

Correlation between Individual Characteristics, Work Monotony, and Mental Workload with Work Stress

Ainayya Rizky Savitri, Noeroel Widajati

Departement of Occupational Safety and Health, Faculty of Public Health, Universitas Airlangga, Indonesia
Campus C Mulyorejo, Surabaya, East Java, 60115 Indonesia

ABSTRACT

Introduction: Work stress is the inability of a worker to face job demands, leading to discomfort while working. Work stress can be caused by many factors, among them work monotony, excessive workload, and individual characteristics. This study's aim was to analyze the strength of the relationship among individual characteristics, work monotony, and mental workload with work stress on the crane operators of Jamrud Terminal. **Methods:** This study used cross-sectional design. The population in this study was all crane operators in Jamrud Terminal as many as 28 people. Total sampling was applied as sampling technique. The independent variables in this study include individual characteristics (age and tenure), work monotony obtained from the questionnaire, mental workload which was appraised using NASA-TLX questionnaire, while the dependent variable was work stress assessed with DASS 42 questionnaire. Coefficient contingency and Spearman correlation test were applied to analyze collected data. **Results:** This study revealed 13 operators (46.4%) felt normal work stress and the other operators (53.6%) felt work stress ranging from light until very heavy. Contingency coefficient correlation test resulted in weak relationship among age and work stress and strong relationship among work monotony and work stress. Spearman correlation test revealed weak relationship among tenure and work stress and moderate relationship among mental workload and work stress. **Conclusion:** There were relationships among work monotony and mental workload with work stress on crane operators. The company is advised to give work music, variation on work, and arrange proper break time for crane operator.

Keywords: monotony, operator, stress, workload

Corresponding Author:

Ainayya Rizky Savitri
Email: naya.savitri@gmail.com
Telephone: +6281230312121

INTRODUCTION

Stress can happen to anyone, including workers. The number of work stress-related cases is still high. Based on a survey conducted by Labour Force Survey in 2018-2019, in England there are 602,000 cases of work stress with the prevalence of 1,800 per 100,000 workers. There is estimated to be 12.8 million days loss of work due to work stress and other mental disorders related to work (Health Safety Executive, 2019). The International Labour Organization (2016) stated that 48% of the respondents stated that job demands are hindering them to have healthy lifestyle according to Australian Stress and Wellbeing Survey, and a Survey on

Prevention of Industrial Accidents done in Japan resulted in 32.4% workers had anxiety and stress caused by their work.

In Indonesia, data from Riskesdas 2018 showed that prevalence of mental-emotional disorders on Indonesian citizens aged ≥ 15 years increased from 6% in 2013 to 9.8% (Ministry of Health Republic of Indonesia, 2018). There are also several researches conducted about work stress. As many as 75% or 36 instant noodle checker workers in PT. Indofood CBP Sukses Makmur, Tbk Palembang experienced work stress (Laura, Widjasena and Jayanti, 2017). In addition, research by Febriani (2018) on crane operators of PT. Terminal Petikemas Surabaya resulted in 37.8% people experienced heavy work stress and 35.6% with average level.

Tarwaka (2019) stated that work stress is the inability of workers to face job demands which will result to discomfort while working. World Health

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Organization (2020) described work stress as the response from workers when faced with assertions and tensions from work that are not harmonized with their expertise and competencies. Work stress is both physical and emotional responses from workers to job demands and inability for adapting in order to resolve them. Work stress may cause different responses in different individuals. Those responses will affect individual performance, whether directly or indirectly. If not controlled, work stress might reduce productivity of workers.

According to work stress theory by Cooper (in Munandar, 2020), work stress can be caused by five big factors, which are (1) intrinsic factors in the job, (2) role in organization, (3) career development, (4) relationship at work, and (5) organizational structure and climate. Stress can also be caused by demand from the outside of the organization or job. Problems caused by family or society can pressure someone while doing their job. There are also factors from the inside of an individual that might act as a change factor for stimuli from environment, or known as stressor. Those factors include age and tenure. Anoraga (2016) stated that the older someone gets, the greater the chance for them to experience work stress.

Intrinsic factors in the job are factors that come from inside of the job, categorized into physical demand and task demand (Munandar, 2020). Task demand includes work routine and workload. According to Verawati (2017), a worker who does repetitive and boring work might trigger them to feel demotivated and stressed. Excessive workload might also burden workers. Tarwaka (2019) stated that excessive workload might cause overstress, while lack of workload might cause worker to feel under-stressed. It is important to balance task demands to suit the worker's ability, which can be done through controlling the workload.

PT. Pelabuhan Indonesia III, or better known as Pelindo III, is a company owned by the state. Pelindo III is engaged in the transportation sector, running 43 public Terminals in seven provinces in Indonesia. One of the provinces PT. Pelindo III manages is East Java. The biggest and busiest Port in East Java is Tanjung Perak Port. According to Pelindo III (2018), Tanjung Perak Port is the center of domestic containers in Indonesia, with 72 routes of domestic shipping to and from Tanjung Perak Port. Pelindo III (2018) recorded the stream of containers in 2017 amounted to 4,9 million TEUs and it increased to 5,3 million TEUs in 2018. The

flow of domestic containers in 2018 recorded 3 million TEUs, where 70% of it happened in Tanjung Perak Port.

Tanjung Perak Port has several terminals to support its busy activities, namely Jamrud Terminal, Nilam Terminal, and Mirah Terminal. Jamrud Terminal is divided into three areas, namely North Jamrud, West Jamrud, and South Jamrud. North and West Jamrud are allocated for international loading and unloading operations, while South Jamrud is used for domestic dry bulk and general cargo/non-container. To help the activity of loading and unloading in Jamrud Terminal, there are cranes named Harbor Mobile Crane (HMC) and Harbor Port Crane (HPC). A crane is operated by an operator. According to Ministry of Manpower and Transmigration Republic of Indonesia (2020), an operator is the labor who has special ability and skill to operate lifting and transporting instruments. To be able to work, an operator must be certified with a license called Surat Izin Operator (SIO).

Based on the results from field observations, the height of HMC and HPC reaches 20 meters above sea level. The operators work on a shift system, which is divided into three shifts. Morning shift is from 08.00 until 16.00, afternoon shift from 16.00 until 00.00 and, night shift from 00.00 until 08.00. The 28 crane operators are also divided into four groups, namely group A-D. Group A consists of seven operators, B with six operators, C with eight operators, and D with seven operators. The work process of loading and unloading using HMC and HPC is almost the same, where the operator sits in a static posture with their eyes focused on between the monitor camera and the view of the loading/unloading process. Their hands are either used to grip on the crane's controller or to operate the buttons of the instrument.

From the results of interviews with the HMC and HPC operators of Jamrud Terminal, information regarding their work as monotonous work was gained. They said that all they have to do was sit and repeatedly do the loading/unloading process, which makes their job a repetitive one. Crane operators often feel bored as they have to wait for a long time on their cranes for the ship, cargo truck, and/or the load to be ready. In addition, crane operators experience high mental workload, as they use mental activities more than physical ones while working. Mental activities done by crane operators are focusing and concentrating on the movement of the load. While operating the crane, operators

are responsible of their own safety, the safety of the crane itself, and also the safety of other people around the instrument. Hence, the purpose of this study is to analyze the strength of the relationship between individual characteristics, work monotony, and mental workload with work stress of crane operators at Jamrud Terminal.

METHODS

This research is categorized as a quantitative study. The design of this research is cross-sectional. This research is observational research because the object of research does not given any special treatments. In addition, when viewed from the nature of the problem and how the data are analyzed, this study is categorized as analytical research because its purpose is to analyze the strength of the relationship between individual characteristics, work monotony, and mental workload with work stress on crane operators of Jamrud Terminal.

All crane operators in Nilam and Jamrud Terminal (58 people) were this study's population. The sample in this study also amounted to 58 people considering this study used total sampling technique, where all populations were samples. Independent variables in this study include individual characteristics (age and tenure), work monotony, as well as mental workload. Work stress is the independent variable for this study. Primary data are utilized in this study. Individual characteristics (age and tenure) as well as work monotony were obtained from questionnaire, mental workload data were measured using the NASA-TLX questionnaire, and work stress data were measured using DASS 42 questionnaire.

The questionnaire for work monotony is based from research conducted by Baek *et al.* (2018). Work monotony is categorized into two categories, which are: 1) Monotonous and 2) Not Monotonous. Mental workload is measured using NASA-TLX (acronym for National Aeronautics & Space Administration-Task Load Index) from Tarwaka (2019). There are six dimensions on NASA-TLX, which are Mental Demand (MD), Physical Demand (PD), Temporal Demand (TD), Own Performance (OP), Effort (EF), and Frustration (FR). The steps of measuring mental workload using NASA-TLX include weighting, rating, and categorizing mental workload based on the final score.

For work stress, DASS 42 (acronym for Depression Anxiety Stress Scale 42) questionnaire

is used. DASS 42 is an instrument used to measure someone's level of depression, anxiety, and stress. To measure the level of stress, the questions asked are the ones regarding stress, which are 14 items: question item number 1, 6, 8, 11, 12, 14, 18, 22, 27, 29, 32, 33, 35, and 39.

After data collection is completed, the data are then processed with SPSS application. Univariate and bivariate analysis are performed to analyze the data. Univariate analysis is needed to determine the frequency distribution of each variable. Bivariate analysis in the forms of contingency coefficient and Spearman correlation tests are used to find out the strength of the relationship between variables.

This research was done at Jamrud Terminal, Tanjung Perak Port on PT. Pelindo III. This research was conducted in March 2021. Ethical test for this research has passed requirements at the Faculty of Dentistry, Universitas Airlangga with number 053/HRECC.FODM/II/2021.

RESULT

Individual Characteristics of the Workers

Individual characteristics in this study included age and tenure. Table 1 shows that the age of most crane operators is 21-40 years, amounting to 75% or 21 people. The other crane operators are aged 21-60 years, amounting to 25% or seven people.

Table 1 also shows that most leading tenure of crane operators at Jamrud Terminal is 6-10 years, amounting to 46.4% or 13 people. Crane operators with tenure of ≤ 5 years amounting to 35.7% or 10 people, while crane operators with tenure of >10 years are 17.9% or five people.

Work Monotony of the Workers

Work monotony is measured using questionnaire. Table 2 reveals that the leading work

Table 1. The Frequency Distribution of Crane Operators' Individual Characteristics at Jamrud Terminal in 2021

Individual Characteristics	Group	Number of People (n)	Percentage (%)
Age (years)	21-40	21	75
	41-60	7	25
Tenure (years)	≤ 5	10	35.7
	6-10	13	46.4
	>10	5	17.9

monotony of crane operators at Jamrud Terminal is monotonous, in the amount of 53.6% or 15 people. The rest of the crane operators at Jamrud Terminal had not monotonous work, amounting to 46.4% or 13 people.

Mental Workload of the Workers

Data about mental workload were obtained by calculating the final score from NASA-TLX questionnaire. Table 3 displays that the leading mental workload of crane operators is very high, amounting to 46.4% or 13 people. In addition, 28.6% or eight people had high mental workload and 25% or seven people had moderate mental workload.

Table 2. The Frequency Distribution of Crane Operators' Characteristics Based on Work Monotony at Jamrud Terminal in 2021

Work Monotony	Number of People (n)	Percentage (%)
Monotonous	15	53.6
Not monotonous	13	46.4
Total	28	100

Table 3. The Frequency Distribution of Crane Operators' Characteristics Based on Mental Workload at Jamrud Terminal in 2021

Work Monotony	Number of People (n)	Percentage (%)
Moderate	7	25
High	8	28.6
Very High	13	46.4
Total	28	100

Work Stress of the Workers

Data about work stress were obtained by calculating the final score from DASS 42 questionnaire. Table 4 reveals that leading work stress of crane operators is normal, amounting to 46.4% or 13 people.

Correlation between Variables with Work Stress

Table 5 displays that the strength of the relationship among age and work stress of crane operators at Jamrud Terminal is weak with coefficient correlation of 0.390 using contingency coefficient correlation test. The strength of the relationship between tenure and work stress of crane operators at Jamrud Terminal is weak with coefficient correlation of 0.357 using Spearman correlation test. Table 5 also shows that the strength of the relationship between work monotony and work stress of crane operators at Jamrud Terminal is strong with coefficient correlation of 0.707 using contingency coefficient correlation test. In addition, the strength

Table 4. The Frequency Distribution of Crane Operators' Characteristics Based on Work Stress at Jamrud Terminal in 2021

Work Stress	Number of People (n)	Percentage (%)
Normal	13	46.4
Light	4	14.3
Moderate	8	28.6
Heavy	2	7.1
Very Heavy	1	3.6
Total	28	100

Table 5. The Cross-Tabulation of Independent Variables and Work Stress of Crane Operators at Jamrud Terminal in 2021

Independent Variables	Group	Work Stress										Coefficient Correlation
		Normal		Light		Moderate		Heavy		Very Heavy		
		n	%	n	%	n	%	n	%	n	%	
Age	21-40 years	10	35.7	4	14.3	4	14.3	2	7.1	1	3.6	0.390
	41-60 years	3	10.7	-	-	4	14.3	-	-	-	-	
	≤5 years	7	25	1	3.6	2	7.1	-	-	-	-	
Tenure	6-10 years	5	17.9	2	7.1	3	10.7	2	7.1	1	3.6	0.357
	>10 years	1	3.6	1	3.6	3	10.7	-	-	-	-	
Work Monotony	Monotonous	-	-	4	14.3	8	28.6	2	7.1	1	3.6	0.707
	Not Monotonous	13	46.4	-	-	-	-	-	-	-	-	
Mental Workload	Moderate	7	25	-	-	-	-	-	-	-	-	0.463
	High	2	7.1	2	7.1	3	10.7	1	3.6	-	-	
	Very High	4	14.3	2	7.1	5	17.9	1	3.6	1	3.6	

of the relationship among mental workload and work stress of crane operators at Jamrud Terminal is moderate with coefficient correlation of 0.463 using Spearman correlation test.

DISCUSSION

Work Stress of the Crane Operators

This study revealed that most of the crane operators at Jamrud Terminal have normal work stress, yet the rest of them experienced work stress with level ranging from light until very heavy. Similar results were obtained from research by Fitri *et al.* (2017), where 43.9% of the respondents have normal stress level while the rest (56.1%) experienced stress ranging from light until very heavy levels.

Crane operators who have normal work stress are able to manage existing mental demand, resulting to be able to minimize work stress. According to Marlioni (2018), work stress can arise due to the demands of the work environment and the response of each worker in dealing with it is different. A setting that can lead someone to feel stressed might not necessarily provoke the same thing to other people, because it also depends on the nature and personality of each individual. Crane operators having heavy and very heavy work stress is caused by their monotonous work and heavy mental workload. These crane operators have to focus while working for eight hours, dealing with repetitive activity. In addition, the number of operators in each group is different. The insufficient number of operators makes some of them have to work long hours because there's no one to replace them. If a worker is unable to deal with job demands, it might lead to discomfort while working, which is named work stress (World Health Organization, 2020).

The International Labour Organization (2016) stated that the impact of work stress on health can vary, depending on the response of each individual. However, high level of work stress can contribute to fatigue, burnout, depression, cardiovascular disease, and musculoskeletal disease. Tarwaka (2019) said the impact of work stress is categorized into two types, which are impact on individuals and impact on organization. On individuals, stress can affect emotional reaction and cause behavioral or mental changes, as well as physiological changes. On organization, work stress may cause the decrease of work productivity, with signs such as low work

performance, elevated absenteeism, diminished work attitude, and elevated worker turnover that leads to loss of working time.

Correlation between Individual Characteristics with Work Stress

Age is the process of getting older, accompanied by the decrease of work ability caused by changes in body organs, cardiovascular system, and hormonal system. Age might affect workers, especially regarding time to react and the feeling of exhaustion. According to Candraditya (2016), age is often linked with the maturity of one's mindset to make a decision. The older someone gets, the more mature they will be in deciding something. Before making a decision, that person will take into account many considerations especially regarding opportunity and other factors.

Age is also described as period of someone's life conveyed in years, beginning from the date of birth until the date of this research was done. Based on Table 5, it shows that as many as four operators aged 21-40 years experienced light work stress and another four operators experienced moderate work stress. Heavy and very heavy work stress happened in operators aged 21-40 years, with two operators experienced heavy work stress and one operator with very heavy work stress. Meanwhile, four operators aged 41-60 years experienced moderate work stress.

The outcomes of this study demonstrated that the strength of the correlation between age and work stress in crane operators at Jamrud Terminal is weak along with positive direction. The positive direction means that the older someone is, the more work stress they will have. Similar findings were gained from research by Diniari (2019), revealing a very weak relationship among age and work stress in workers in the circulator room of PT. Kerja Rajasa Raya.

This study also demonstrated that most of the crane operators at Jamrud Terminal have been working for 6-10 years as of the time this research was conducted. According to Tarwaka (2016), a worker who has been working on a company for a long time will adapt and adjust to the problems in the workplace. That longer tenure will afford them a bigger chance to get through problems that might occur. Meanwhile, new workers might need some time to adapt to the workplace and the existing problems there.

Tenure can be described as working time calculated starting from when the worker first began working prior to the time this research was conducted. Munandar (2020) stated that workers with longer tenure will have more working experience, where it will lessen job demands and affect the level of work stress. Workers with longer tenure will have more time to adapt to their work environment. Liu, Zhang and Zhang (2020) argued that tenure is closely related to boredom at work. In workers with longer tenure, they will also experience high level of boredom, resulting to the decrease of their engagement in proactive initiatives which eventually will affect their performance.

Based on Table 5, it shows that as many as one operator with tenure of ≤ 5 years experienced light work stress and two other operators experienced moderate work stress. Heavy work stress happened in two operators with tenure of 6-10 years, while very heavy work stress occurred in one operator with the same category of tenure. Meanwhile, one operator with tenure of >10 years experienced light work stress and three other operators experienced moderate work stress. The outcomes of this study demonstrated that the strength of the correlation among tenure and work stress on crane operators at Jamrud Terminal is weak along with positive direction. The positive direction means that the longer someone's tenure is, the more work stress they will have. Similar outcomes were obtained from research by Diniari (2019), where there is a very weak relationship among tenure and work stress on workers in the circulator room of PT. Kerja Rajasa Raya.

The weak relationship of individual characteristics (age and tenure) with work stress experienced by crane operators of Jamrud Terminal might be influenced by the fact they have to be licensed with SIO (Surat Izin Operator) as a requirement to be able to work. According to Pelindo III (2015), every crane operator who wants to acquire a license must undergo the same training. The training includes exposure about knowledge and skills in operating cranes so operators will be more responsible and disciplined while working. Hence, relatively crane operators have the same ability for working as an operator, despite the differences in age and tenure.

Correlation between Work Monotony with Work Stress

Most of the crane operators at Jamrud Terminal considered their work as monotonous. Similar

findings were gained from research by Arini and Dwiyantri (2017), where most of the toll collectors considered their work as monotonous (50.7%). The results of research by Perwitasari and Tualeka (2018) on nurses showed that most of them have monotonous work (57.1%). In addition, Haryanto, Septiari and Rofieq (2020) did research on batik workers with the result that their job is considered as monotonous work, which makes them feel bored easily.

Verawati (2017) described monotonous work as an activity which is done repeatedly on a certain period of time with less variation. If a worker has to do their job repeatedly without any variations or challenges, it might affect them in a bad way. Monotonous work might cause workers to experience boredom, laziness, and tiredness. Monotonous work is also often linked with job dissatisfaction (Okeafor and Alamina, 2018).

Work monotony can be described as repetition of work that can cause negative feelings in workers. Verawati (2017) also claimed that monotonous work is a work that has less variation. That kind of work will cause boredom and reduce work motivation. Monotonous work might also tire workers easily. Work monotony might also cause work stress, as the International Labour Organization (2016) has categorized monotonous work as a psychological hazard because it will gradually change the mental state of the worker.

The results of this study have proven that most of the crane operators at Jamrud Terminal considered their work as monotonous, where all of them experienced work stress ranging from light until very high levels. Data analysis also demonstrated the strength of the correlation between work monotony and work stress on crane operators at Jamrud Terminal was strong along with positive direction. The positive direction means that the more monotonous someone's work is, the higher work stress they will have.

Similar outcomes were found in research by Susanty (2019) where there was a relationship among monotonous work routine with work stress on workers of a mattress factory ($p=0.000$). Research by Li *et al.* (2019) on copper-nickel miners resulted in 42.65% of the miners suffered occupational stress, where monotonous work and the labor organization system become the main sources of stressors.

Nowadays, a lot of work is done with the help of machines. Working speed is increased with the help of increased automation and mechanization, which makes work feels monotonous and becomes

less interesting to do. This condition also happens on crane operators at Jamrud Terminal, where they have to sit down in static posture while doing loading/unloading activity by operating the crane. Work activities of crane operators are done repeatedly, making it a monotonous work (Lina, 2016).

Crane operators also have to spend a lot of their time waiting, either for the ship's load to get ready to be loaded or for the arrival of cargo trucks. The waiting time often makes operators feel impatient and bored. While working on their shift, they also spend time in the crane's cabin, even for praying. In this study, monotonous work has a correlation with the incidence of work stress, which proves the statement made by Munandar (2020) that monotonous work routine (as a part of task demand) might also contribute to work stress.

Correlation between Mental Workload with Work Stress

Most of the crane operators at Jamrud Terminal have very high mental workload. Similar findings were gained from research by Habibi, Taheri and Hasanzadeh (2015) where mental workload is very high among hospital nurses (77.7%). Research by Ardiyanti *et al.* (2017) on nurses and midwives resulted in most of them have very high mental workload (52.38%). In addition, research by Kusman (2019) resulted in 55.56% of crane operators have overload workload with average of mental workload amounting to 61.18%.

According to Hou *et al.* (2015), mental workload is an affiliation between human cognitive scope and the attempt needed to process a certain objective. Van Acker *et al.* (2018) also added that mental workload is a physiological processing state which is experienced subjectively, where there's interaction among one's restricted and multidimensional cognitive assets and the cognitive work demands being revealed. Crane operators have very high mental workload because their work activity requires more mental activities than physical ones. While working, they need to focus and concentrate to operate the crane safely. According to Tarwaka (2019), every mental activity involves perception, interpretation, and mental processing from receiving information.

Crane operators have the responsibility to ensure their own safety, the load moved by the crane, and people around the crane. The safety of the crane itself is also the responsibility of the operator. If they're not concentrating it might result to damage on the instrument, where they have to

pay compensation money for the repair. There is also a target set for the load they have to move per hour (Amalia *et al.*, 2017). The company will give premium for the operators who fulfill the target, making the mental workload experienced by the crane operators very high.

Mental workload can be described as the burden received by workers to complete work involving mental activity. It is important for mental workload to be balanced according to worker's capacity. If a worker receives workload exceeding their capacity, it might lead to overstress (Tarwaka, 2019).

The results of this study prove that most of the crane operators at Jamrud Terminal experienced very high mental workload. According to Table 5, two crane operators who experienced heavy work stress have high mental workload and very heavy mental workload respectively. Table 5 also shows that a crane operator who experienced very heavy work stress also had very high mental workload.

Data analysis demonstrated that the strength of the correlation between mental workload and work stress on crane operators at Jamrud Terminal was moderate with coefficient correlation along with positive direction. The positive direction means that the higher the mental workload is, the higher work stress they will experience. Related with the finding of this research, Fahamsyah (2017) revealed significant relationship among mental workload and work stress in employees of CSSD installation of RSU Haji Surabaya. In addition, research conducted by Sugiharto (2019) on aircraft maintenance officers of PT. X also showed moderate relationship between mental workload and work stress.

Workers who have high mental workload do a lot of mental activities during their work process (Ardiyanti *et al.*, 2017). Crane operators at Jamrud Terminal require high concentration and focus to move load without spilling or damaging anything. The process of loading-unloading needs high accuracy and efficiency. In addition, every crane operator is responsible for the safety of many parties, including their own safety, the crane they're operating, and people around the crane who are involved in loading/unloading activities. There are also targets set for the load the crane operators have to move per hour, in which they will get a premium from the company if the target is fulfilled.

To prevent work stress, it is necessary to adjust the workload according to the capacity and ability of workers. Workload measurement can be done on a regular basis through an assessment of working time. Also, setting reasonable deadlines is needed to

ensure that working hours are predictable and within reasonable limits (International Labour Organization, 2016).

CONCLUSION

There were relationships among work monotony and mental workload with work stress on crane operators. Work monotony has strong relationship with work stress, while mental workload has moderate relationship with work stress. The company is advised to give work music, variation in work, and arrange a proper break time for crane operators.

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REFERENCES

- Amalia, N. R., Wahyuni, I. and Ekawati (2017) 'Hubungan Postur Kerja dengan Keluhan Kelelahan Kerja pada Operator Container Crane PT. Terminal Peti Kemas Semarang', *Jurnal Kesehatan Masyarakat (e-Journal)*, 5(5), pp. 290–298.
- Anoraga, P. (2016) *Psikologi Kerja*. Jakarta: Rineka Cipta.
- Ardiyanti, N. *et al.* (2017) 'Hubungan Beban Kerja Mental dengan Kelelahan Kerja pada Tenaga Keperawatan dan Tenaga Kebidanan di Puskesmas Mlati II Sleman Yogyakarta', *Jurnal Kesehatan Masyarakat (e-Journal)*, 5(5), pp. 264–273.
- Arini, S. Y. and Dwiyantri, E. (2017) 'Analisis Faktor yang Berhubungan dengan Terjadinya Kelelahan Kerja pada Pengumpul Tol di Perusahaan Pengembang Jalan Tol Surabaya', *The Indonesian Journal of Occupational Safety and Health*, 4(2), pp. 113–122.
- Baek, K. *et al.* (2018) 'The Association of Workplace Psychosocial Factors and Musculoskeletal Pain Among Korean Emotional Laborers', *Safety and Health at Work*, 9(2), pp. 216–223.
- Candraditya, R. (2016) *Hubungan Tingkat Kebisingan dengan Stress Kerja pada Pekerja di PT. Vale Indonesia*. Undergraduate Thesis. Surabaya: Faculty of Public Health Universitas Airlangga.
- Diniari, H. R. (2019) *Hubungan Paparan Kebisingan dan Beban Kerja dengan Stres Kerja pada Pekerja di Unit Circulator Loom PT. Kerta Rajasa Raya*. Undergraduate Thesis. Surabaya: Faculty of Public Health Universitas Airlangga.
- Fahamsyah, D. (2017) 'Analisis Hubungan Kerja Mental dengan Stres Kerja', *The Indonesian Journal of Occupational Safety and Health*, 6(1), pp. 107–115.
- Fitri, E. W., Titis, H. and Widodo, S. A. (2017) 'Hubungan Antara Tingkat Stres Dengan Tingkat Insomnia Mahasiswa/I Angkatan 2012/2013 Program Studi Pendidikan Dokter Fakultas Kedokteran Universitas Diponegoro', *Jurnal Kedokteran Diponegoro*, 6(2), pp. 549–557.
- Habibi, E., Taheri, M. R. and Hasanazadeh, A. (2015) 'Relationship between Mental Workload and Musculoskeletal Disorders among Alzahra Hospital Nurses', *Iranian Journal of Nursing and Midwifery Research*, 20(1), pp. 1–6.
- Haryanto, S., Septiari, R. and Rofieq, M. (2020) 'Analisis Tingkat Kelelahan Pada Pembatik Batik Tulis Menggunakan SOFI (Swedish Occupational Fatigue Index)', *Journal of Industrial View*, 2(2), pp. 29–35.
- Health Safety Executive (2019) Work-Related Stress, Anxiety or Depression Statistics in Great Britain, 2019, Annual Statistics.
- Hou, X. *et al.* (2015) 'CogniMeter: EEG-based Emotion, Mental Workload and Stress Visual Monitoring', *2015 International Conference on Cyberworlds (CW)*, pp. 153–160.
- International Labour Organization (2016) Workplace Stress: a collective challenge, International Labour Organization (ILO).
- Kusman, A. (2019) *Analisis Beban Kerja Mental terhadap Operator Crane dan Rigger dengan Menggunakan Metode Nasa-TLX (Studi Kasus: PT. Sinar Samudera Abadi)*. Undergraduate Thesis. Bandung: Faculty of Engineering Universitas Pasundan.
- Laura, N. C. S., Widjasena, B. and Jayanti, S. (2017) 'Hubungan Beban Kerja Mental dan Shift Kerja terhadap Stres Kerja pada Pekerja Checker PT. Indofood CBP Sukses Makmur, TBK Palembang', *Jurnal Kesehatan Masyarakat (e-Journal)*, 5(5), pp. 239–245.
- Li, Y. *et al.* (2019) 'The Status of Occupational Stress and Its Influence The Quality of Life of Copper-Nickel Miners in Xinjiang, China', *International*

- Journal of Environmental Research and Public Health*, 16(3).
- Lina, H. P. (2016) Analysis of Work Stress and Its Relationship with Job Factors at Container Crane (CC) Operators PT. Pelindo III (Persero) Tanjung Perak Branch. Undergraduate Thesis. Surabaya: Faculty of Public Health Universitas Airlangga.
- Liu, X., Zhang, B. and Zhang, Z. (2020) 'Leveraging Organizational Tenure to Improve Service Performance: The Role of Relational Coordination among Frontline Service Workers in China', *Asia Pacific Business Review*, 00(00), pp. 1–20.
- Marliani, R. (2018) *Psikologi Industri & Organisasi*. Bandung: PUSTAKA SETIA.
- Ministry of Health Republic of Indonesia (2018) Riset Kesehatan Dasar (Riskesdas) 2018, Riset Kesehatan Dasar. Jakarta: Ministry of Health Republic of Indonesia.
- Ministry of Manpower and Transmigration Republic of Indonesia (2020) Peraturan Menteri Ketenagakerjaan Republik Indonesia Nomor 8 Tahun 2020 tentang Keselamatan dan Kesehatan Kerja Pesawat Angkat dan Angkut. Jakarta: Ministry of Manpower and Transmigration Republic of Indonesia.
- Munandar, A. S. (2020) *Psikologi Industri dan Organisasi*. Jakarta: UI-Press.
- Okeafor, C. U. and Alamina, F. E. (2018) 'A Qualitative Study on Psychosocial Hazards Among Health Care Workers in a Tertiary Health Facility in South-South Nigeria', *Annals of Ibadan Postgraduate Medicine*, 16(1), pp. 23–29.
- Pelindo III (2015) Press Release: Pelindo III Sertifikasi Operator Container Crane.
- Pelindo III (2018) Arus Petikemas Pelindo III Naik 8,5 Persen.
- Perwitasari, D. and Tualeka, A. R. (2018) 'Faktor yang Berhubungan dengan Kelelahan Kerja Subyektif pada Perawat di RSUD dr. Mohamad Soewandhie Surabaya', *The Indonesian Journal of Occupational Safety and Health*, 6(3), pp. 15–23.
- Sugiharto, F. M. (2019) 'The Relationship between Mental Workload and Occupational Stress among Aircraft Maintenance Officers at PT X', *The Indonesian Journal of Occupational Safety and Health*, 8(2), pp. 233–239.
- Febriani, K. D. (2018) Hubungan Shift Kerja Dengan Tingkat Kelelahan Kerja Pada Operator Container Crane (CC) di PT. Terminal Petikemas Surabaya Jawa Timur. D3 Thesis. Surakarta: Faculty of Medicine Universitas Sebelas Maret.
- Susanty, N. A. (2019) *Hubungan Beban dan Rutinitas Kerja Monoton dengan Stres Kerja Pekerja Pabrik Kasur*. Undergraduate Thesis. Jakarta: Faculty of Medicine Universitas Trisakti.
- Tarwaka (2016) *Dasar-Dasar Keselamatan Kerja serta Pencegahan Kecelakaan di Tempat Kerja*. Surakarta: Harapan Press.
- Tarwaka (2019) *Ergonomi Industri : Dasar-Dasar Pengetahuan Ergonomi dan Aplikasi di Tempat Kerja*. 2nd edn. Surakarta: Harapan Offset.
- Van Acker, B. B. *et al.* (2018) 'Understanding Mental Workload: From A Clarifying Concept Analysis Toward An Implementable Framework', *Cognition, Technology and Work*, 20(3), pp. 351–365.
- Verawati, L. (2017) 'Hubungan Tingkat Kelelahan Subjektif dengan Produktivitas pada Tenaga Kerja Bagian Pengemasan di CV Sumber Barokah', *The Indonesian Journal of Occupational Safety and Health*, 5(1), pp. 51–60.
- World Health Organization (2020) Occupational Health: Stress at The Workplace.