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Measurement of Work Fatigue in Dump Truck Operator at PT. AX, Tenggarong, Indonesia

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A B S T R A C T

Job burnout is a form of work fatigue resulting from work stress , which can manifest as emotional, physical , and mental exhaustion followed by decreased performance . This study aimed to measure job fatigue among PT. AX employees. Data collection was conducted through interviews using a questionnaire. This descriptive study was conducted from February to March 2024. The sample consisted of 80 dump truck operators at PT. AX who were randomly selected. The variables measured included work fatigue level , worker age, length of service , and number of working hours. The results of the study showed that most (80.0%) respondents had less than 10 years of work experience, were less than 31 years old (69.5%), and had eight-hour working hours (46.25%). Although the majority of workers (72.5%) experienced moderate fatigue, 2.5% of workers were found to be in the severe category. Symptoms of fatigue experienced by operators were eye fatigue, and signs of fatigue were seen while driving, such as pain in the lower back, frequent yawning, and frequent thirst. This study found that most dump truck operators at PT AX experienced moderate (72.5%) and severe (2.5%) fatigue.

Kelelahan kerja (Job burnout) merupakan bentuk kelelahan kerja yang akibat stres bekerja, dapat berupa situasi kelelahan emosional, fisik, serta mental yang diikuti oleh penurunan kinerja. Penelitian bertujuan untuk mengukur kelelahan kerja pada karyawan PT. AX. Pengumpulan data dengan wawancara menggunakan kuisioner. Penelitian bersifat deskriptif, dilaksanakan pada bulan Februari hinggga Maret 2024. Sampel penelitian adalah Operator Dump Truck PT. AX (80 orang) yang dipilih secara acak. Variabel yang diukur antara lain tingkat kelelahan kerja, usia pekerja, masa kerja, dan jumlah jam kerja. Hasil penelitian menunjukkan bahwa sebagian besar (80,0%) responden memiliki masa kerja kurang dari 10 tahun, berusia kurang dari 31 tahun (69,5%), dengan jam kerja selama delapan jam (46,25%). Walaupun mayoritas pekerja (72,5%) mengalami kelelahan tingkat sedang, namun, ditemukan 2,5% pekerja telah masuk dalam kategori berat. Gejala dari kelelahan dialami para operator yakni lelah di mata, lalu ciri kelelahan tampak disaat mengemudi yakni nyeri pada bagian pinggang, sering menguap dan sering merasakan haus. Penelitian ini telah mendapatkan bahwa sebagian besar pekerja operator dump-truck di PT AX telah mengalami kelelahan tingkat sedang (72,5%) dan berat (2,5%).

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1. Introduction

Fatigue indicates different physical and mental conditions, but all are caused by decreased work capacity and a lack of endurance in the body to work. Fatigue can be expressed as a situation that varies from individual to individual, but all experience a loss of efficiency, decreased work capacity, and body endurance (Diana, Evendi, and Ismail, 2017). Fatigue is a variety of situations and conditions that coincide with decreased power and endurance while working (Silastuti A, 2023).

Fatigue is a mechanism protection to activate the body to avoid further damage, and recovery can occur after rest. Work fatigue can be caused by weak worker energy when carrying out work, thus increasing the level of errors at the time. Performing work can even result in workplace accidents. Work fatigue is manifested in slow reactions, difficulty making decisions, and low motivation. High levels of fatigue prevent workers from performing well and impact their health (Santriyana, Dwimawati, and Listyandini, 2023).

Job burnout is a form of fatigue at work caused by job stress, especially work in the service sector resulting from emotional, physical, and mental exhaustion (II, 2023) . Job fatigue results in decreased performance, thus impacting the decline in company productivity (Rahmadhani, 2017). The main signs of fatigue are inhibition of the function of consciousness in the brain and changes in the external organs of consciousness. People who are tired will experience decreased attention, inhibition of perception, slow thinking, decreased work ability (Pratiwi, Karimah and Marpaung, 2017).

Work fatigue is a significant factor affecting workforce health and productivity, and contributes to high rates of workplace accidents across various sectors. According to reports from the International Labour Organization (ILO) and the WHO, nearly 3 million people die annually from work-related accidents and diseases, with approximately 750,000 deaths attributed to long working hours as a form of chronic fatigue (WHO & ILO, 2021). In Indonesia, data from the Social Security Agency for Employment (BPJS Ketenagakerjaan) shows an increase in workplace accidents from 221,740 cases (2020) to 265,334 cases (November 2022), mostly occurring in the construction, manufacturing, and mining sectors (Ministry of Manpower, 2022). Each year, an estimated There are 99,000 accident cases, and 70% result in death and disability (Indrawati and Nufus, 2018). According to (Dianti, 2017), work fatigue is related to 50% of work accidents.

Fatigue is influenced by internal factors, including somatic/physical, lifestyle, knowledge, gender, physical, nutritional, status marriage, level education, and medical history. Meanwhile, external factors are influenced by the physical conditions of the work environment (fungi, bacteria, chemicals, toxic substances, noise, lighting, and temperature), ergonomics, job category, nature of the work, discipline / regulations within the company, wages , social , and job position . (Elisyeva, 2021) Other reports state that fatigue is influenced by internal factors (psychological situation , medical history, nutritional status, and age) and external factors (length of work, working period, environmental situation, workload, and work attitude) (Council , 2018).

Fatigue can be reduced or eliminated with various general to specific actions. General actions such as the use of working hours and rest periods in harmony, leave regulations, providing rest areas that take into account physical fitness, holiday breaks and recreation. Meanwhile, special actions relate to controlling physical factors, such as work space lighting that meets health requirements, as well as ergonomic factors (Rahayu, 2017). Ergonomic factors relate to work equipment, work methods, and management of the full work environment physiological and psychological requirements.

PT. AX operates in the wet concrete construction and road paving sectors. Based on preliminary studies, dump truck operators reported fatigue, back pain, and dizziness. Several accidents reported that fatigued dump truck operators forgot to apply the *handbrake*. This study aimed to analyze factors related to work fatigue among dump truck operators at PT. AX in Tenggarong City.

2. Methods

Quantitative research using a cross-sectional design, conducted at PT. AX, Tenggarong, East Kalimantan. The study population was all dump-truck operators in the production department, totaling 100 people. Using the Slovin formula, a sample of 80 people was determined, selected randomly. Data collection was done through interviews using structured instruments. The variables studied were the level of work fatigue, worker age, length of service, and number of working hours. All data were analyzed descriptively and presented in tabular form.

3. Results

1.1. Fatigue level

The study results (Table 1) found that 58 (72.5%) dump truck operators experienced moderate levels of work fatigue. This indicates a potential risk of decreased productivity and health problems if not addressed promptly. Fatigue is generally caused by insufficient rest time and suboptimal use of rest time. Moderate fatigue can develop into chronic fatigue, which impacts occupational safety and performance. Therefore, the implementation of fatigue prevention strategies is necessary.

Table 1. Fatigue level of dump truck operators

Category	Skor	n	%
Not Tired	0	0	0
Mild Fatigue	30-52	20	25%
Moderate Fatigue	53-75	58	72.5%
Severe Fatigue	76-98	2	2.5%
Extreme Fatigue	99-120	0	0

1.2. Employment duration

Table 2 shows that the majority (51.25%) of dump truck operators have worked between 1 and 5 years, followed by 28.75% with 6–10 years of service. The remaining 1920.0% have worked more than 10 years. These data indicate that most operators are still classified as short to medium-term workers, reflecting their limited work experience and potentially impacting their workload and fatigue levels.

Table 2. Dump truck operator's working period

Years of service	n	%
1-5 Years	41	51.25%
6-10 Years	23	28.75%
11-15 Years	14	17.5%
15-20 Years	1	1.25%
>20 Years	1	1.25%

1.3. Age

Table 3 shows that the majority (47%) of dump truck operators are in the young age range, namely 20–25 years old, followed by 26–31 years old (22.5%). The remaining 30.5% are aged 32 to 61. These data indicate that the majority of the workforce is in their early productive age, generally possessing high work energy.

Table 3. Age of dump truck operators

Age	n	%
20-25 Years	36	47.0%
26-31 Years	18	22.5%
32-37 Years	12	15%
38-43 Years	6	7.5%
44-49 Years	1	1.25%
50-55 Years	3	3.75%
56-61 Years	1	1.25%

1.4. Working hours

The majority of dump truck operators at PT. AX (Table 4) work 8 hours per day (46.25%). Twenty-seven percent work 9–10 hours per day, and the remaining 25.8 percent work 11–14 hours per day (22.5%). These data indicate that more than half of the dump truck operators work beyond the standard working hours (8 hours per day), thus putting them at risk of work fatigue.

Table 4. Dump truck operator working hours

Working hours	n	%
8 hours	37	46.25%
9-10 hours	22	27.5%
11-12 hours	18	22.5%
13-14 hours	3	3.75%

4. Discussion

The research results (Table 1) found that all (n=80) dump truck operators experienced work fatigue, ranging from mild (25%), moderate (72.5%), to severe (2.5%). These results indicate that work fatigue must be managed promptly to prevent decreased work productivity and even workplace accidents. Based on the symptoms they experienced, most dump truck operators experienced physical fatigue, decreased activity, and decreased motivation. This study's findings align with those of Irfandi et al., 2022, who found that 67.0% of dump truck operators experienced moderate fatigue and 4% experienced severe fatigue.

Workplace fatigue was more common among operators with 1-5 years of service (Table 2). Of the 58 workers who experienced moderate fatigue, 20 had 6-10 years of service. These findings align with those of Atiqoh, Wahyuni, and Lestantyo (2016) in Semarang, which concluded that there is a

relationship between length of service and work fatigue.

All dump truck operators experienced work fatigue , whether at light, moderate, or severe levels. Several operators under 30 years of age experienced work fatigue in the severe, moderate, or severe categories. These results indicate that the level of work fatigue among dump truck operators is not affected by the level of work fatigue. by age. The results of this study according to research (Camelia and Rahmiwati, 2018) in South Sumatra which concluded that worker age was not related to fatigue levels (P = 0.793).

The results of the study (Table 4) show that 37 (46.25%) respondents worked for 8 hours per day. There were 22 (27.5%) respondents worked for 9-10 hours per day, and 21 (26.25%) respondents worked up to 14 hours per day. The results of this study are in accordance with (Birana, Alim, and Azwar, 2019), that work fatigue is closely related to length of work (P = 0.002).

The study results show a correlation between dump truck operator fatigue and age and length of service. These results indicate that most workers are relatively young, with relatively little work experience. Young age is generally associated with optimal physical abilities, but limited work experience can impact the ability to manage workloads and cope with operational pressures. Meanwhile, older age groups with longer tenure are very few, which may indicate low long-term job retention or high levels of workforce turnover. This correlation is important to consider in planning training, job placement, and human resource management strategies to maintain the sustainability and efficiency of company operations.

5. Conclusions

The study found that most dump truck operators at PT. AX experienced moderate fatigue (72.5%). However, 2.5% were classified as severe. These results indicate that control measures must be implemented immediately to prevent further fatigue, which could lead to decreased productivity and workplace accidents. Short tenure (1-5 years) and long working hours (>8 hours per day) are suspected to be associated with fatigue levels. Therefore, it is important for companies to evaluate work systems, rest periods, and fatigue management strategies.

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