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A Study on impact of Eye Fatigue Complaints on the Work Productivity of Ticketing at PT. Gapura Angkasa at Sultan Hasanuddin Airport Makassar

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ABSTRACT

Background: The work environment plays a crucial role in enhancing performance, with a safe workplace directly influencing worker productivity. Mismatched workplace conditions can lead to eye fatigue, discomfort, and bone issues, particularly from prolonged computer use and poor sitting posture. Therefore, implementing Occupational Health and Safety (K3) measures is essential; the more K3 is applied, the higher the quality of work produced. Conversely, a lack of K3 can pose risks to workers, significantly impacting their productivity due to eye fatigue.

Methods: The study showed that there was a significant positive effect of workload on eye fatigue complaints (2.787>1.96). There was a significant positive effect of workload on work productivity (2.018>1.96), there was a significant positive effect of monitor viewing distance on eye fatigue complaints (3.383>1.96) and there was a significant positive effect of monitor viewing distance on work productivity (2.022>1.96) and there was a significant positive effect of eye fatigue complaints on work productivity (3.383>1.96). Based on the intervening test, the large indirect effect of workload on work

productivity through eye fatigue complaints was -0.109 (negative effect), and the large indirect effect of monitor viewing distance on work productivity through eye fatigue complaints was 0.123 (positive effect).

Conclusions: In addition, there is a significant effect of workload, monitor viewing distance on work productivity through eye fatigue complaints and there is an insignificant effect eye fatigue complaint. It is expected that further investigations will be carried out on additional variables that can affect eye fatigue complaints in addition to the independent variables above.

Keywords: *Workload, Lighting Intensity, Monitor Viewing Distance, Complaints of Eye Fatigue, Work Productivity*

1. INTRODUCTION

The work environment significantly impacts performance, influenced by factors such as management, organizational structure, job descriptions, autonomy, and physical conditions. Even minor variations in temperature, noise, lighting, or area quality can greatly affect employee attitudes and performance[1]. A safe work environment is vital for maximizing productivity, making the implementation of Occupational Health and Safety (K3) essential. Effective K3 practices improve work quality, while inadequate implementation can lead to risks like eye fatigue, negatively affecting productivity. Ultimately, individual performance depends on the balance between task demands and personal abilities. If the ratio of task demands is greater than a person's ability or work capacity, it will cause discomfort, overstress, fatigue, accidents, injuries, pain, illness, and unproductiveness, conversely if the task demands are lower than a person's ability or work capacity, then the final appearance will be under stress, boredom, boredom, lethargy, illness, and unproductiveness[2]. According to the WHO, eye fatigue (asthenopia) affects 40% to 90% of people worldwide, with 60 million individuals suffering from this condition. Additionally, 285 million people, or 4.24% of the global population, experience visual impairment, including low

vision and blindness, with 246 million of these cases representing 65% of the total. Eye fatigue is a condition experienced by someone when using their eyes excessively, including those experienced by garment tailors[3]. Eye fatigue can lead to reduced accuracy, increased errors, longer working hours, decreased productivity, and lower alertness, resulting in more workplace accidents and reduced morale. Airport inspection check operators, who work long shifts at close screen distances, are particularly affected, and an uncomfortable work environment can worsen physical and mental fatigue, causing headaches and psychological issues. While workload can provide opportunities for employee growth, it must be managed to prevent negative health impacts. In facing challenges in the workplace, it is a determining factor in whether a job is good or not. So that a heavy workload will affect worker productivity[4]. This study investigates complaints of eye fatigue among workers in the ticketing area of Sultan Hasanuddin International Airport, focusing on causes related to workload and eye health disorders that affect productivity.

2. MATERIALS AND METHODS RESEARCH METHODS

This study uses a quantitative, analytical observational design to examine the relationships between eye fatigue, work productivity, workload, and eye health disorders among 50 inspection check operators at Sultan Hasanuddin International Airport. It employs the NASA TLX questionnaire for workload measurement, follows Indonesian Health Minister Regulation No. 48 of 2016 for monitor viewing distance, and assesses eye fatigue with the Visual Fatigue Index (VFI). The research received ethical approval and will be conducted from January to August 2024.

Population and Sample

The study involved a population of 50 workers in the inspection check operator section at Sultan Hasanuddin International Airport, Makassar, using total sampling, where the entire population was included as the sample.

Data Processing and Analysis

In this study, data processing was carried out using computerized techniques through the Smart PLS program. Univariate analysis was used for workload and eye fatigue complaints and work productivity to provide a summary of the frequency distribution and percentage of research variables and Multivariate Analysis to determine the effect of two variables by controlling other variables and to determine how much influence the variables have purely using According to (Dillon and Goldstein, 1984) or analyzing several measurements (variables) that exist in each object in one or many samples simultaneously.

3. RESULTS

This research at PT. Gapura Angkasa Makassar from June to July 2024 involved 50 Check-in Counter workers across three shifts. Data collection included direct observations and a questionnaire on eye fatigue complaints and work productivity, with analysis conducted using SPSS and Smart PLS 4, resulting in specific findings.

Univariate Analysis

Distribution of respondents' operator at Sultan Hasanuddin Internasional Airport Makassar based on the results obtained, the distribution of respondents by gender shows that 29 respondents (58.0%) are male, while the least number, 21 respondents (42.0%), are female. Based on the distribution of monitor viewing distance, 33 respondents (66.0%) have an ideal viewing distance. Regarding eye fatigue complaints, 19 respondents (38.0%) experienced eye fatigue, while 31 respondents (62.0%) did not. Based on the distribution of work productivity, 30 respondents (60.0%) have high productivity, while 20 respondents (40.0%) have moderate productivity (50-100%).

Multivariate Analysis

Table I, Direct Effect Significance Test

1. Workload and Eye Fatigue: The workload significantly affects eye fatigue complaints (t statistic 2.787 > 1.96) with a positive effect of 0.347, indicating that increased

workload leads to more eye fatigue complaints.

2. Workload and Work Productivity: The workload significantly impacts work productivity (t statistic 2.018 > 1.96) with a negative effect of -0.242, showing that higher workload decreases productivity.
3. Monitor Viewing Distance and Eye Fatigue: The monitor's viewing distance significantly affects eye fatigue complaints (t statistic 3.383 > 1.96) with a negative effect of -0.392, meaning closer viewing distances increase eye fatigue.
4. Monitor Viewing Distance and Work Productivity: The monitor viewing distance significantly impacts work productivity (t statistic 2.022 > 1.96) with a positive effect of 0.234, indicating that closer distances decrease productivity.

5. Eye Fatigue and Work Productivity: Eye fatigue complaints significantly affect work productivity (t statistic 2.587 > 1.96) with a negative effect of -0.314, showing that increased eye fatigue leads to decreased productivity.

	Original Sample	Sample Mean (M)	Standard Deviation	T Statistics	P Value
Workload-> Eye fatigue complaints	0.347	0.329	0.125	2.787	0.006
Workload-> Work productivity	-0.242	-0.229	0.12	2.018	0.044
Monitor viewing distance-> Eye fatigue complaints	-0.392	-0.404	0.116	3.383	0.001
Monitor viewing distance -> Work productivity	0.234	0.239	0.116	2.022	0.044
Eye fatigue complaints -> work productivity	-0.314	-0.306	0.122	2.587	0.01

Table II, Significance Test of Indirect Influence

Based on Table X, we can see the indirect influence of the independent variable on work productivity.

1. The workload significantly influences work productivity through eye fatigue complaints, with a t statistic of 1.962 (> 1.96) and an indirect effect of -0.109, indicating that increased workload leads to decreased productivity.
2. The monitor viewing distance also significantly affects work productivity via eye fatigue complaints, with a t statistic of 2.016 (> 1.96) and an indirect effect of 0.123, suggesting that a greater viewing distance improves productivity.

	Original Sample	Sample Mean (M)	Standard Deviation	T Statistics	P Value
Workload-> eye fatigue complaints -> work productivity	-0.109	-0.1	0.056	1.962	0.049
Monitor viewing distance -> Eye fatigue complaints -> work productivity	0.123	0.122	0.061	2.016	0.044

4. DISCUSSION

After outlining the research findings in the previous section, we will discuss and review previous research references and sources regarding the factors studied such as mental workload, lighting intensity, monitor viewing distance, eye fatigue complaints and work productivity.

The Effect of Mental Workload on Eye Fatigue Complaints in Inspection Check Operators at Sultan Hasanuddin International Airport, Makassar.

Mental workload is the stress individuals feel while performing tasks, affected by task difficulty, information volume, and time constraints. At Sultan Hasanuddin International Airport, 74% of inspection check operators (37 respondents) report a heavy mental workload, leading to performance pressure, stress, and eye fatigue from extended computer use. The workload experienced by employees should be balanced with the abilities of the workers themselves so as not to experience fatigue, either mentally or physically[6]. Chi-Square analysis showed a significant relationship between workload and eye fatigue complaints ($p = 0.009$, $p < 0.05$), indicating that high mental workload negatively affects employees' health and performance. To reduce fatigue and enhance well-being, management should balance workloads with employee capabilities and promote adequate rest and screen time regulation.

The Effect of Monitor Viewing Distance on Eye Fatigue Complaints in Inspection Check Operators at Sultan Hasanuddin International Airport in Makassar.

The study found that monitor viewing distance significantly impacts eye fatigue complaints among employees at Sultan Hasanuddin International Airport, with 20% of those at a non-ideal distance reporting fatigue compared to 38% at an ideal distance. Chi-Square analysis confirmed a significant relationship ($p = 0.029$, $p < 0.05$), emphasizing the importance of

proper monitor placement to reduce eye strain and promote employee comfort. In aviation, visibility is crucial for safety, with a minimum safe distance of 5 kilometers required for flights. If visibility falls below this, flights must be postponed due to safety concerns[10]. Visibility regulation is vital in aviation, with Minister of Transportation KM 18 of 2010 setting a safe flight visibility at 5 kilometers. This underscores the importance of visibility management for both work and flight safety to ensure health and safety.

The Effect of Mental Workload on Work Productivity of Inspection Check Operators at Sultan Hasanuddin International Airport, Makassar.

Chi-Square analysis revealed a significant relationship between workload and work productivity among inspection check operators at Sultan Hasanuddin International Airport ($p=0.035$, $p<0.05$). Both physical and mental workloads significantly affect productivity, with lower work stress linked to higher productivity. Excessive workload can hinder creativity, and further testing indicated that high mental workload negatively impacts productivity ($p = 0.044$, original sample score of -0.242). Many employees reported heavy mental workloads, especially during peak periods like Hajj and Umrah seasons. In the aviation world, one of the divisions that has a high mental workload to ensure on-time flight performance is the flight operation officer unit[12]. Divisions like the flight operation officer unit face high mental workloads to ensure timely and safe flights. Thus, it's crucial to analyze workload levels to prevent excessive pressure on employees, which can negatively impact operational performance and safety.

The Effect of Monitor Viewing Distance on Work Productivity of Inspection Check Operators at Sultan Hasanuddin International Airport, Makassar.

Based on Law No. 13 of 2003 concerning Manpower, standard working hours are set at 8 hours a day or 40 hours a week, but excessive working hours can risk causing health problems such as fatigue, illness, and work accidents, which can ultimately reduce productivity. Forcing the eyes to continue working in a less-than-ideal monitor viewing distance will make employees tired faster and decrease productivity[13].Chi-Square and t-test analyses indicated a significant relationship between monitor viewing distance and employee productivity at Sultan Hasanuddin International Airport ($p = 0.002$ and $p = 0.044$). Despite 66% of check-in operators having an ideal viewing distance, many experience eye fatigue due to improper screen placement, which affects productivity. Taking breaks can help improve endurance, emphasizing the need for proper monitor placement.

The Effect of Eye Fatigue Complaints on Work Productivity of Inspection Check Operators at Sultan Hasanuddin International Airport Makassar.

Eye fatigue among check-in counter operators negatively affects their performance and productivity, leading to blurred vision, slow reactions, and increased errors. Data analysis showed a significant relationship between lighting intensity and work productivity ($p = 0.001$), and t-test results confirmed that eye fatigue significantly impacts productivity ($p = 0.010$). Another study stated that fatigue at work is the main cause of work accidents and decreased productivity[14]. Higher eye fatigue levels result in lower productivity and increased risk of work accidents. Establishing ideal work and rest times is essential to prevent eye fatigue and ensure safety, particularly in the aviation industry, where effective fatigue management is crucial for operational efficiency and flight safety.

5. CONCLUSIONS

The study on inspection check operators at Sultan Hasanuddin International Airport concluded that workload significantly affects eye fatigue complaints and work productivity. Increased workload correlates positively with eye fatigue (t statistic 2.787) and negatively impacts productivity (t statistic 2.018). Additionally, closer monitor viewing distances increase eye fatigue complaints (t statistic 3.383) and decrease productivity (t statistic 2.022). Finally, higher eye fatigue complaints negatively affect productivity (t statistic 2.587).

Conflicts of interest

The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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Authors' contributions

The first author contributed to designing and planning the study, collecting and analyzing primary and secondary data using SPSS, drafting the initial manuscript, revising the final draft, and approving the final version for publication. The second and third authors provided guidance, supervision, and support throughout all stages of the research, including problem identification, methodological design, data analysis, and manuscript submission. The fourth, fifth, and sixth authors contributed by reviewing the study before and after obtaining the research findings, focusing on methodology, analysis, and conclusions, and providing constructive feedback and suggestions to improve the research quality. All authors contributed

equally to the manuscript and read and approved the final version of the manuscript.

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This paper has not been presented as a poster at any congress.

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