Evaluating Determinants of Employee Ppe Compliance in Mitigating Occupational Risks in A Batam Firm

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Article Information	Abstract
	This study aims to examine the factors influencing employee adherence to the use of Personal Protective Equipment (PPE) within a private manufacturing company in Batam. The study population consists of the production department employees at the company, totaling 87 respondents. A quantitative research design was employed, utilizing a cross-sectional approach and correlation analysis. The relationship between independent variables—age, tenure, knowledge, availability of PPE, and HSE supervision—and the dependent variable of PPE compliance was assessed using the chi-square test in SPSS 24. The findings indicate that age, tenure, PPE availability, and HSE supervision do not significantly influence or correlate with employee PPE compliance. In contrast, the knowledge variable demonstrates a significant influence on PPE compliance among employees.
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INTRODUCTION

Non-compliance with the use of Personal Protective Equipment (PPE) constitutes unsafe behavior, arising from improper actions or decisions, which can ultimately result in occupational accidents (Heryawan & Heryana, 2018). The manufacturing company examined in this study specializes in producing Exhaust Gas Cleaning Systems (EGCS) Scrubbers, which are designed to reduce and convert harmful ship emissions into more environmentally friendly exhaust gases. Despite the provision of PPE to all employees in this high-risk work environment, the company continues to experience work-related accidents.

In 2022, the Health, Safety, and Environment (HSE) department recorded 10 workplace accidents, half of which involved employees aged over 40 years. According to work development psychology, workers are categorized into early adulthood (18 to 40 years) and older adulthood (41 to 60 years). Early adulthood is typically considered a productive period for work, where individuals possess peak cognitive abilities, including learning, reasoning, logical thinking, and creativity, with minimal health decline. In contrast, older adult workers may experience both physical and cognitive decline, which can affect their performance (Rachman et al., 2020).

Observations within the company's workshop, which employs approximately 150 individuals, reveal instances of inadequate PPE use, such as employees neglecting to wear helmets in the workshop environment where they are mandatory.

In light of these observations and the supporting data, this study seeks to investigate the relationship between several factors—age, length of service,

knowledge, PPE availability, and HSE supervision—and employee compliance with PPE usage within the company's work environment.

LITERATURE REVIEW

In relation to the formulated research problems, several previous studies have explored determinants of employee compliance with PPE usage. The first factor examined is the relationship between employee age and PPE compliance. According to Rachman et al. (2020), the cognitive abilities of individuals in early adulthood are at their peak, allowing for easier learning and logical reasoning. This heightened cognitive function positively influences PPE compliance at this life stage.

Another determinant is the length of service. Rakhmawati (2019) suggests that prolonged employment without job variation can diminish enthusiasm for compliance. Workers with longer service tend to feel more experienced and assume they understand their work environment well, which may lead them to disregard the need for PPE, perceiving minimal health risks. In contrast, newer employees, who lack in-depth knowledge about their roles, safety protocols, and associated risks, may be more inclined to adhere to PPE guidelines. As Husein (2021) emphasizes, experience gained over time correlates with increased knowledge and skill, potentially impacting compliance behavior.

Knowledge is another crucial factor in PPE adherence. Actions grounded in knowledge are more consistent than those lacking such a foundation. Knowledge, defined as information combined with understanding and the intent to act, plays a significant role in shaping attitudes towards PPE usage. This is evident in the workplace, where greater knowledge of PPE is linked to an increased awareness of occupational hazards, emphasizing the importance of PPE compliance (Husein, 2021).

The availability of PPE is also identified as an important compliance indicator. As noted by Annisa et al. (2020), sufficient access to PPE influences employee adherence to safety protocols. Lastly, supervision emerges as a significant factor in ensuring compliance. Research conducted by La Tho et al. (2020) demonstrates a strong correlation between safety officer supervision and employee adherence to PPE usage. Supervision serves as a mechanism for enforcing organizational safety regulations and ensuring that employees follow established protocols.

In conclusion, employee compliance with PPE is influenced by factors such as age, length of service, knowledge, availability of equipment, and supervisory practices. Understanding these determinants is crucial for developing effective strategies to enhance PPE usage and mitigate occupational risks.

RESEARCH METHOD

The focus of this research is on employees of a manufacturing company in Batam, specifically those working in the production department. The sampling technique employed in this study is simple random sampling, in which samples are selected randomly from the population without regard to strata or hierarchical levels. A sample is a subset of a population that shares similar characteristics and attributes with the overall population, serving as a data source for analysis. This allows the findings to be generalized, making the results applicable and relevant to the entire population (Bagus, 2016). The sample size for this study was determined using the Slovin formula, resulting in a total of 87 participants.

Data collection was conducted through the distribution of structured questionnaires, randomly administered to the selected participants, following a survey methodology.

This study employs a quantitative analytical correlation method with a cross-sectional approach. Before distribution, the questionnaire underwent validity and reliability testing to ensure its suitability for the study. The data collected from the questionnaires were then processed and analyzed using SPSS 24, employing the chi-square test for variable analysis and the T-test.

RESULTS AND DISCUSSION
Description of Respondent

The following chart provides a detailed overview of employee distribution by age and length of service at a manufacturing company in Batam.
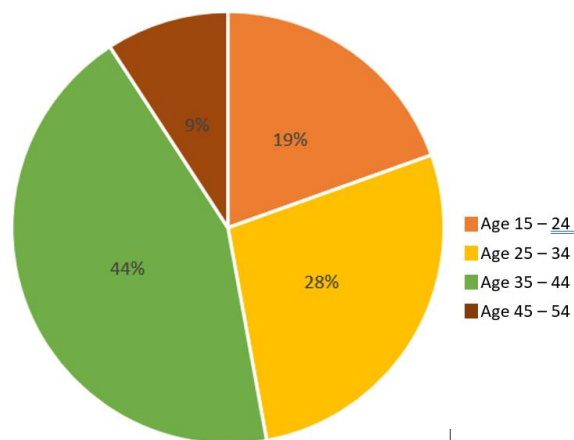

Figure 1. Profile of Respondents Based on Age
Source: Researcher's Data Processing Results 2023

The data presented above shows the majority of respondents fall within the 35-44 age range, representing 44% of the total 87 respondents. This age data will be analyzed and tested to assess whether the age variable is correlated with employee compliance in using PPE.
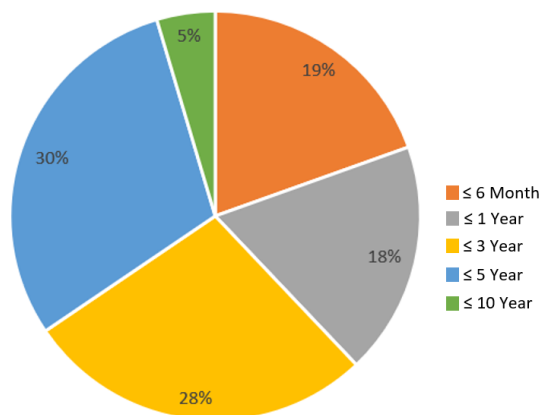

Figure 2. Profile of Respondents Based on Length of Service
Source: Researcher's Data Processing Results 2023

The data indicate that the majority of respondents, represented by the Length of Work variable, have a tenure of 3 to 5 years at the manufacturing company in Batam. In contrast, only 5% of the respondents, out of a total of 87, have a tenure exceeding 5 years. This tenure data will be analyzed and tested to determine whether the length of work is associated with employee compliance in using PPE.

Reliability Test

An instrument is considered reliable if multiple researchers studying the same subject produce consistent or similar results, or if the same researcher, when conducting the study at different times, obtains comparable data. Additionally, reliability is demonstrated when a dataset, if divided into several parts, yields consistent results (Sugiyono, 2013). The calculations performed using the SPSS 24 software indicate that all X variables in this study are reliable in relation to the Y variable, with the Cronbach's alpha value confirming the reliability of the research instrument

Chi Square Test

The analysis of the variables, conducted using the SPSS 24 for Windows software, yielded the following Chi-Square test results for the five X variables Age on Employee Compliance in the use of PPE

Table 1. Chi Square Test Results Age on Compliance

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	77.456[a]	64	.120
Likelihood Ratio	71.254	64	.249
Linear-by-Linear Association	.166	1	.684
N of Valid Cases	87		

a. 99 cells (100.0%) have expected count less than 5. The minimum expected count is .06.

Source: Researcher's Data Processing Results 2023

The test results indicate an asymptotic significance (sig) value of 0.120, which is greater than 0.05. This suggests that the age variable does not significantly influence employee compliance with PPE usage. Consequently, confirming that age does not impact PPE compliance among employees. This finding is consistent with Rakhmawati (2019), who also found no significant relationship between age and compliance with PPE usage in their study. This study is further supported by the findings of Azizah et al. (2021), who reported no significant relationship between age and employee compliance with PPE usage. Their study indicated that the proportion of younger workers not adhering to PPE requirements was higher compared to that of older workers.

In this research, the overrepresentation of the 35-44 age group (representing 44% of the total 87 respondents) could limit the ability to detect significant differences across different age groups, contributing to the finding that age does not have a significant impact on PPE compliance. A more balanced age distribution in the sample might provide a clearer understanding of the influence of age on compliance behavior. Individuals in the 35-44 age range might share similar work experiences, attitudes, and behaviors towards PPE usage, leading to relatively uniform compliance rates. This homogeneity could mask differences that might be more apparent if the sample included more respondents from different age groups, such as younger workers who may have different attitudes towards safety protocols or older workers who may have more experience and awareness of risks.

Length of Work on Employee Compliance in the Use of PPE

Table 2. Chi Square Test Results Length of Work on Compliance

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.574[a]	8	.695
Likelihood Ratio	7.420	8	.492
Linear-by-Linear Association	.000	1	.986
N of Valid Cases	87		

a. 7 cells (46.7%) have expected count less than 5. The minimum expected count is .29.

Source: Researcher's Data Processing Results 2023

The test results show an asymptotic significance (sig) value of 0.695, which is greater than 0.05, indicating that length of service does not significantly influence employee compliance with PPE usage. This result confirming that the length of work does not affect PPE compliance among employees. These findings are consistent with Rakhmawati (2019), whose study reported a p-value of 0.496, indicating that the tenure variable does not significantly impact compliance with PPE usage within the company. In contrast, the findings of Husein (2021) indicate a significant relationship between length of service and employee compliance with PPE usage in the workplace. The study suggests that the length of service substantially influences an individual's work experience and familiarity with the work environment, which, in turn, enhances their performance. This accumulated experience increases workers' awareness of occupational hazards and the importance of PPE compliance, with such awareness growing alongside their tenure and duration of employment.

With only 5% of respondents having more than 5 years of service, there is a lack of representation for longer-tenured employees. Employees with more than 5 years of experience might have different attitudes, habits, or knowledge regarding PPE usage, but their impact on the overall findings is minimized due to their small sample size. The overrepresentation of employees with 3 to 5 years of service and the underrepresentation of those with longer tenures might have contributed to the finding that length of work does not significantly impact PPE compliance. A more

balanced distribution of respondents with varying lengths of service could provide a more accurate and comprehensive understanding of how tenure affects PPE compliance behavior.

Knowledge on Employee Compliance in the Use of PPE
Table 3. Chi Square Test Results knowledge on Compliance

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	46.940[a]	4	.000
Likelihood Ratio	54.073	4	.000
Linear-by-Linear Association	39.907	1	.000
N of Valid Cases	87		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .06.

Source: Researcher's Data Processing Results 2023

The test results indicate an asymptotic significance (sig) value of less than 0.05, suggesting that knowledge significantly influences employee compliance with PPE usage. This result confirming that knowledge impacts PPE compliance among employees. This finding is supported by previous research, which asserts that a strong understanding of PPE use enhances workers' awareness of workplace safety, thereby positively influencing their compliance with PPE requirements (Akbar et al., 2022). Consistent with the findings of Husein (2021), it is asserted that a worker's compliance with PPE usage is significantly influenced by their attitude, experience, and knowledge. However, contrasting results were observed in the study by Lestari and Warseno (2021), which found that workers with both high and low levels of knowledge exhibited nearly the same rates of non-compliance with PPE usage, indicating that possessing good knowledge does not necessarily ensure adherence.

Availability of PPE on Employee Compliance in the Use of PPE
Table 4. Chi Square Test Results of PPE Availability on Compliance

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.459[a]	2	.795
Likelihood Ratio	.458	2	.795
Linear-by-Linear Association	.119	1	.731
N of Valid Cases	87		

a. 2 cells (33,3%) have expected count less than 5. The minimum expected count is 2,24.

Source: Researcher's Data Processing Results 2023

Based on the results of the tests conducted, the asymptotic significance value was found to be 0.795, which exceeds the threshold of 0.05. This indicates that the availability of personal protective equipment (PPE) does not significantly influence employee compliance in its use.

This finding is consistent with the research conducted by Lestari and Warseno (2021), which suggesting that the availability of PPE is not significantly related to compliance with its use. In contrast, Azizah et al. (2021) found that companies with insufficient PPE provision face a risk level 16 times higher for non-compliance with PPE regulations, highlighting a discrepancy with the current study's findings.

HSE Supervision on Employee Compliance in the Use of PPE

Table 5. Chi Square Test Results of HSE Supervision on Compliance

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	5.109[a]	2	.078
Likelihood Ratio	5.247	2	.073
Linear-by-Linear Association	1.527	1	.217
N of Valid Cases	87		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.30.

Source: Researcher's Data Processing Results 2023

Based on the test results, the asymptotic significance value was found to be 0.078, which exceeds the 0.05 threshold. This indicates that HSE (Health, Safety, and Environment) supervision does not significantly influence employee compliance with the use of personal protective equipment (PPE).

These findings align with the research conducted by Lestari and Warseno (2021), indicating no significant relationship between supervision and employee compliance with PPE. This suggests that the supervision variable does not exert a significant effect on compliance.

Conversely, La Tho et al. (2020) argues that HSE supervision aims to enhance and monitor workers' adherence to PPE use by implementing reminders, reprimands, warnings, and even sanctions. This approach is intended to improve worker behavior through effective supervision.

CONCLUSION

Based on the results presented, the following conclusions can be drawn, the age factor does not have a significant impact on employee compliance with the use of personal protective equipment (PPE). The duration of employment does not significantly influence employee adherence to PPE usage. The level of knowledge significantly affects employee compliance with PPE requirements. The availability of PPE does not have a substantial effect on employee compliance with its use. HSE supervision does not significantly impact employee adherence to PPE protocols.

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