illness is psychological, which can be caused by many things. One of them is work stress where the main cause is excessive workload (Deguchi et al., 2016). Another research that was done found that heavy workload had an association with increase work stress (Deguchi et al., 2016). Thus, when workload is increased, it will affect work stress and followed by the increasing rate of mental stress (Tubbs-Cooley et al., 2018). Other impacts of heavy workloads are outcomes such as turnover intention (Hidayat, Pujangkoro and Anizar, 2013). Another statement shows that the heavy workload experienced by workers is able to cause job burnout (Hülsheger et al., 2013). Besides being able to cause illness due to work, stress caused by excessive mental workload can cause work accidents (Farid, Jayanti and Ekawati, 2019). This could lead into fatality that we cannot afford whether it is loss of primary containment or bigger incident.

Workload is a condition in which physical, mental abilities and time are used to do work (Tarwaka, 2015). Workload is influenced by many factors. The following are the factors that affect workload according to Tarwaka (2015), including External Factors and Internal Factors.

External factors are factors that originate from outside the worker's body. This factor is also commonly called a stressor. The following are external factors that affect workload.

First, Task carried out by workers can affect the physical, for example, from work tools, work stations, work spaces and so on. Mental influence can also be obtained from tasks such as the complexity of the job and responsibility for the job.

The Second is Work Organization, Examples of things in work organizations that affect workloads are length of work time, rest time, rotating work, wage systems, and night work. Working environment is also a factor that gives effect as an additional burden of work activities carried out at the place. The examples are physical factors (lighting, noise, and vibration), chemical factors (gas and fume), biological factors (bacteria, fungi, and viruses) and psychological factors (social conditions around workers).

Internal factors that affect workload are factors that originate from the worker himself as a reaction to stressors. These internal factors are somatic factors. Things included in these factors are age, gender, body size, nutritional status and Psychic factor. The psychological factors include motivation, trust, perception, job satisfaction and so forth.

Mental workload refers to the mental work which is the working conditions in which there is still information that must be processed in the brain (Young et al., 2015). The brainwork is a thought process that requires creativity, for example, making a contract, reporting, writing, observing the engine, making plant design, and studying the report. Mental workload is the gap between the demands of work and the maximum capacity of workers in motivated conditions. Excessive mental workload will lead to job stress. According to Siegrist (2015), work stress is what is happening around hazardous work or while in threats such as fear, anxiety, guilt, anger

sadness, despair, boredom, and the onset of the stress of the workload that exceeds the ability of workers for relatively long time in certain circumstances.

Different jobs for each worker will cause different levels of work stress. Work stress has a direct or indirect effect on aspects of work, especially on achievement motives that will later be related to work processes. Psychological aspects of a job change all the time. Factors that cause changes in psychological aspects can come from within (internal) or from outside themselves such as work and the environment (external). Both internal and external factors are difficult to see from the naked eye so that the observations are the only one to see the results of the work or factors that can be measured objectively or from the behavior and narrative of workers that can be identified (Katsuro et al., 2010; Melo, da Silva and dos Santos Rebelo, 2017).

In some occupations, it is difficult to separate work obligations from personal life, especially with the expansion of electronic communications and surveillance devices. Other characteristics of stressful organizations are overloads in the workplace, such as high work demands and pressures, frequent disruptions, or high levels of responsibility. Conflicts between workers at work can accelerate stressful workloads, in this case, a lack of support and respect as well as unfair treatment by supervisors or coworkers. In addition, many jobs are characterized by monotony and low levels of skill utilization and autonomy. When combined with reduced work stability, forced or part-time forced labor, and low wages and salaries, these challenges tend to increase poor health at work (Hülsheger et al., 2013). However, it also can cause excessive fatigue and work stress on employees and often leads to work accidents and product defects (Permata Sari, 2018).

Over time, a person's ability can change as a result of workplace practice (performance improvement), fatigue (performance deterioration) and boredom from work and working conditions (performance deterioration). The ability of a person to be different from others because of differences in physical and mental support, differences in practice, and the difference in the work. According to Young et al., (2015), the mental burden of the work involves several things, the need to maintain a high level of vigilance for a certain period, the need to make decisions, decrease in concentration due to monotony and lack of human contact.

Excessive mental workload can cause physical, mental and social symptoms as described by (Young et al., 2015). The physical symptoms includes excessive mental workload which can cause headaches, abdominal pain, easily shocked, disturbed sleep patterns, lethargy, stiff neck back to back, decreased appetite and others. Workload can be measured objectively and subjectively. Objective measurements are made by measuring heart rate, body fluids, blinking time, eye movement patterns, salivary acid levels, and work performance by calculating the number of errors and changes in the work rate. Subjective measurement of workload is done with a psychological approach by creating a psychometric scale to measure workload.

Psychometric scaling can be done directly (spontaneously) or indirectly (derived from experimental responses). The measurement method used is to choose factors that influence mental workload and provide subjective assessments.

The stages of subjective measurement of mental workloads is determining the mental workload factor on the observed work by determining the range and interval values, choosing a significant workload factor for specific tasks and determining the subjective errors that are calculated to have an influence in estimating and studying workloads. The objectives of measuring subjective mental workloads are to determine the best scale based on experimental calculations, to determine differences in scale for different types of work and to identify mental workload factors that are significantly related based on empirical and subjective research using workload ratings from certain population samples.

The subjective workload can be measured by several methods namely the National Aeronautics and Space Administration Task Load Index (NASA-TLX), Subjective Workload Assessment Technique (SWAT), Modified Cooper Harper Scaling, Multidescriptor Scale, and Rating Scale Mental Effort (RSME) (Widyanti, et al. 2010; Widyanti, et al, 2013). Based on the statement issued by Young, et al (2015), among several methods that give a good result are including NASA-TLX, and SWAT. Other studies also showed that measurement of NASA-

$$n = \frac{(Z_1 - \alpha/2)^2 \, p \, q \, N}{d^2(N-1) + (Z_1 - \alpha/2)^2 \, p \, q}$$

TLX is superior in terms of sensitivity, validity, and the reception from the perspective of the respondents (Grier, 2015).

NASA-TLX method is a method used to analyze the mental workload faced by workers who must perform various activities in their work. This method was developed by Sandra G. Hart of NASA-Ames Research Center and Lowell E. Staveland from San Jose State University in 1981. This method was developed by the emergence of the needs of subjective measurement scale consisting of nine factors (difficulty of the task, time pressure, type of activity, physical effort, mental effort, performance, frustration, stress, and fatigue). Among the nine factors, it reduced to 6, including Mental demands (MD), Physical demands (PD), Temporal demands (TD), Performance (P), Effort (E), level of frustration (FR). NASA-TLX (Task Load Index Nasa) is a method for measuring a subjective mental workload. The NASA-TLX measurement method is divided into two stages, which are the ratio of any scale (Paired Comparison) and assessment work (Event Scoring).

Based on this fact, the possibility of workload in maintaining health and safety is high, so it is necessary to assess the workload to prevent negative impacts caused by heavy workloads.

Based on explanation before, it shows that HSE worker mental workload portrait is important. So, PT. Pertamina RU IV Cilacap can take action based on the portrait that was taken by the measurement.

METHOD

This research is a descriptive quantitative study. When reviewed regarding the time, this study was a cross-sectional study because the data was taken at a time.

The population in this study were all workers in the HSE Pertamina RU IV Cilacap section of 256 people. The sample size in this study was determined using the Lemeshow formula.

Where:

n = the minimum number of samples needed

N = number of study populations

α = degree of trust. In this study was 0.05

Z = Z score based on the desired α value

d = fault/error tolerance

p = proportion of cases studied

q = proportion for the occurrence of an event, 1-p

Based on these calculations, the sample used was 71 workers from the HSE department of PT. Pertamina RU IV Cilacap.

The sampling technique used in this study was Stratified Random Sampling. This is due to differences in levels of education in the HSE section, as well as a comparison of the number of workers between different levels of education. This research was conducted in the HSE department of PT. Pertamina RU IV Cilacap. This research began in April 2018 until October 2019.

The variable in this study was the mental workload of HSE workers PT. Pertamina RU IV Cilacap. The data in this study were obtained by interviewing and filling out the NASA-tlx questionnaire. In measuring NASA-TLX, there were 6 indicators that must be considered (Indrawati, Prabaswari and Pradipta, 2018). Those indicators include Mental Demands which are the amount of mental and perceptual activity demands required at work, Physical Demands which are the amount of

Table 1. Pairwise Comparison Between NASA-tlx Mental Workload Indicators

Mark	Mental Workload Indicator		Mark
	MD	PD	
	MD	TD	
	MD	OP	
	MD	E	
	MD	F	
	PD	TD	
	PD	OP	
	PD	E	
	PD	F	
	TD	OP	
	TD	E	
	TD	F	
	OP	E	
	OP	F	
	E	F	

Table 2. Mental Workload Level

Score	Mental Workload Level
0 - 20	Very Light
21 - 40	Light
41 - 60	Medium
61 - 80	Weight
81 - 100	Very Heavy

physical activity needed at work, Temporal Demands which is the amount of time pressure felt during doing work, Own Performance which is the amount of success (satisfaction) in achieving job targets, effort which is the amount of effort that is spent mentally and physically needed to reach the level of performance and Frustration which is the amount of insecurity, despair, offense, stress, and disturbance compared to feeling safe, satisfied, fit, comfortable, and self-satisfaction felt while doing the work.

This questionnaire was carried out with the following steps. There were weighting, rating, calculating the mental elements value, calculating the weighted workload, calculating the average weighted workload, and interpreting the data.

In the weighting step, respondents were asked to choose one of the two elements (the comparison between elements that are paired into 15 pairs) that was felt to be more dominant related to mental workload on the work they do. The data in this step were the number of tallies that was the weight of each element.

In the rating step, Respondents were asked to rate each element of mental workload. This was subjective because it was related to how the respondent feels. The rating was done by six parameters. There were mental demands, physical demands, temporal demands, own performance, efforts, and frustration.

The mental demands are about how much mental activity is needed. If the rating value is high then the work will be more difficult. Physical demands are about how much physical effort is needed. If the rating value is high then the physical load such as lifting or pulling gets heavier and if the rating value is low then the physical load gets lighter. The temporal demands are about how much time pressure is felt. If the rating value is high, then the time allotted is shorter, if the rating value is low then the time allotted is getting longer.

The own performance is about how big is your success rate in achieving the target on the job. If the rating value is high then the success rate gets worse, and if the rating value gets smaller then the success rate gets smaller. The efforts are about how much effort is given to achieve the job target. If the rating value is high, the effort done is getting bigger, if the rating value is low then the effort done is getting smaller. The last is frustration which is about how much anxiety, feeling depressed, and stress felt to get the job done. If the rating value is high then the insecurity or stress gets bigger, if the rating value is low then the anxiety or insecurity level gets smaller.

Table 3. Evaluation of the Level of Mental Workload on the HSE Function of PT. Pertamina RU IV Cilacap in 2018

Mental Workload Level	n	%
Very light	0	0
Light	0	0
Moderate	5	7.04
Heavy	35	49.29
Very heavy	31	43.67
Total	71	100

Table 4. Mental Workload Evaluation in the Fire & Insurance Unit of PT. Pertamina RU IV Cilacap in 2018

Mental Workload Elements	Score
Mental demand	180.00
Physical demand	191.25
Temporal demand	158.13
Own performance	287.50
Efforts	283.13
Frustration	53.75

In the calculating step, there were three calculation that needs to be done. There were the mental workload elements, the weighted workload, and the average weighted workload. The mental workload elements value was determined by multiplying each of the element's mental workload with the number of the tallies. As for the weighted workload, it was obtained by adding up the values of the mental workload that have been obtained. The average weighted workload was obtained by dividing the amount of WWL with the number of mental workload elements then it would produce a value for the workload felt by the respondent.

After all of the data were collected, then data interpretation was conducted. Data interpretation was conducted by processing and categorizing the weight mental workload data into 5 groups, which can be seen in the following table.

This research has been reviewed and approved by the Health Research Ethics Commitee Faculty of Public Health of Universitas Airlangga. The code of ethics approval number is No: 167-KEPK.

Table 5. Mental Workload Evaluation in the Occupational Health Unit of PT. Pertamina RU IV Cilacap in 2018

Mental Workload Elements	Score
Mental demand	214.44
Physical demand	152.22
Temporal demand	179.44
Own performance	292.22
Efforts	233.67
Frustration	133.89

Table 6. Mental Workload Evaluation in the Safety Unit of PT. Pertamina RU IV Cilacap in 2018

Mental Workload Elements	Score
Mental demand	207.35
Physical demand	108.53
Temporal demand	185.00
Own performance	249.71
Efforts	319.12
Frustration	120.59

Table 7. Mental Workload Evaluation in the Environment Unit of PT. Pertamina RU IV Cilacap in 2018

Mental Workload Elements	Value
Mental demand	227.93
Physical demand	175.05
Temporal demand	205.69
Own performance	238.59
Efforts	277.93
Frustration	58.24

RESULTS

Mental Workloads Evaluation

Based on the results obtained, table 3 is an evaluation of mental workload in the HSE function of PT. Pertamina RU IV Cilacap.

Based on table 3, it can be seen that most of the workers in the HSE function of PT. Pertamina RU IV Cilacap has a high mental workload and even tends to be very high. This can be seen from the absence of workers who had low and very low workloads. It can also be seen from the number of workers who had a moderate workload of 5 people (7.04%).

The HSE function has 4 work units namely Occupational Health, Safety, Environment, and Fire & Insurance. Each work unit certainly has a different mental workload. Measurement of mental workload using NASA-tlx consisted of 6 elements those are Mental Demand (MD), Physical Demand (PD), Temporal Demand (TD), Own Performance (OP), Effort (EF) and Frustration (FR) in each work unit. Measurement of each unit in HSE was done by calculating the average value of each element, so it can be seen which element had the highest value. The following is the results regarding the amount of mental workload values based on the elements of mental workload.

Fire & Insurance Unit

Evaluation results regarding the level of mental workload on the Fire & Insurance section that were carried out by filling out a questionnaire on 16 workers. The following is a table of results regarding the level of mental workload.

In general, the Fire & Insurance unit had a high level of mental workload with an average value of 76.92. Based on table 4, it can be seen that own performance was an element of mental workload that had the highest value in the Fire & Insurance unit.

Occupational Health Unit

The results of the evaluation in the Occupational Health unit were obtained by filling out a questionnaire by 9 respondents. The following is the results of the questionnaire.

Overall, the Occupational Health unit had a high level of mental workload. With an average value of 80.39, mental workload in the Occupational Health unit almost entered the very high category. Based on table 5, it can be seen that the own performance element has the highest value that is equal to 292.22.

Safety Unit

An evaluation of the level of mental workload in the Safety section was obtained by filling out a questionnaire by 17 workers. The following is the results of the questionnaire that was distributed.

Table 6 shows that the safety unit had a high level of workload. This can be seen from the average value of mental workload which shows a figure of 79.35. Based on table 6, it can be seen that the highest average value was owned by the efforts element that is equal to 319.12.

Table 8. Mental Workload Evaluation in the HSE Department f PT. Pertamina RU IV Cilacap in 2018

Mental Workload Elements	Units			
	Safety	Occupational Health	Fire & Insurance	Environment
Mental demand	207.35	214.44	180.00	227.93
Physical demand	108.53	152.22	191.25	175.05
Temporal demand	185.00	179.44	158.13	205.69
Own performance	249.71	292.22	287.50	238.59
Effort	319.12	233.67	283.13	277.93
Frustration	120.59	133.89	53.75	58.24

Environment Unit

Evaluation results regarding the level of mental workload in the environment unit were obtained by filling out a questionnaire by 29 respondents. The following is the results of the assessment of the level of mental workload in the Environment unit.

Overall, the level of mental labor load in the environment unit was high. This can be seen from the average value of 78.90. Based on table 7, it can be seen that the highest value on the mental workload element in the environment unit was efforts with an average value of 277.93.

HSE Department

Overall, the results of mental workload in all of units (Fire & Insurance, Occupational Health, Safety, Environment) in HSE Section can be seen in table 8.

Overall, from these data, it can be seen in Table 8, that the highest mental workload elements in the HSE function were own performance and efforts. This data show that to achieve the level of satisfaction and success in the target work in the HSE function, it requires very high performance given the large workload carried out by this function, so that it will demand high effort to be expended by workers both mentally and physically to achieve the best performance. This further encourages heavy and very heavy mental workload experienced by workers in the HSE function.

DISCUSSION

Mental Workloads Evaluation

Based on table 3, it can be seen that the mental workload on the HSE function of PT. Pertamina RU IV Cilacap tended to be high and even very high. Based on the results of the mental workload analysis of each part in the HSE function, the mental workload element that had the highest value was the business and work performance element. The complexity of the work that must be carried out in the HSE function of PT. Pertamina RU IV Cilacap caused high mental workload felt by workers. This can be seen from the scope of work in terms of occupational safety and health and the environment related to the RU IV Cilacap refinery which was the largest refinery in Indonesia.

HSE Department at PT. Pertamina RU IV Cilacap had 4 work units. The work units were, fire & insurance, occupational health, environment and safety. With the aim of preventing and overcoming emergencies, maintaining safety and preserving the environment, HSE is divided into 4 sections to facilitate coordination to achieve these goals.

Fire & Insurance Unit

The result states that fire unit has its own performance as the highest mental workload element. This is because PT. Pertamina RU IV Cilacap is an industry that manages oil and gas. This company has explosive raw materials, processes and products. The fire & insurance work unit here functions to monitor the application of fire protection aspects of readiness & insurance. These aspects include the readiness of fire protection including its facilities, emergency prevention and handling efforts, to insurance. The implementation of the work concept can be seen from the programs in this work unit such as rescue training, fire drill, fire extinguisher use, fire alarm system and investigation in case of a case occurs. Those excluded the conditions where fire is starting to be uncontrollable. If these situations occur, they have to act right and quickly so they can reduce the damage caused by the fire. In addition, several workers were found to have more than 1 role in the HSE section. This is in line with research that has been done at PT Pertamina Transcontinental

that high workload is caused due to unclear job description. Starting from the lack of manpower, the job description of several jobs was carried out by the same worker (Pandiangan et al., 2019).

Occupational Health Unit

Another work unit is Occupational Health. This work unit has a work function in the form of applying health aspects of the work environment. These aspects include analysis and control of occupational disease risks and the provision of personal protective equipment against hazards that can cause occupational diseases. Another thing that this unit has to do is when there are cases regarding disease that is presummed caused by work. The workers here have to analyze carefully so the cause of the disease is clear and provide appropriate treatment, conduct mitigation evaluations and arrange administration regarding related cases to reduce the possibility of occupational diseases. With a large burden of responsibility, the OH section may have a high workload due to lack of manpower. This is due to the vast work area, in which the OH section only has 12 workers. This is in accordance with research conducted by (Andini, 2015) stating that one of the causes of the high mental workload is due to the lack of manpower at work.

Safety Unit

Not separated from the occupational health unit, there is a safety unit in the HSE department. In the results, it was mentioned that the safety unit has an effort as the highest mental workload element due to its work to maintain the work environment in order to remain safe for workers and prevent work accidents. These aspects include the implementation of PEKA programs, tagging, CSMS programs, and other programs. This is in line with research conducted by (Andini, 2015) at PT Pertamina RU V Balikpapan that with a high workload in the HSE Sarfas maintenance technician section, it requires its workers to oversee the security of the unit in terms of maintenance and HSE. The same thing happened in RU IV Cilacap with very large units with 263 ha refinery unit area and the number of safety workers was not much with 49 workers, causing workloads to become high.

Environment Unit

The last work unit is the environment unit. This unit functions to monitor environmental aspects in RU IV Cilacap. These aspects include environmental management and monitoring that refers to applicable environmental policies. Starting from RKL/RPL, UKL/UPL, AMDAL, to achieve PROPER. This including when there are cases such as oil spilling. This unit has to resolve the problems quickly so the related case does not have a big impact on the surrounding environment and prevents the company's image from deteriorating. Even though the number of workers in the environment section counts as many as 113 people, but the majority of workers in this section are carpenters. The burden of responsibility from the environment work section that has been mentioned is borne by PT. Pertamina RU IV Cilacap workers as many as 5 people and a small team of outsourcing workers.

HSE Department

Some things that affect mental burden according to (Young et al., 2015) are the necessity to maintain a high level of vigilance during a certain period and the need to make decisions. The high mental workload in the HSE section of PT. Pertamina RU IV Cilacap due to the purpose of the HSE function itself. The aim is to monitor and create a safe work environment, starting from before the work starts until the work is completed. Where HSE workers must continue to supervise and move quickly when an accident occurs in order to reduce the impact.

Based on table 3 and 8, it can be seen that the high mental workload in the HSE section shown by this data indicates that the level of work stress for workers in the HSE function tends to be heavy. This is considering the high measurement results for the mental workload level which was at a heavy level and very heavy for two main elements, which are own performance and efforts. Further analysis was concerning the mental workload element that has the highest value among the 4 work units which is the element of own performance and effort. This is because HSE workers are required to be able to carry out analysis in the field as well as recap the data from the analysis. This will require good performance and effort both physically and mentally.

Other information obtained by the researchers is that according to respondents, one of the causes of the high workload on the HSE function is the lack of manpower. This is because PT. Pertamina has experienced a vacuum for recruitment activities for a long time in the 90s. Thus, the work is considered too much for the amount of manpower that available.

However, PT. Pertamina is still carrying out efforts to solve this problem by doing regular recruitment.

The application of mental workload management is expected to reduce the excessive mental workload that occurs. Another expectation is that it can enable workers to carry out their duties properly and minimize the possibility of impacts resulting from excessive mental workloads.

CONCLUSION

Based on the explanation of the results and discussions that have been carried out, it can be concluded that the workers of PT. Pertamina RU IV Cilacap has a mental workload that tends to be heavy and even very heavy. This can be corrected by doing good mental workload management, especially by recruiting and adjusting work tasks.

ACKNOWLEDGEMENTS

The author expresses gratitude for Dr. Y. Denny Ardyanto W., Ir, M.S. that has provided guidance to the author, so the author can finish this journal. Furthermore, the author also gives gratitude to Arjon Siagian that helped the author to collect data and gave guidance so the author can map out the data better.

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