

HUBUNGAN *SLEEP QUALITY* DAN *MENTAL WORKLOAD* DENGAN KECENDERUNGAN *HUMAN ERROR* MELALUI *SITUATIONAL AWARENESS* PADA KRU KAPAL TUNDA: STUDI KASUS PT PELINDO MARINE SERVICE

Mohammad Zidane

ABSTRAK

Human error merupakan salah satu faktor yang berkontribusi terhadap kecelakaan pada operasional kapal tunda. Penelitian ini bertujuan menganalisis hubungan *sleep quality* dan *mental workload* terhadap kecenderungan *human error* serta peran mediasi *situational awareness* pada kru kapal tunda PT Pelindo Marine Service. Penelitian menggunakan pendekatan kuantitatif dengan desain *cross-sectional* terhadap 115 kru Departemen *Deck* dan *Engine*. Data dikumpulkan menggunakan kuesioner *Pittsburgh Sleep Quality Index* (PSQI), *NASA Task Load Index* (NASA-TLX), *Situation Awareness Rating Technique* (SART), dan Kuesioner Buatan Kecenderungan *Human Error*, kemudian dianalisis menggunakan *Structural Equation Modeling–Partial Least Squares* (SEM-PLS). Hasil penelitian menunjukkan bahwa *sleep quality* berpengaruh signifikan terhadap *situational awareness* ($p < 0,001$), sedangkan *mental workload* juga berpengaruh signifikan terhadap *situational awareness* ($p = 0,039$). Sebaliknya, *sleep quality* ($p = 0,955$) dan *mental workload* ($p = 0,442$) tidak berpengaruh signifikan secara langsung terhadap kecenderungan *human error*. *Situational awareness* berpengaruh signifikan terhadap kecenderungan *human error* ($p < 0,001$) serta memediasi hubungan antara *sleep quality* dan kecenderungan *human error* ($p < 0,001$), namun tidak memediasi hubungan antara *mental workload* dan kecenderungan *human error* ($p = 0,055$). Temuan ini menunjukkan bahwa *sleep quality* dan *situational awareness* merupakan faktor utama yang memengaruhi kecenderungan *human error* pada kru kapal tunda. Berdasarkan hasil penelitian, rekomendasi perbaikan difokuskan pada penerapan sistem manajemen kelelahan, peningkatan *situational awareness* melalui pelatihan, serta penguatan pengelolaan waktu istirahat dan rotasi *shift* guna mendukung keselamatan operasional kapal tunda.

Kata kunci: kecenderungan *human error*; *sleep quality*; *mental workload*; *situational awareness*; kapal tunda

**THE RELATIONSHIP BETWEEN SLEEP QUALITY AND
MENTAL WORKLOAD ON HUMAN ERROR TENDENCY
THROUGH SITUATIONAL AWARENESS AMONG TUGBOAT
CREWS: A CASE STUDY OF PT PELINDO MARINE SERVICE**

Mohammad Zidane

ABSTRACT

Human error is one of the major factors contributing to accidents in tugboat operations. This study aimed to analyze the relationships between sleep quality and mental workload and the tendency toward human error, as well as the mediating role of situational awareness among tugboat crews at PT Pelindo Marine Service. A quantitative approach with a cross-sectional design was employed involving 115 crew members from the Deck and Engine departments. Data were collected using the Pittsburgh Sleep Quality Index (PSQI), NASA Task Load Index (NASA-TLX), Situation Awareness Rating Technique (SART), and Human Error Questionnaire (HEQ), and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The results indicated that sleep quality had a significant effect on situational awareness ($p < 0.001$), while mental workload also significantly affected situational awareness ($p = 0.039$). However, neither sleep quality ($p = 0.955$) nor mental workload ($p = 0.442$) had a significant direct effect on the tendency toward human error. Situational awareness had a significant effect on the tendency toward human error ($p < 0.001$) and significantly mediated the relationship between sleep quality and the tendency toward human error ($p < 0.001$), but did not significantly mediate the relationship between mental workload and the tendency toward human error ($p = 0.055$). These findings indicate that sleep quality and situational awareness are the primary factors influencing the tendency toward human error among tugboat crews. Based on the findings, improvement strategies should prioritize the implementation of a fatigue management system, enhancement of situational awareness through training, and strengthening of rest period and shift rotation management to improve operational safety in tugboat operations.

Keywords: *human error tendency; sleep quality; mental workload; situational awareness; tugboat crew*