OCCUPATIONAL FATIGUE ON HEAVY EQUIPMENT OPERATORS OF PT. SAPTAINdra SEJATI KABUPATEN TABALONG KALIMANTAN SELATAN

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Study Background

PT SIS is one of mining companies in Indonesia which is a member of Adaro Energy Group, operating world class heavy equipment.

Workers are at risk of injuries, or even death. Hazards exist when operating, maintaining, or working around heavy equipment at mining company.
Operators’ fatigue often happens in activities in mining using large vehicles, such as bulldozers and excavators. This causes accidents within the mining industry.

Shifts can often be 12-hours long, with drivers taking "microsleeps" when suffering from fatigue. Within public sectors, drivers’ drowsiness and inattention are key factors in contributing to commercial truck crashes, accounting for 1,200 deaths and 76,000 injuries each. Meanwhile, human error is responsible for around 93% of haulage truck accidents in surface mining, and up to 70 percent of these are fatigue-related.
OBJECTIVE

To identify the occupational fatigue on heavy equipment operators

To identify characteristics of heavy equipment operators

To analyze the relationship between nutritional status and fatigue in the heavy equipment operators of PT SIS

To analyze the relationship between sleeping duration and occupational fatigue on heavy equipment operators of PT SIS
METHOD

This study uses cross-sectional design with analytic observational method.
ADMO is the largest jobsite in the working area of PT.
Saptaindra Sejati
Working area includes 4 regencies (kabupaten):
1. Kab Tabalong
2. Kab. Balangan
3. Kab. Barito Timur
4. Kab. Barito Selatan
POPULATION AND SAMPLE

SAMPLING TECHNIQUE → simple random sampling

SAMPLE = 232 WORKERS

POPULATION = 553 WORKERS
RESEARCH INSTRUMENTS

INTERVIEW + Questionnaire About Subjective feelings of fatigue from Industrial Fatigue Research Committee (IFRC)

RESEARCH VARIABLE

INDEPENDENT VARIABLE
1. Sleeping Duration
2. Nutritional status

DEPENDENT VARIABLE
Occupational Fatigue
RESULT & DISCUSSION

RESPONDENT CHARACTERISTICS

AGE
- Young: 29%
- Old: 71%

Period of Work
- New: 34%
- Old: 66%
SLEEPING DURATION

- sufficient: 28%
- lack of: 72%

OCCUPATIONAL FATIGUE

- no fatigue: 0.9%
- light fatigue: 23.3%
- medium fatigue: 33.2%
- heavy fatigue: 42.7%

NUTRITIONAL STATUS

- thin: 5%
- normal: 40%
- fat: 55%
## Analysis Bivariate

<table>
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<tr>
<th>INDEPENDENT VARIABLE</th>
<th>DEPENDENT VARIABLE OCCUPATIONAL FATIGUE</th>
<th>Total</th>
<th>P</th>
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<tbody>
<tr>
<td>No fatigue</td>
<td>Light</td>
<td>Medium</td>
<td>Heavy</td>
</tr>
<tr>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
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<td>DEPENDENT VARIABLE (Fatigue)</td>
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<td>P</td>
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<tr>
<td></td>
<td>No fatigue</td>
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<td>Medium</td>
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<tr>
<td></td>
<td>n</td>
<td>%</td>
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<tr>
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<td>Normal</td>
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<tr>
<td></td>
<td>Fat</td>
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<td>0</td>
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<tr>
<td></td>
<td>Total</td>
<td>2</td>
<td>0,9</td>
</tr>
</tbody>
</table>
SYMPTOMS OF SUBJECTIVE FEELING OF FATIGUE

- Yawning
- Difficulty in keeping head still
- Difficulty in concentrating
- Difficulty in keeping eyes open
- Hallucinating
- Forgetting direction and route
- Walking in zig-zag direction
- Ignoring traffic signs
- Forgetting to turn
- Slow respond in stepping on the break
- Slowing down unconsciously
The decline of allertness

- Biologically, allertness will decline when surrounding temperature reaches the lowest level, which is at 3-6 o’clock am. Concentration level is also at the lowest level.

- The highest risk to make fault caused by fatigue happens at 3-5 o’clock am. Therefore, two-way instruction to communication is highly recommended.
Impact 24 hours x 7 days Production Employees

- Lack of sleep at home – barracks
- Number of hours of sleep which had fallen sharply
- Lack of Alertness because of lack of sleep
- Drowsy
- Syndrome of deviant behavior
- Severe sleepiness in the workplace
- Less cautious, alertness and performance in the workplace
Fatigue vs. Accident

- 6 times more frequent happen to night shift workers
- Twice more frequent happen to afternoon shift workers
- Other high risks:
  - Performing more than 1 kind of job
  - Lack of sleep (less than 6 hours)
  - Staying awake more than 20 hours continually
  - Driving between midnight to 6 o’clock am.

Sumber: AAA Study, J. Stutts, UNC 1999
Sleeping well

Fatigue Management; Sufficient Sleep Habit:
1. Try to sleep only when really sleepy
2. Avoid alcohol and caffein 4-6 hours before bed time
3. Avoid smoking before bed time
4. Avoid exercising 4 hours before bed time
5. Consume snacks which contain carbohydrate before sleeping
6. Try to wake up at the same time every day

So, how much sleep do we need in a day?

Seven to eight hours is the ideal one.
Fatigue Management

Comfortable and healthy sleep

Create a comfortable sleep condition and environment:

• Avoid direct contact of sun light
• Cover windows with dark-coloured curtain
• Wear eye cover
• Wear ear plugs
• Set a comfortable temperature
• Turn off phone ringtone or silent the phone
• Turn up alarm ringtone
• Inform family or roommate about your sleeping pattern
Choose nutritious food

Nutritional Status

Refreshing Effectivity
1. The result of the study illustrates that the occupational fatigue level of heavy-equipment operators of PT Saptaindra Sejati Tanjung ranges from light fatigue prevalence of 23.3%, medium fatigue prevalence of 33.2%, heavy fatigue prevalence of 42.7%, and no fatigue prevalence of 0.9%.

2. There is no significant relationship between sleeping duration and occupational fatigue ($P=0.116$).

3. There is significant relationship between nutrition status and occupational fatigue with $p$ value $=0.05$ ($P\leq0.05$).
THANK YOU