The Effect of Work Environment on Work Productivity: Stress as a Mediator

Anggun Puspita[1], Syamsiar S. Russeng[2], Masyitha Muis[3,]Atjo Wahyu[4,]Andi Zulkifli[5]

[1,2,3,4]*Department of Occupational Safety and Health, Faculty of Public Health, HasanuddinUniversiy, Indonesia*

[5]*Department of Epidemiology, Faculty of Public Health, HasanuddinUniversiy, Indonesia*

***Corresponding Author:** Anggun Puspita, **E-mail:**anggunpuspita2003@gmail.com*

KEYWORDS

Noise, work climate,work stress, work load, work productivity

ABSTRACT:

Introduction: One of the problems in mining is the hot working climate, noise, and long workloads which can affect work productivity.

Objectives: This study aims to analyse the influence of work climate, noice, workload and length of work on work productivity through work stress on workers at PT. AdijayaKaryaMakmur.

Methods: The study employed a quantitative approach with a cross-sectional design, involving 100 respondents selected through stratified random sampling.

Results: The results showed that mental workload significantly affected productivity (p = 0.043) and stress (p = 0.001), with stress acting as a mediator (p = 0.002), while work climate influenced stress (p = 0.025) but not productivity (p = 0.781), and noise had no significant effect on stress (p = 0.738) or productivity (p = 0.174)..

Conclusions: Work climate, physical and mental workload significantly affect work productivity both directly and through work stress as an intervening variable.

1. Introduction

Resources such as capital, materials, machines and productive human resources (HR) are very important for companies because HR plays a crucial role in increasing industrial productivity and competitiveness, which accelerates economic growth [1]. Companies strive to increase employee productivity to compete efficiently, with a focus on a healthy workforce because health supports productivity and performance [2]. Employee productivity in Indonesia is relatively low compared to neighboring countries, so increasing it requires attention to various factors, including comfort and working environment conditions [3]. The work environment, both social and physical, affects employee morale and emotions, so companies need to ensure comfort, cleanliness, safety, and physical conditions such as lighting and ventilation to increase work morale [4]. A comfortable and safe working environment motivates employees, increases morale and productivity, while a less supportive environment can cause stress, decreased health and reduced concentration [5]. As a tropical country with high temperature and humidity, Indonesia faces the challenge of a hot working climate that can burden the body and worsen the health and stamina of workers, especially in heavy physical work [6].

The working climate, which is influenced by temperature, humidity, and other factors, affects the health and stamina of workers, with comfortable temperatures ranging from 24°C to 26°C, while hot temperatures have the potential to cause dehydration and health complaints, especially with heavy workloads. The hot working climate in mining companies, especially with temperatures of 36.2°C, causes workers to sweat quickly and become stressed, as found in 60% of underground mine workers in Australia who start their shifts under stress [7]. Research in Australia shows that 79% of outdoor workers experience stress and fatigue, while research at PT. Albasia Sejahtera Mandiri found that a hot working climate has a significant effect on productivity with a p-value of 0.023. High room temperatures increase body temperature, influenced by ambient temperature and air humidity [8]. Noise is a major disruptive factor in the work environment, with approximately 250 million workers

exposed to noise globally, which causes hearing loss, particularly in the construction, agriculture, and mining industries, and requires effective hearing protection and programs as regulated by the OSHA Noise Standard [9]. In Indonesia, there are 20 cases of occupational diseases per 100,000 workers, and based on the 2018 Basic Health Research (Rikesdas) data, 2.6% of the population experiences hearing loss due to excessive noise exposure in the workplace. Noise in the workplace can cause physiological disorders, communication, deafness, as well as problems such as hearing loss, safety, decreased work performance, fatigue, and stress in workers [10]. Noise in the work environment is a physical hazard that can affect the health of workers, with the permitted standard quality being 85 dB and a maximum working time of 8 hours per day [11]..

A survey conducted by the National Institute for Occupational Safety and Health showed that 40% of American workers experience stress due to noise, 25% consider work as a major stressor, 25% of workers are often tired or stressed, and 29% of workers feel very stressed due to machine noise [12]. Noise can interfere with concentration, cause fatigue and boredom, which leads to decreased worker productivity, and has a negative impact on the company's production process [13]. The measurement results of Suryaatmaja&EkaPridianata (2020) at PT NobelindoSidoarjo showed two areas with noise exceeding the NAB, namely spare parts (85.37 dBA) and waterjet (87.44 dBA), which disrupt work productivity and cause stress and fatigue. Companies need to ensure safe and healthy working conditions to prevent stress in workers with high workloads [14]. Management expects high productivity, but the workload must be in accordance with the worker's abilities, because excessive workload can have a negative impact on productivity [15].

Workload is the demand for tasks that must be completed by employees within a certain time, with varying levels of burden, which becomes a burden if the worker is unable to complete or adapt to the task [16]. Research by Saefullah et al. (2020) shows a significant influence between workload on employee productivity in production at PT. Venia Agape Indonesia, with a t count of 4.305 and a significance of 0.000, as well as other factors such as length of work which can reduce worker efficiency, quality, and health and increase accidents and dissatisfaction [17]. Law No. 13 of 2003 regulates working hours of 7 hours a day for 6 days or 8 hours a day for 5 days. The mining sector has special rules, namely 10 consecutive working weeks with 2 weeks of rest. Long working hours can be detrimental to workers' health. Companies need to be aware of the impact of long working hours on workers' health. Research shows that productivity during overtime decreases between 8.04% and 53.33% on construction projects, influenced by fatigue, health, workforce ability, material and equipment conditions, motivation, location, and disruption to project resources [18].

Work stress can disrupt physical and psychological balance, reduce productivity, and affect employee performance, depending on the level of stress [19]. HSE 2020 data recorded 828,000 workers affected by stress, with a prevalence of 1,579 per 100,000 workers. WHO and ILO call stress a major factor in mental disorders and a cause of 50-60% of workdays lost [20]. Work stress causes 12 billion lost working days each year, costing the global economy US$1 trillion, and WHO recommends action to reduce the risks of stress. Riskesdas 2018 data shows that 9.8% of the Indonesian population experiences stress, with the highest prevalence in Central Sulawesi. Work stress can affect productivity, although some studies show inconsistent results [21]. PT. AdijayaKaryaMakmur (AKM), a contractor of PT. Citra Palu Minerals (CPM) in Palu, Central Sulawesi, operates a gold mine with cyanidation technology. The mining sector often faces work stress due to heavy loads, tight schedules, and targets that add stress, fatigue, and disturbances from the work environment such as noise, heat, and dust. At PT. AKM, more than 100 workers complained about the hot and noisy conditions in the work area with a temperature of 30-34°C. This is what made researchers interested in taking up the problem of Work Climate, Noise, Workload and

Working Hours on Work Productivity through Work Stress on workers at PT. Adijaya Karya Makmur (AKM).

2. Objectives

The purpose of this research to analyse the influence of work climate, noise, workload and length of work on productivity through work stress on workers at PT. AdijayaKaryaMakmur.

3. Methods

Type of Research

The type of research used in this study is quantitative research using a cross-sectional study approach. This research was conducted over a period of 30 days.

Participants

A population of 117 workers. The sample was calculated using the Slovin formula, resulting in 91 respondents rounded up to 100 after adding 9 samples. This research was conducted in accordance with the principles of the National Commission for Health Research Ethics and approved by the ethics committee of Hasanuddin University, Indonesia. After the research is completed, the researchers provide their respective results.

4. Results

The 100 respondents, the majority were aged 20-35 years as many as 76 people (76.0%), followed by 26-45 years as many as 15 people (15.0%), and 46-55 years as many as 9 people (9.0%). Most of the workers were male (86.0%) with 14 female workers (14.0%). All workers at PT. AdijayaKaryaMakmur have a working period of less than 5 years and work more than 8 hours/day. The distribution of work climate shows 40 workers (40.0%) with qualified work climate conditions, while 60 workers (60.0%) work in an environment with unqualified climate risks. A total of 91 workers (91.0%) work in an environment with qualified noise, while 9 workers (9.0%) in an environment with unqualified noise. Light physical burdens are experienced by 63 workers (63.0%), while 37 workers (37.0%) experience heavy physical burdens. For mental workload, 67 workers (67.0%) had low workload, and 33 workers (33.0%) had high workload. Regarding stress, 68 workers (68.0%) experienced mild stress, while 32 workers (32.0%) experienced severe stress. In terms of productivity, 71 workers (71.0%) had good work quality, while 31 workers (31.0%) had poor work productivity

Table 1.Bivariate Analysis of Each Variable

Variables	Work Productivity		P-Value	Job Stress		P-Value
	Good	Not enough		Light	Heavy	
Working Climate						
Qualify	31	9	0.269	28	12	0.828
Doesn't Qualify	40	20		40	20	
Noise						
Qualify	63	28	0.278	61	30	0.715
Doesn't Qualify	8	1		7	2	
Physical Workload						
Light	57	6	0,000	63	0	0,000
Heavy	14	23		5	32	
Mental Workload						
Light	60	7	0,000	65	2	0,000
Heavy	11	22		3	30	

Based on the results of the bivariate analysis in Table 1, it can be seen that physical workload and mental workload are significantly related to work productivity and work stress levels (P-Value <0.05). Heavy physical workload is correlated with lower work productivity and higher stress.Mattersimilar was also found in heavy mental workload. In contrast, the work climate and noise variables did not show a significant relationship to work productivity or stress levels (P-Value > 0.05). This shows that workload factors, both physical and mental, are more dominant in influencing work conditions compared to environmental conditions such as climate and noise.

Table 2 Relationship between Work Stress and Work Productivity

Job Stress	productivityWork				*P-value*
	Good		Not enough		
	n	%	n	%	
Light	62	62.0	6	6.0	0.000
Heavy	9	9.0	23	23.0	

The 100 workers at PT. AdijayaKaryaMakmur, a significant relationship was found between stress levels and work productivity. The results of statistical tests show that the higher the level of stress experienced by workers, the lower their work productivity

Path Analysis

In this study, there are several variables that will be analyzed, including the independent variables are work climate, noise, physical workload, and mental workload, the intervening variable is work stress complaints and the dependent variable is work productivity.

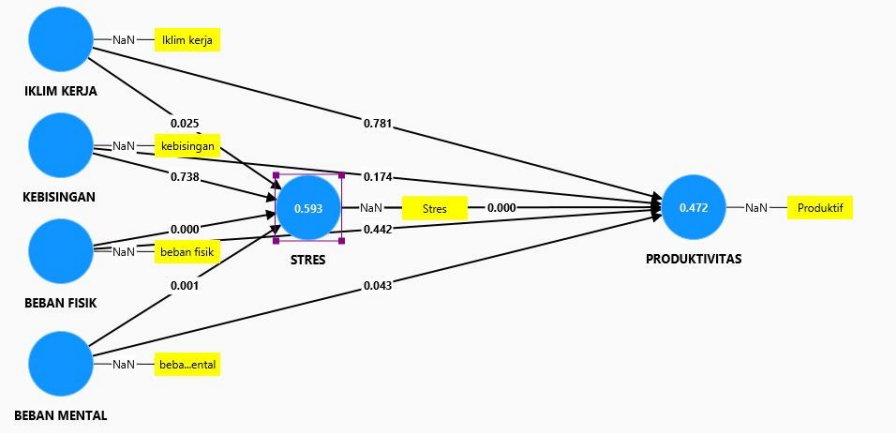

Figure 1: Path Analysis

Table 3 Results of Direct Influence Hypothesis Analysis

Hypothesis	Path Coefficient/ Estimate	P-values	95% Path Coefficient Confidence Interval		F-Square	Caption
			Lower Limit	Upper Limit		
Work Climate -> Productivity	-0.021	0.781	-0.163	0.138	0.001	Low
Work Climate -> Stress	0.147	0.025	-0.278	-0.025	0.051	Low
Noise -> Productivity	0.087	0.174	-0.042	0.211	0.014	Low
Noise -> Stress	0.019	0.738	-0.091	0.129	0.001	Low
Physical Load -> Productivity	0.119	0.442	-0.182	0.425	0.009	Low

Physical Load -> Stress	0.444	0.000	0.258	0.640	0.201	Currently
Mental Load -> Productivity	-0.232	0.043	-0.462	-0.019	0.036	Low
Mental Burden -> Stress	0.381	0.001	0.148	0.586	0.144	Currently
Stress -> Productivity	-0.583	0.000	-0.780	-0.366	0.262	Currently

*P-Value < 0.05: There is a significant effect

This table shows the results of the hypothesis analysis of the direct influence of various factors on productivity and stress. Based on the path coefficient and p-value, the influence of work climate on productivity and noise on stress shows a low and insignificant value (p-value > 0.05), while the influence of work climate on stress has a low and significant influence (p-value = 0.025). Physical burden is proven to have a significant influence on stress (p-value = 0.000) with a moderate influence, while its influence on productivity tends to be low and insignificant. Mental burden has a significant influence on stress and productivity (p-value = 0.001 and 0.043), with a moderate influence on stress and low on productivity. Finally, stress is proven to have a significant influence on productivity (p-value = 0.000) with a moderate influence, indicating that stress plays an important role as a factor that can reduce productivity. Overall, this study indicates that factors such as physical and mental burden and stress have a greater influence on employee performance and productivity compared to noise and work climate.

Table 4

Table 4 Testing the Indirect Effect Hypothesis with the Sobel Test

Hypothesis	Path Coefficient/ Estimate	P values	95% Path Coefficient Confidence Interval		Z-Sobel	Caption
			Lower Limit	Upper Limit		
Work Climate -> Stress -> Productivity	0.085	0.042	0.014	0.178	2,094	Influential
Noise -> Stress -> Productivity	-0.011	0.740	-0.074	0.057	-0.338	No effect
Physical Load -> Stress -> Productivity	-0.259	0.001	-0.422	-0.123	-3.553	Influential
Mental Load -> Stress -> Productivity	-0.222	0.002	-0.367	-0.083	-2,919	Influential

*Z-Sobel> 1.96: There is a significant influence

Table 4 shows the results of the analysis of the indirect influence of work climate, noise, workload, and length of work on work productivity through stress on workers at PT. AdijayaKaryaMakmur. The influence of work stress as a mediator on work climate shows a significant influence with a P-Value of 0.042 and Z-Sobel 2.094, which means that the mediating role of work stress in the influence of work climate on work productivity will increase by 0.178. The effect of work stress on noise is not significant (P-Value 0.740, Z-Sobel -0.338). On the other hand, the role of work stress in mediating the influence of physical workload on work productivity is significant with a P-Value of 0.001 and Z-Sobel -3.553, where this mediating role will increase by -0.123. Likewise, the effect of mental workload on work productivity through work stress is significant with a P-Value of 0.002 and Z-Sobel -2.919, which indicates an increase in mediation of -0.083 if work stress is not immediately intervened.

5. Discussion

The Influence of Work Climate on Work Productivity

The results of the study showed no significant effect between work climate and work productivity, with a path coefficient value of -0.021 indicating a negative effect. The p-value of 0.781 indicates the

insignificance of the effect, and the effect is relatively low with an f-square of 0.001. The results of this study are in line with previous studies showing that the physical work environment does not have a significant effect on employee productivity (t count -0.797 <t table 1.699, p = 0.432> 0.05). This finding is in line with the research of Fitriani et al. (2019). Exposure to heat in the mining sector can cause health problems, work accidents, and decreased performance[22]. The 100 respondents at PT. AKM, 29 workers have low productivity, most of whom work in areas with unqualified working climates, with air temperatures reaching 30-38°C, which have an impact on health, although there is no significant effect on productivity, so management is advised to monitor the working climate to prevent health problems.

The Influence of Work Climate on Work Stress

The study showed a significant effect between work climate and work stress (p-value 0.025, path coefficient 0.147), although the effect was low, with 68 workers experiencing mild stress and 32 severe stress, especially at temperatures above 32°C, so management is advised to provide shelter and drinking water to reduce stress. The results of this study are in line with previous studies showing a significant relationship between hot work climate and work stress (sig 0.003 <0.05, r = 0.561), emphasizing the need for special attention to the health impacts of workers in the mining and construction sectors, with heat hazard control through automation, heat insulation, work schedule arrangements, and the use of personal protective equipment.

The Effect ofNoice on Work Productivity

The results of this study indicate that there is no significant effect between noise and work productivity, with a p-value of 0.174 indicating a low effect (f-square = 0.014). The study shows that the effect of noise on work productivity is very low, with a range of influence between -0.042 to 0.211, and the results of the Chi-Square test show that there is no significant relationship between noise and productivity at PT. Alis Jaya Ciptatama. Noise above 85 dBA can cause health problems, so noise control in the workplace is important, although at PT. AKM most workers are in an environment with safe noise. Companies are advised to improve the discipline of using Personal Protective Equipment (PPE) and continue to manage noise to prevent health impacts and support employee productivity.

The Effect of Noise on Work Stress

The study showed that noise did not significantly affect work stress (p-value 0.738, f-square = 0.001). At PT. AKM, 68 workers experienced mild stress and 32 severe stress, with most of them exposed to noise below the NAB. Although noise above 85 dB can affect health, the use of earmuffs effectively reduces its impact. This study shows that noise in the workplace can affect work stress. Of the 61 respondents exposed to noise above the NAB, 7 experienced mild stress, while 30 of the 32 respondents exposed to noise below the NAB experienced severe stress. Factors such as duration of exposure, noise characteristics, and individual sensitivity to noise can affect stress levels. Similar findings were found in South Korea, where individuals with high sensitivity to noise were more susceptible to stress [23].

The Effect of Physical Workload on Work Productivity

This study shows that physical workload does not have a significant effect on work productivity, with a p-value of 0.442 and a path coefficient of 0.119, indicating a low effect (f-square = 0.009). This finding is in line with Kristina's (2024) research, which also found that physical workload does not significantly affect employee performance, with statistical tests showing t count < t table and probability value> 0.05. Physical workload refers to the tasks and responsibilities that must be completed to achieve organizational goals.[24].Research at PT. AKM shows that workers with light physical loads tend to have good productivity, while heavy physical loads have a negative impact on

performance. This result is in line with previous research which states that low workloads can increase productivity, but high work stress can decrease it

The Effect of Physical Workload on Job Stress

This study shows a significant effect between physical workload and work stress, with a p-value of 0.000 (<0.05) and a path coefficient of 0.444 indicating a positive relationship. This means that changes in physical workload, either increasing or decreasing, have a direct effect on work stress. The results showed that 68 workers experienced mild stress, most of whom had a mild physical load, while 32 workers with severe stress had a severe physical load. Field workers were more likely to experience a severe physical load, while office workers mostly had a mild physical load. Evaluation of physical workload according to worker expertise and training is needed to reduce stress and improve work efficiency.

The Effect of Mental Workload on Work Productivity

The results of the study indicate that mental workload has a significant effect on work productivity with a p-value of 0.043. This study is in line with previous studies showing that increasing mental workload is often associated with decreased productivity. For example, previous studies found that high mental workload is associated with decreased productivity. Observations at PT. AKM showed similar results, where workers with high mental workload had lower work productivity. Workers in the field, security, office, and driver departments, who face high mental stress, showed decreased productivity. This study is consistent with various studies stating that mental workload has a negative effect on work productivity. To reduce these negative impacts, companies need to reduce job demands, provide appropriate compensation, and create a work environment that supports productivity.

The Effect of Mental Workload on Job Stress

This study shows a significant effect between mental workload and job stress (p-value 0.043), with a moderate effect (f-square = 0.144). Job stress has a negative impact on employee performance and absenteeism. Therefore, it is important for management to monitor and manage mental workload effectively, for example by adjusting work targets, dividing tasks fairly, and providing emotional support and relaxation facilities. Job stress at PT. AKM is influenced by mental workload, with field workers more affected by physical and performance factors, while office workers are affected by performance, time, and effort factors. Previous studies have shown a positive relationship between mental workload and job stress.

The Effect of Work Stress on Work Productivity

The results of the study showed that stress had a significant negative effect on productivity with a p-value of 0.000. The higher the stress, the lower the productivity [25]. Although stress can increase productivity to a certain level, excessive stress causes fatigue and decreased performance. Previous studies also support this finding. At PT. AKM, 29 workers with low productivity mostly experienced severe stress, while workers with good productivity experienced more mild stress. Companies need to manage stress with support programs such as stress management training and relaxation facilities to increase productivity.[26]

The Influence of Work Climate on Work Productivity through Work Stress

The results of the study indicate that work climate has a significant effect on work productivity through work stress as a mediator. The P-Value of 0.042 and Z-Sobel 2.094 indicate a significant relationship between work climate and productivity. A conducive work climate improves performance, while conditions that are not conducive reduce performance. Work stress, which arises from an uncomfortable work environment, acts as a link between work climate and productivity. Research at PT. Telkom WitelBekasi found that work stress had a significant effect on productivity by 53.2% [26]. If stress can be managed well, it can be a driver of increased performance.

The Effect of Noise on Work Productivity through Work Stress

Industrial progress increases machine noise, which can trigger stress if it exceeds the limit. Although stress does not mediate the effect of noise on productivity (P-Value 0.740 > 0.05), work stress can function as a motivator, although uncontrolled noise can reduce productivity because it interferes with concentration [27]. This study shows that noise does not have a significant effect on work productivity through stress. Although some areas, such as Crusher and Control Room, have noise exceeding the NAB standard, most workers with low productivity are in areas with noise that meets the standard. Work stress, whether physiological, psychological, or behavioral, is seen in workers in both low and high noise environments. However, most respondents who experience mild or severe stress work in areas with noise below the NAB standard. This study emphasizes the importance of noise adaptation in managing stress [28].

The Effect of Physical Workload on Work Productivity through Work Stress

The study shows that noise does not significantly affect work productivity through stress. Although some areas such as Crusher and Control Room have noise exceeding the NAB standard, most workers with low productivity are in areas with noise that meets the standard [29]. This study emphasizes the importance of creating a conducive work environment to increase company productivity. Symptoms of work stress, both physiological, psychological, and behavioral, appear in workers in both low and high noise environments. However, 91% of respondents who experienced mild or severe stress worked in areas with noise below the NAB standard. This study emphasizes the importance of noise adaptation, which helps individuals manage stress and not be affected by environmental stimuli such as noise.

The Effect of Mental Workload on Work Productivity through Work Stress

This study shows that noise does not significantly affect work productivity through stress. Symptoms of stress occur in workers in both low and high noise environments, and most respondents who experience stress work in areas with noise below the NAB standard [30]. This study emphasizes the importance of noise adaptation in managing stress.Job stress, which is influenced by factors such as tension, job demands, and interpersonal relationships, can reduce performance and productivity. Research at PT. AdhiKarya (Persero) showed a significant relationship between job stress and productivity (p-value = 0.000). Strategies such as counseling, welfare programs, and support management are important to reduce stress and increase employee productivity and well-being.

6. Conclusions

Based on the research findings and direct observations, it is concluded that at PT. AdijayaKaryaMakmur, work climate does not directly affect work productivity but has an indirect influence through work stress. Noise has no direct or indirect impact on productivity, while physical workload does not directly affect productivity but influences it indirectly through stress. Conversely, mental workload significantly impacts productivity both directly and indirectly through stress. To enhance employee well-being and productivity, the company is advised to manage workloads more effectively by ensuring fair task distribution, setting realistic targets, and implementing flexible working hours. These efforts should be complemented by stress management programs, such as counseling, training, and mental health initiatives. Additionally, the company must address the risks associated with work climate and noise by conducting routine environmental measurements, educating employees about workplace hazards, and adopting more comprehensive stress measurement methods to design more targeted interventions.

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References

[1] A. Pratiwi and K. Yudianto, "The Effect of the Work Environment on Work Productivity in PT. Intercontinental Transport Express," *Formosa J. Sci. Technol.*, vol. 2, no. 1, pp. 257–268, 2023, doi: 10.55927/fjst.v2i1.2645.

[2] Anti Zalika, Muhammad Rusdi, and Fakhrina, "the Effect of Leadership, Work Experience, Compensation, and Work Environment on Work Productivity of Production Employees," *Indones. J. Multidiscip. Sci.*, vol. 1, no. 1, pp. 19–34, 2022, doi: 10.59066/ijoms.v1i1.58.

[3] R. Badaruddin, "Faktor - Faktor yang Mempengaruhi Produktivitas Kerja di PT Adijaya Karya Mandiri," pp. 1–210, 2020.

[4] W. N. Handayani and S. W. Hati, "Pengaruh Lingkungan Kerja Fisik Terhadap Produktivitas Kerja Karyawan Operator Bagian Produksipada Perusahaan Manufaktur Di Pt Abc Batam," *Apl. Adm. Media Anal. Masal. Adm.*, vol. 21, no. 1, p. 08, 2022, doi: 10.30649/aamama.v21i1.95.

[5] R. Artomo, "Pengaruh Lingkungan Kerja dan Stres Kerja terhadap Kinerja Karyawan pada PT. Mowilex Indonesia pada Bagian Produksi," no. April, 2020.

[6] Y. Sahendra, S. Riski Amanda, S. Aulia Faradela, Y. Fahrimal, and A. Husna, "Revitalisasi Peran Pemuda Dalam Gerakan Sosial Peduli Perubahan Iklim Di Era Digital Revitalizing the Role of Youth in Social Movements Concerning Climate Change in the Digital Age," *J. Komun. Korporasi dan Media*, vol. 4, no. 1, pp. 1–14, 2023, [Online]. Available: file:///C:/Users/Leonardo Ginting/Downloads/57-Article Text-438-1-10-20230710.pdf%0Ahttps://jasima.fisip-unmul.ac.id/site/index.php/jasima/article/view/57.

[7] Y. E. Cumhur *et al.*, "Hubungan Iklim Kerja Panas Dan Status Gizi Dengan Kelelahan Kerja Pada Pekerja Pabrik Kelapa Sawit Bagian Produksi PT Letawa Kabupaten Mamuju Utara Tahun 2019," *J. Wind Eng. Ind. Aerodyn.*, vol. 26, no. 1, pp. 1–4, 2019.

[8] C. Riawan *et al.*, "Iklim Kerja Dan Motivasi Kerja Terhadap Kinerja Pegawai," *Dikombis J. Din. Ekon. Manaj. dan Bisnis*, vol. 1, no. 2, pp. 281–290, 2022, [Online]. Available: https://doi.org/10.24967/xx.v8i.

[9] NIOSH, "Dampak Hidup di Dunia yang Bising.," vol. 2, pp. 1–13, 2019.

[10] E. Endrianto, "Upaya Pencegahan Kebisingan di Industri Petrokimia.," *J. Educ.*, vol. 5, no. (4), pp. 16478–16493, 2023.

[11] J. Park, S. Chung, J. Lee, J. H. Sung, S. W. Cho, and C. S. Sim, "Noise sensitivity, rather than noise level, predicts the non-auditory effects of noise in community samples: A population-based survey," *BMC Public Health*, vol. 17, no. 1, pp. 1–9, 2017, doi: 10.1186/s12889-017-4244-5.

[12] E. Kerns, E. A. Masterson, C. L. Themann, and G. M. Calvert, "Cardiovascular conditions, hearing difficulty, and occupational noise exposure within US industries and occupations," *Am. J. Ind. Med.*, pp. 477–491, 2018.

[13] V. Suryaatmaja, A., & Eka Pridianata, "Hubungan antara Masa Kerja, Beban Kerja, Intensitas Kebisingan dengan Kelelahan Kerja di PT Nobelindo Sidoarjo.," *J. Heal. Sci. Prev.*, vol. 4, no. (1), pp. 14–22, 2020.

[14] S. Kilbaren and E. Elwindra, "Analisis Faktor Penyebab Stres pada Pekerja Jalur di Pabrik Fabrikasi Baja II PT. Wijaya Karya Industri & Konstruksi Tahun 2019," *J. Persada Husada Indones.*, vol. 7, no. 25, pp. 1–13, 2020.

[15] B. A. T. Kasih, "Hubungan Usia, Beban Kerja, Posisi Tubuh, Dan Aktivitas Fisik Terhadap Kejadian Low Back Pain Pada Perawat Pelaksana Di RS EMC Sentul Tahun 2023," *J. Pengabdi. Ilmu Kesehat.*, vol. 3, no. 2, pp. 160–174, 2023, doi: 10.55606/jpikes.v3i2.2235.

[16] L. Mardiani and N. Dudija, "Pengaruh Beban Kerja Terhadap Kinerja Karyawan Melalui Stres

Kerja Sebagai Variabel Intervening Pada Masa Pandemi Covid-19 (Studi Kasus Pada Tenaga Kesehatan Rumah Sakit Umum Prasetya Bunda)," *e-Proceeding Manag.*, vol. 8, no. 5, pp. 4428–4441, 2021.

[17] R. Santriyana, N., Dwimawati, E., & Listyandini, "Faktor-Faktor yang Berhubungan dengan Kelelahan Kerja pada Pekerja Pembuat Bolu Talas Kujang di Home Industry Kelurahan Bubulak," *Promotor*, vol. 6, no. (4), pp. 402–409., 2023.

[18] A. D. Puspita and N. Widajati, "Gambaran Iklim Kerja Dan Tingkat Dehidrasi Pekerja Shift Pagi Di Bagian Injection Moulding 1 Pt.X Sidoarjo," *J. Public Heal. Res. Community Heal. Dev.*, vol. 1, no. 1, p. 13, 2020, doi: 10.20473/jphrecode.v1i1.20452.

[19] N. Rahayaan, A. P. Tjilen, and H. Tambajong, "Pengaruh Stres Kerja Terhadap Produktivitas Kerja Pegawai Badan Pusat Statistik," *Musamus J. Public Adm.*, vol. 2, no. 01, pp. 1–13, 2019, doi: 10.35724/mjpa.v2i01.2454.

[20] E. M. Singal, A. E. Manampiring, and J. E. Nelwan, "Analisis Faktor-Faktor Yang Berhubungan Dengan Stres Kerja Pada Pegawai Rumah Sakit Mata Provinsi Sulawesi Utara," *Sam Ratulangi J. Public Heal.*, vol. 1, no. 2, p. 040, 2021, doi: 10.35801/srjoph.v1i2.31988.

[21] M. Shujahat, M., Sousa, M. J., Hussain, S., Nawaz, F., Wang, M., & Umer, "Translating the impact of knowledge management processes into knowledge-based innovation: The neglected and mediating role of knowledge-worker productivity.," *J. Bus. Res.*, pp. 422–450, 2019.

[22] D. H. Ramdhan, "Perubahan Iklim Dan Tekanan Panas Di Tempat Kerja: Dampak Kesehatan Dan Pencegahannya," *FKM Univ. Indones.*, pp. 1–18, 2023.

[23] E. Safitri Sillehu, I. Paskarini, F. Tantroman, and S. Sillehu, "Kebisingan dan Stres Kerja Karyawan PT PLN (Persero) Kairatu," *J. Penelit. Kesehat. Suara Forikes*, vol. 13, no. 4, pp. 1066–1071, 2022.

[24] A. R. Vanchapo, "Beban Kerja dan Stres Kerja Scanned by CamScanner," *CV. Penerbit Xiara Media*, no. March 2019, 2022.

[25] M. N. Alam, A. Rahman, and S. Karim, "The impact of work-related stress on the mental health of older workers in the gig economy: A study of online transport drivers in urban areas.," *J. Occup. Heal. Saf.*, vol. 58, no. 2, pp. 112–124, 2021, doi: https://doi.org/10.1016/j.johs.2021.01.005.

[26] A. E. Safitri and A. Gilang, "Pengaruh Stres Kerja terhadap Produktivitas Kerja Karyawan pada PT. Telkom Witel Bekasi," *J. Ilm. MEA (Manajemen, Ekon. dan Akuntansi)*, vol. 4, no. 1, pp. 216–226, 2020.

[27] S. Cahyawati, M. Y. Latuamury, R. Fani, and F. Rumbia, "Pengaruh Kebisingan Terhadap Produktivitas Kerja di Mebel Gemba Kecamatan Kairatu Kabupaten Seram Bagian Barat Tahun 2020," vol. 6, no. 1, pp. 14–18, 2021.

[28] G. Saulina Batubara and F. Abadi, "Pengaruh Beban Kerja Dan Dukungan Rekan Kerja Terhadap Kinerja Karyawan Dengan Stres Kerja Sebagai Variabel Intervening," *SIBATIK J. J. Ilm. Bid. Sos. Ekon. Budaya, Teknol. dan Pendidik.*, vol. 1, no. 11, pp. 2483–2496, 2022, doi: 10.54443/sibatik.v1i11.385.

[29] P. S. Prakoso, S. Nurfadhilah, and L. Rochmawati, "Pengaruh beban kerja Air Traffic Controller terhadap stres kerja di Bandar Udara Internasional Juanda," *J. Teknol. Penerbangan*, vol. 2, no. 2, pp. 20–28, 2018.

[30] L. M. Saleh *et al.*, "The Development of a Work Stress Model for Air TrafficControllers in Indonesia," *Kesmas*, vol. 17, no. 1, pp. 40–47, 2022, doi: 10.21109/kesmas.v17i1.5001.