The Effect of Noise and Lighting on the Output of Work Production in Small and Medium-Sized Foundry Enterprises

Nurmaningsih [1], Agung Kristanto [2], Widodo Hariyono [3], Muhammad Syamsu Hidayat [4], Muhammad Syapril [5]
Universitas Ahmad Dahlan, Yogyakarta

Article Info

ABSTRACT

The main work environment factors which include temperature, lighting, noise, and air circulation are factors that affect the physical, mental, and psychological burden of employees. High physical, mental, and psychological burdens can affect the non-achievement of production output. This is found in Metal Casting SMEs TS Aluminum. The noise level at the TS Aluminum SMEs at the scraping workstation exceeded the normal threshold of 92.42 dB and the lighting at the scraping workstation was below the threshold of 49.8 Lux. This study was conducted to determine the effect of noise and lighting simultaneously or partially on production output at the processing workstation at SMEs TS Aluminum. This study used the multiple linear regression method, with 5 respondents. The equipment used for noise data collection is the Lutron SL-400 Sound Level Meter and lighting is measured using the Lux MeterLX101 A measuring instrument. Based on the results of statistical tests, show that simultaneous and partial noise and lighting variables have a significant positive effect on production output at the processing workstation at SMEs TS Aluminum (p-value < 0.05). Testing the value of multiple coefficients of determination obtained a percentage of 47% of the influence of noise and lighting on productivity variables, while the remaining percentage of 53% was influenced by other variables that were not studied. Suggestions for noise are that SMEs pay more attention to room capacity, pay attention to the layout of employees in filing, installation of room silencers, and workers required to use personal protective equipment (PPE). The lighting suggestion is that SMEs must add lights in every corner of the room so that the lighting is evenly distributed to all rooms.
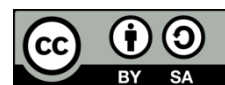
Corresponding Author:

Nurmaningsih
Universitas Ahmad Dahlan
Email: 2108053048@webmai.uad.ac.id

INTRODUCTION

The development of the manufacturing industry which is currently experiencing increasingly rapid progress affects the high business competition by these manufacturing industry players. Business competition can be won, one of which is through improving its performance. The performance generated by operational activities at the workstation will be influenced by the work environment which affects the physical, mental, and psychological burden of the employees [1]. Performance plays a very important role in providing an overview of the quality of workers[2]. and the results of human resource work in the company against the job description provided assuming that maximum employee performance is in line with the improvement of

company performance [3]. The work environment is a factor in improving worker performance divided into two, namely, physical and non-physical [4].

Human resources play an important role in the success of an organization or industry, therefore employees must receive special attention from the industry, especially in terms of work security regulated in Occupational Health and Safety (K3) [5]. A good and comfortable work environment is needed by workers to be able to work optimally and productively[6]. The physical work environment is related to something that can be felt tangibly, directly, or indirectly[7]. The physical work environment can be assessed based on indicators of the arrangement of light, air, noise, temperature, and workspace layout [8]. The adverse effects that can be caused by an unfavorable physical work environment on workers' health are as follows: noise, causing dizziness/headache, feelings of nausea, and shortness of breath; lighting, causing eye fatigue which ultimately results in eye damage [9].

Small and Medium Enterprises (SMEs) TS Aluminum is an industry engaged in manufacturing. which has 6 workstations. The workstations owned are foundry workstations, printing workstations, scraping stations, sanding workstations, turning workstations, and Packing workstations. TS Aluminum UKM has 2 work shifts, namely in the morning at 8:00-12:00 WIB and 13:00-16:00. Regarding the temperature factor, SMEs TS Aluminum in their production process activities have a working environment with a temperature at the scraping workstation of 27.02ºC. So that the data shows that the temperature owned by the scraping workstation is still at the normal threshold set by the Ministry of Health, which is 18-30ºC. The Decree of the Minister of Health (2002) explains that good working environment standards include temperature, among others 18-30ºC, noise of 85 dB, and lighting of 100 lux in the assembly machine area is rough and not continuous. Noise and lighting problems caused by employees cause a decrease in performance and the risk of mild to severe work accidents that can hamper the production process. Production is hampered causing TS Aluminum SMEs to be unable to meet consumer demand.

At the sorting workstation, each operator 5 has a product target that must be sent on average as many as 800-900 products per day, but in its implementation, operators are only able to file 500-700 products, data obtained from interviews with operators in September to November 2020. Based on this, this study aims to determine the influence of noise and lighting factors on work productivity simultaneously or partially at the smoking workstation.

METHOD

In this study, there are independent variables and dependent variables, namely noise (X1) and lighting (X2), and dependent variables, namely production output (Y) at the study workstation at TS Aluminum SMEs. To determine the significant influence between the independent variable and the dependent variable both simultaneously and partially, is done with a multiple linear regression statistical test which is used to determine the direction and how much influence the independent variable has on the dependent variable [10]. The following is a hypothesis analysis of the effect of noise and lighting on production output:
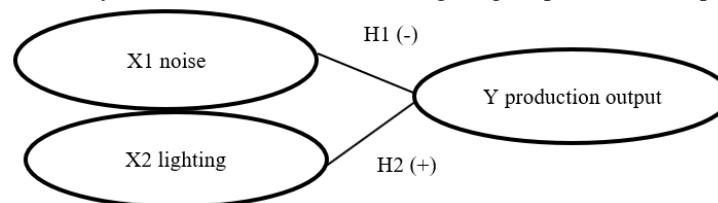
Picture 1. Hypothesis

DISCUSSION

In simultaneous testing, it can be seen that the significance value is 0.00, and the F count is 12.23. So that 0.00, 0.05, and 12.23 > 3.34 it can be concluded that H3 Noise and lighting simultaneously affect production output at the Assessment workstation in Small and Medium Enterprises (SMEs) TS Aluminum. This research is also supported by the research output, Irwanto who said there was a significant positive relationship between lighting and noise on employee performance [11]

Based on the results of the study, shows that there is a significant positive influence of noise on work production output in the noise variable has a significant value of 0.00 with a calculated T value of 3.98 so it can be concluded that if the significant value of (0.00) < alpha (0.05) and T count (3.98) > table T (2.05) then H1 is accepted, meaning that the noise variable has a significant positive effect on production output. at the workstation at TS Aluminum's Small and Medium Enterprises (SMEs).

The results of the study contradict existing theories. The theory is that higher noise levels will interfere with operators at work, which can cause fatigue and reduce production output or employee performance. Noise

causes health and communication problems in employees such as hearing loss, stress, and communication errors, and it can affect employee performance [12]. The non-physical environment is associated with psychological conditions. The work environment is important in determining a comfortable atmosphere at work[13].

The absence of significant noise differences between morning, afternoon, and evening causes no difference in production output in the morning, afternoon, and evening. Thus testing the effect of noise on production output with a regression approach becomes inappropriate. The reality on the ground is that noise conditions are likely to be commonly faced by operators who work for more than 4.4 years on average. However, if the noise level is left unchecked, it will interfere with the operators' sense of hearing in the long run. Given the condition that the noise level exceeds the threshold level, the company must think about how to reduce the existing noise level.

For this reason, the results of research on the effect of noise on production output cannot be used as a basis for formulating recommendations related to noise conditions. Recommendations related to noise are given based on noise conditions that exceed the threshold, such as paying attention to the capacity of the room to make employees feel comfortable at work and paying attention to the layout of employees in filing, the scraping room should be installed with room silencers and expected workers to use Personal Protective Equipment (PPE) such as earplugs.

The effect of lighting on work productivity in the lighting variable has a significant value of 0.03 with a calculated T value of 2.27 so that it can be concluded if the significant value of alpha 41 (0.03 < 0.05) and T calculate > T table (2.27 > 2.05) then H2 is accepted, meaning that the lighting variable has a significant effect on production output at the processing workstation in Small and Medium Enterprises (SMEs) TS Aluminum.

The results of this study are in line with Tachyudin's research stating that lighting has a significant effect on employee performance [14]. The non-physical work environment has the effect of psychological changes in employees so comfortable working conditions are needed to motivate carrying out their work [15].

Recommendations related to lighting are that Small and Medium Enterprises (SMEs) TS Aluminum must add lights in every corner of the room so that lighting in the room is evenly distributed to all rooms. Testing the value of the Multiple Coefficient of Determination (Adjusted R Square) obtained is 0.47 or 47%. It can be seen that 47% of the effect of noise and lighting on productivity variables. While the remaining percentage, which is 53%, the perception of noise analysis and enumeration of production output in TS Aluminum SMEs is influenced by other variables that were not studied in this study.

CONCLUSION

Based on data processing and discussion that has been carried out on the analysis of the effect of noise and lighting on work productivity in small and medium enterprises TS Aluminum SMEs, it is concluded that noise testing and lighting simultaneously can be stated, noise and lighting have a significant effect on work productivity at the thinking workstation at TS Aluminum SMEs so that it can be seen from the significance value of 0.00 and F count of 12.23 so 0.00 < 0.05 and F count (12.23) > table (3.34) then H3 is accepted. Partial lighting variables using multiple linear regression data analysis techniques, the results were obtained that noise had a significant effect on production output at the thinking workstation at TS Aluminum SMEs

For employee work productivity to be good, TS Aluminum SMEs must pay attention to the capacity and layout of the room on the scraping workstation so that the room is not narrow and the TS Aluminum SMEs should add workers and file machines so that production output increases and meets the target, the room at the Scraping Work Station must be installed soundproof so that the sound does not interfere with other work stations, Adding lights in every corner of the work station room so that the lighting in the room is evenly distributed to all rooms with a short distance, SMEs TS Aluminum requires workers to use Personal Protective Equipment (PPE) such as eraplugs.

REFERENCES

[1]   Stephen P R. Perilaku Organisasi. Kedua Bela. Jakarta: Salemba Empat; 2008.

[2]   Ramli AH. Work Environment, Job Satisfaction and Employee Performance in Health Services. Bus Entrep Rev. 2019;19(1):29-42. doi:10.25105/ber.v19i1.5343

[3]   Anthony AE. Effects Of Discipline Management On Employee Performance In An Organization: The Case Of County Education Office Human Resource Department, Turkana County. Int Acad J Hum Resour Bus Adm. 2017;2(3):1-18.

[4]   Sitepu FA, Dalimunthe RF, Sembiring BKF. Effect of Physical Work Environment and Non-Physical Work Environment on Employee Performance through Job Satisfaction at PT. MNC Sky Vision Tbk Medan. Int J Res Rev. 2020;7(5):302-309.

[5]   Lazuardi MR, Sukwika T, Kholil K. Analisis Manajemen Risiko Keselamatan dan Kesehatan Kerja Menggunakan Metode HIRADC pada Departemen Assembly Listrik. J Appl Manag Res. 2022;2(1):11-20. doi:10.36441/jamr.v2i1.811

[6]   Pawennari A, Alisyahbana T, Nurhayati, Ismail H, Tri N. Analisis Pengaruh Lingkungan Kerja Terhadap Respon Psikomotorik Di PT. Sermani Steel. 2018;3(2):32-40

[7]   Sedarmayanti S, Rahadian N. Hubungan Budaya Kerja Dan Lingkungan Kerja Terhadap Peningkatan Kinerja Pegawai Pada Lembaga Pendidikan Tinggi The Correltion Of Work Culture And Work Environment Towards To Enhancementin Employee Performance In College. J Ilmu Adm Media Pengemb Ilmu dan Prakt Adm. 2018;15(1):63-77.

[8]   Al-Omari K, Okasheh H. The influence of work environment on job performance: A case study of an engineering company in Jordan. Int J Appl Eng Res. 2017;12(24):15544-15550.

[9]   Sedarmayanti. Manajemen Sumber Daya Manusia. Bandung: Refika Aditama; 2007.

[10]   Gozali I. Aplikasi Analisis Multivariate Dengan Pogram IBM SPSS. Sembilan. Semarang: Badan Penerbit Universitas Diponegoro; 2018.

[11]   Gunawan. Mahir Menguasai SPSS: Mudah Mengelola Data Dengan IBM SPSS Statistic. 25th ed. Yogyakarta: CV. Budi Utama; 2018.

[12]   Irwanto D. Pengaruh Pencahayaan Dan Kebisingan Tempat Kerja Terhadap Kinerja Karyawan di PT. Perkebunan Nusantara X (Persero) Pabrik Gula Gempolkrep Mojokerto. J Tek Mesin. 2013;1 (2):162-170.

[13]   Pratama MAR, Ratni N. Analisis Pengaruh Tingkat Kebisingan Terhadap Respon Kinerja Karyawan Pdam Tirta Kencana Kota Samarinda. Pros ESEC. 2020;(5):43-50.

[14]   Tachyudin M. Pengaruh Tingkat Kebisingan Dan Pencahayaan. Malang: Karya Ilmiah UM; 2016.

[15]   Wijaya H, Susanty E. Pengaruh lingkungan kerja terhadap kinerja pegawai pada instansi pemerintah daerah kabupaten musi banyuasin. J Econ Globla. 2017;2(1):40-50.