The Analysis of Mental Workload and Drivers' Burnout
(Case Study in Oil and Gas Company X- Balikpapan)

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ABSTRACT

Oil and Gas Company X which has the most extensive exploration unit in Indonesia, has several exploration fields. Due to the operation field being far from Balikpapan City, the company provides special transportation facilities for going and returning employees on duty in the operating area. So that the role of drivers is crucial in the continuity of business processes in this company. Drivers are required to have high concentration and mentality in making decisions quickly and accurately. In addition, monotonous driver activity when road conditions are smooth can cause driver burnout to increase. This study aims to analyze the mental workload and the level of driver burnout and provide suggestions for reducing the level of mental workload and driver burnout. Mental workload was measured using the NASA-TLX method while MBI method used to analyze level of burnout. Result showed that the average mental workload of drivers was 69.1 (classified as high category), and the average operator burnout level was 14.44 (classified as low category). In addition, there is no significant correlation between mental workload and drivers' burn out. Suggestions was given in the form of encouraging driver to have regular schedule, sleep, break and vacation as well as better eating habit.
KEY WORDS: NASA-TLX; MBI; Driver; Mental Workload; Burnout; Correlation

INTRODUCTION

Driver burnout is a well-known contributor to potentially fatal car accidents. Burnout has several components, with symptoms including mental, physical, and muscular burnout, which they claim, are the most critical aspects of burnout in a driving context [1]. In addition, much of the research is consistent to assume that accident risks are strongly associated with driver mental workload, attending to the impact that it has on driving task performance and road safety [2]. Mental workload is the adaptation and interaction between work requirements and employee's perception, talents, abilities and emotions [3]. Mental Workload is related to mental needs and the availability of human brain resources [4]. Thus, job burn out and mental workload are the contributors for potentially fatal car accidents.

Oil and Gas Companies X has several exploration fields which are spread over several areas, such as Samboja, Sanga – Sanga, Handil, and Tani Baru. Due to the operational area (field) being far from Balikpapan City, the company provides special transportation facilities for going and returning employees who work in the field. Thus, the driver's role is crucial in the continuity of the business processes in this company. Prolonged time on the road with too few breaks, traffic headaches, poor road conditions and lack of physical exercise can lead to drivers' burn out and high mental workload.

Researching job burn out and mental workload of drivers will ensure that the security in the whole process of shuttle transport of the technician. Several studies have been conducted to determine the relationship between job stress and burnout, i.e., job stress as one of the main factors affecting job burnout [5]. Furthermore, job burnout affects the daily life of a professional, increases time and costs, reduces employee satisfaction, and ultimately leads to job burnout [6]. Therefore, this paper aims to examines the mental workload and burnout experienced by drivers at Oil and Gas Companies X.

METHODS

This study used quantitative research to collect quantitative data from 18 respondents. In addition, a descriptive study was conducted to determine the level of workload and the level of job burnout. In this study, linear regression was conducted to investigate the relationship between the independent variables (mental workload) and the dependent variables (job burnout) of the driver.

NASA-TLX was used to assess mental workload [3]. The NASA-TLX has six dimensions related to workload. The assessment is achieved by requesting the respondents to rate mental, physical, and temporal demands imposed by the completion of the task, as well as the level of frustration they experienced, number of performance concerns they had, and overall effort required to complete the task. Mental and physical demands determine the level of intellectual/perceptual and physical work required for completion of a task, respectively. The temporal demand provides the measure for time pressure during the completion of the task. The effort component assesses mental and physical work required to perform at a certain proficiency level. The frustration component evaluates the level of stress associated with completion of the task. The start and end points for the scales used to quantify each of these five components are low and high, respectively. The sixth component, performance, was developed to assess the degree of the trainee's satisfaction on completion of the task.

In the first part of the NASA TLX, participants are asked to rate each dimension on a 0–100 scale at five-point intervals. In the second block, the dimensions are compared in a binary comparison and each dimension is selected as more important and effective than the other (according to participants) in the experienced mental workload. The mental workload is calculated. The score interpretation based on calculated WWL are low (0-9), medium (10-29), rather high (30- 49), high (50-79), very high (80-100).

Work Retention Scale developed by Maslach [7], the MBI is a 22-item instrument used to assess burnout of the drivers. The MBI measures three dimensions of burnout: emotional exhaustion (EE), depersonalization (DP) and personal satisfaction (PA) consist of 9, 5, and 8 items respectively. Likert scale ranging from 0 (never) to 6 (every day) were adopted. Scales are scored such that higher scores indicate more of each construct. Higher scores on the EE and DP subscales indicate a higher burnout symptom burden, lower scores on the PA subscale indicate a higher burnout symptom burden. Their range is 0-45, 0-25, and 0-40, respectively. High scores on anxiety (>27) and depersonalization (>13), and self-satisfaction (<31) indicate burnout. The reliability and validity of the MBI and its subscales are well established.

The collected data were analyzed using SPSS software version 23. Descriptive and analytical statistical tests, such as two-way ANOVA, paired t-test, independent t-test, chi-square, Pearson correlation coefficient, and significant level $p \leq 0.05$, were prepared to examine the effect of different variables.

RESULTS & DISCUSSION

Based on research 18 respondents in this study, population of the driver were male. The results found that some respondents are 30-34 years old (16.6%). Some of them are 35-39 years, 40-44 years, 45-49 years, 50-54 years each with a percentage of 11.1%, 22.2%, 33.3% and 16.6%.

There were high scores on all dimensions of mental workload except for the frustration dimension, i.e., 10.4, 11.9, 12.7, 14.7, 13.1, 6.2 for mental demand, physical demand, temporal demand, own performance, effort and frustration. The average score among the driver was 69.1 which classified as high. Interviewed the drivers resulted on finding activities that contributed to high score on each mental workload' dimension. Unpredictable road conditions that require drivers to make decisions quickly was the cause of high mental workload. Some physical activities that must be carried out as part of the job,

such as lifting goods to be put into the vehicle and washing the vehicle when finished contributed to high score of physical demand. Meeting deadlines to deliver passengers safely in the shortest possible time was the cause of high score of temporal demand. Drivers obliged to give best service for passenger's safety and comfort in order to avoid poor feedback. This pressure contributed as factor lead to high score of effort.

On the other hand, frustration dimension score was low, since the drivers were enjoy doing the work and they experienced good working environment. In other word, job satisfaction led to low frustration.

The second objective of the study was to determine the level of job burnout. Table 1 showed the overall mean values and standard deviation analysis on job burnout. There was the low mean score on job burnout which was 14.44. Overall, the majority of the driver showed low levels of emotional exhaustion, low levels of depersonalization, and low levels of reduction of personal accomplishment.

Table 1. Level of Burnout

Dimensions	Mean	Level
Occupational Exhaustion (OE)	6.61	Low
Depersonalisation (DP)	2.44	Low
Reduction of Personal Accomplishment (PA)	5.39	Low
Total	14.44	Low

The third objective of the study was to determine the relationship between workload and job burnout among drivers. Table 2 showed the overall value of Pearson correlation coefficient and significant value between workload and job burnout. The results showed that there was no significant relationship between workload and burnout ($p > 0.05$: Pearson Correlation tests).

Table 2. Correlation between the Mental Workload and Burnout

Variables	OE	DP	PA
MD	0.857	0.799	0.603
PD	0.334	0.339	0.655
TD	0.733	0.139	0.984
OP	0.888	0.257	0.778
EF	0.706	0.797	0.845
FR	0.992	0.769	0.226

Note: MD=mental demand, PD=physical demand, TD=temporal demand, OP=Own performance, EF=effort, FR=frustration, OE-Occupational Exhaustion, DP=depersonalization, PA=Reduction of Personal accomplishment

Result showed that level of burnout on drivers in Oil gas company X were low, and their mental workload were high. Drivers stated that they were enjoying the work so that the frustration had low category despite others dimension of mental workload classified as high category. Research in Brazil stated that the lower the level of emotional exhaustion, the higher the job satisfaction [8,9]. Thus, in this case study, burnout was not correlated with mental workload, because the drivers were satisfied with their job and this factor overcomed all the mental demand that they experienced.

Job satisfaction was described of 6 dimensions, i.e., satisfaction of administration, team, leadership, compensation and benefits, training development, job objectives and performance appraisal [10]. Extended interview with the drivers showed that they satisfied with those dimension in Oil and Gas Company X. The examples of statements in the interview I.e., the drivers' passion was give the best service to the passengers (technicians) and the relation between drivers were very good, they were support each other.

In order to manage high mental demand, the driver should:
- get regular sleep. Regular sleep can keep the driver alert while driving and manage the mental health tough.
- get regular schedule. Regular schedule impacts on regular sleeping and reducing fatique
- get regular break and vacation. Regular break for example walk a little bit in rest area can break the monotony.
- Get better eating habits, for example reducing consumption of energy drink and soda.

CONCLUSIONS

In this case study, the mental workload of the driver was high; however, the burn out level was low. Furthermore, burn out was not correlated with mental workload. This may caused by the job satisfaction of the drivers. Further study need to be conducted to measure the job satisfaction among drives and evaluate the correlation with burn out and mental demand. Finding of this study showed that the mental workload of the drivers was high, therefore company management needs to measure driver's mental and burnout periodically. Furthermore, relevant authorities need to consider the suggestions in order to reduce the mental workload.

CONFLICT OF INTEREST

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter discussed in this paper.

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ETHICS

All of the authors confirmed that this paper is the authors' own original work, which has not been previously published elsewhere.

AUTHOR CONTRIBUTION

Theresia AP and Lina DF contributed to the design of the research. Mayestika A contributed to data collection and computation of the research. Theresia AP, Lina DF and Farida S contributed to analyze and supervised the finding of the research. All authors discussed the results and contributed to the final manuscript.

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