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INCREASING TANKER TRUCK CREW (AMT) AWARENESS OF OCCUPATIONAL SAFETY AND HEALTH AT PERTAMINA USING E-BOOKLET MEDIA (CASE STUDY PERTAMINA FUEL TERMINAL BOYOLALI)

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Abstract
Occupational Safety and Health (OHS) is a crucial aspect in fuel distribution operations, especially for Tanker Crews (AMT) as the frontline. This study aims to analyze the level of AMT awareness of OHS, identify inhibiting factors, and develop and measure the effectiveness of e-booklet media as a means of increasing OHS awareness in the Pertamina Fuel Terminal Boyolali environment. The research method used is mixed methods, with a quantitative approach through pre-test and post-test and a qualitative approach through interviews and observations. The research sample of 79 AMT was selected using a purposive sampling technique. The results showed that the level of AMT OHS awareness increased significantly after the e-booklet was provided. Internal factors such as knowledge and attitudes, as well as external factors such as supervision and the work environment, also influenced the level of awareness. The e-booklet media proved effective as a practical, interactive, and easily accessible educational medium, thus recommended as a means of continuous OHS training. This research contributes to the development of digital media-based occupational safety strategies in the hazardous materials transportation sector.
Keywords: Occupational Safety and Health, Tanker Crew, e-booklet, K3 awareness, Pertamina

Abstrak
Keselamatan dan Kesehatan Kerja (K3) merupakan aspek penting dalam operasional distribusi Bahan Bakar Minyak (BBM), terutama bagi Awak Mobil Tangki (AMT) sebagai garda terdepan. Penelitian ini bertujuan untuk menganalisis tingkat kesadaran AMT terhadap K3, mengidentifikasi faktor penghambat, serta mengembangkan dan mengukur efektivitas media e-booklet sebagai sarana peningkatan kesadaran K3 di lingkungan Pertamina Fuel Terminal Boyolali. Metode penelitian yang digunakan adalah mixed methods, dengan pendekatan kuantitatif melalui pre-test dan post-test serta pendekatan kualitatif melalui wawancara dan observasi. Sampel penelitian sebanyak 79 AMT dipilih menggunakan teknik purposive sampling. Hasil penelitian menunjukkan bahwa tingkat kesadaran K3 AMT meningkat secara signifikan setelah pemberian e-booklet. Faktor internal seperti pengetahuan dan sikap, serta faktor eksternal seperti pengawasan dan lingkungan kerja, turut memengaruhi tingkat kesadaran. Media e-booklet terbukti efektif sebagai media edukasi yang praktis, interaktif, dan mudah diakses, sehingga direkomendasikan sebagai sarana pelatihan K3 berkelanjutan. Penelitian ini memberikan kontribusi terhadap pengembangan strategi keselamatan kerja berbasis media digital di sektor transportasi bahan berbahaya.
Kata Kunci: Keselamatan dan Kesehatan Kerja, Awak Mobil Tangki, e-booklet, kesadaran K3, Pertamina

INTRODUCTION

Transportation plays a vital role in daily life, as humans rely on it to facilitate mobility, meet their needs for goods, and support social interaction. The vast majority of fuel oil is used for transportation, accounting for over 90%. Furthermore, fuel oil is also used in industry, other sectors, households, and the commercial sector.[1] Energy consumption in the transportation sector reached 331.7 million BOE (Oil Barrel Equivalent), with a fuel composition that includes 55.3% gasoline, 14.0% diesel, 22.3% biodiesel, 0.04% fuel oil, 0.07% natural gas, 0.005% avgas, 8.15% avtur, and 0.04% electricity, the increase in energy needs in the transportation sector in Indonesia is largely influenced by improvements and additions to transportation infrastructure in various regions in the country.[2] Transportation and logistics play a vital role in the economy by expanding the distribution reach of goods or services, as well as providing transportation facilities for the delivery of goods or production from one area to another.[3]

Transportation in the distribution of fuel oil (BBM), has a strict K3 system, so that distribution can run smoothly and on time throughout Indonesia. The transportation of dangerous and toxic goods involves various elements, including drivers, companies that produce hazardous materials, and governments that issue permits and carry out supervision.[4] Hazardous chemical management is a crucial aspect that needs attention, considering that accidents can occur due to workers' lack of knowledge in identifying hazardous chemicals.[5] As a State-Owned Enterprise (BUMN), Pertamina manages energy and its distribution, including oil, gas, and renewable energy, in accordance with applicable oil and gas laws.[6] The potential of oil and gas resources is very important for Indonesia's development strategy.[7] Fuel is a key sector in national development and must be managed well to meet the needs of society and industry, as well as to generate foreign exchange for the country.[8] This is important because it can influence the level of customer

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[8] Soesanto et al., *Sistem Manajemen Sekuriti PT. Pertamina (Persero)*.

satisfaction with the products offered.[9] This energy company implements high Occupational Safety and Health (K3) standards, with full support from management to oversee all existing aspects.[10]

Occupational Safety and Health (K3) must be implemented comprehensively throughout the company, involving all parties, from management to implementers. Occupational Safety and Health (K3) management and hazard control require a systematic approach through the implementation of an Occupational Safety and Health (K3) Management System.[11] Work accidents are often caused by management's failure to implement occupational safety and health.[12] Increasing awareness of the importance of Occupational Safety and Health (K3) among management and employees is part of implementing regulations to protect the workforce.[13] Good implementation of occupational safety and health (K3) can improve employee performance, contribute to the efficiency and effectiveness of tasks.[14] Tanker Truck Crews (AMTs) play a crucial role in the distribution process. Tanker Truck Crews (AMTs) are the frontline in fuel distribution.

Tanker crews (AMT) at PT Pertamina have a significant responsibility in distributing fuel safely and efficiently. However, field observations indicate a lack of compliance among some AMTs with applicable Occupational Safety and Health (K3) regulations. This awareness encompasses not only an understanding of potential risks and appropriate safety practices, but also a commitment to implementing these practices in daily activities.[15] It is very important for various parties, especially workers, to be aware of occupational safety in the company environment where they work.[16] Occupational Safety and Health (K3) must be implemented comprehensively within a company, involving all parties, from management to implementers. Occupational health encompasses efforts to reduce the risk of accidents and occupational diseases by implementing

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safety and health standards in the workplace, promoting health and safety, and ensuring that workers have appropriate personal protective equipment.[17] Handling of Occupational Safety and Health (K3) and hazard control needs to be carried out with a systematic approach through the implementation of an Occupational Safety and Health (K3) Management System.[18] Violations such as not using complete personal protective equipment (PPE), ignoring safety procedures when refueling and unloading fuel, and exceeding driving time limits are serious challenges that can increase the risk of workplace accidents. Implementing good Occupational Health and Safety (K3) can improve employee performance, contributing to task efficiency and effectiveness.[19] The main factors behind this non-compliance could stem from a lack of awareness, fatigue due to work pressure, or even a desire to expedite the distribution process. Therefore, strict supervision, ongoing training, and strict enforcement of sanctions are needed to ensure that each AMT carries out their duties in accordance with OHS standards, to ensure their own safety and the smooth distribution of national energy.

Based on field observations, various problems were still found related to the use of the K3 pocket book provided for Tanker Crews (AMT) at PT Pertamina. Many pocket books were not read, left behind, or even lost, so their effectiveness in increasing awareness of occupational safety and health (K3) is still low. The lack of utilization of this pocket book can increase the risk of work accidents due to ignorance or negligence in implementing safety procedures. Therefore, this study proposes the use of e-booklets as a more practical and easily accessible alternative through digital devices. With the E-booklet, it is hoped that AMT awareness and compliance with K3 regulations can increase, thus supporting the creation of a safer and more efficient work environment in the distribution of fuel oil (BBM). This research is presented in a study entitled "Increasing Tanker Crew (AMT) Awareness of Occupational Safety and Health at PERTAMINA with E-Booklet Media."

RESEARCH METHODS

The method used was a mixed method, combining quantitative and qualitative approaches. The quantitative approach was used to measure the effectiveness of the e-booklet in increasing OHS awareness through pre- and post-tests, while the qualitative approach was used to explore the internal and external factors influencing AMT's OHS awareness.This research is included in the

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type of research with a mixed methods method in the form of quantitative and descriptive qualitative research that applies the Research and Development (R&D) approach.This research was conducted at the Pertamina Fuel Terminal in Boyolali, Central Java, which plays a strategic role in fuel distribution. The study population comprised all 365 tanker crew members. A sample of 79 respondents was drawn using a purposive sampling technique, using the Slovin formula with a 10% margin of error.

Data collection was conducted using questionnaires, semi-structured interviews, and field observations. Pre-test and post-test questionnaires were used to measure changes in the level of understanding and awareness of OHS before and after the e-booklet media intervention. The instrument was validated by experts to ensure content and construct validity, and its reliability was tested with a Cronbach's Alpha value of 0.932, indicating a high level of reliability. Qualitative data were obtained through interviews with AMTs and OHS supervisors, as well as direct observation of work behavior in the field. Quantitative data were analyzed using descriptive statistics and the Wilcoxon Signed-Ranks Test, while qualitative data were analyzed through data reduction, data presentation, and conclusion drawing. The results of both approaches were used triangulation to provide a comprehensive understanding of the problem under study.

RESULTS AND DISCUSSION

Analysis of the Level of Awareness of Tank Truck Crews (AMT) Regarding Occupational Safety and Health (K3)

In general, the pre-test results indicate that the level of understanding and awareness of Tank Truck Crews (AMT) regarding Occupational Safety and Health (K3) material is in the fairly good category. The average pre-test score obtained was 107.16 out of a maximum total score of 128, indicating that most AMTs already have basic knowledge regarding occupational safety aspects. However, quite large variations in scores were still found between respondents, indicated by a standard deviation of 9.83 and a value range of 45 points, from a lowest score of 83 to a highest of 128.Therefore, although most AMTs already understand the importance of OHS, reinforcement through interactive and systematic learning media, such as e-booklets, is still needed to equalize the level of understanding among all AMTs. By delivering information in a more structured and easily accessible manner, it is hoped that not only will there be an increase in overall understanding scores but also a stronger collective awareness of consistently applying OHS principles in the workplace.

Analysis of Internal and External Factors that Hinder K3 Awareness Among Tanker Crews (AMT)

Awareness of occupational safety and health (K3) among Tanker Crews (AMT) at Pertamina TBBM Boyolali is influenced by two main dimensions, namely internal and external factors. Internal factors include the cognitive, affective, and behavioral aspects of the AMT individuals themselves. Based on the results of a pre-test distributed to 79 AMTs, a general overview was obtained that the level of understanding of basic K3 concepts, safety procedures, use of personal protective equipment (PPE), hazard identification, and emergency response procedures was already at a fairly good level. However, in several indicators such as understanding the use of PPE and hazard identification, there were still variations in scores indicating the need for further education and socialization.

From an affective perspective, attitudes toward OHS, motivation for OHS implementation, risk perception, commitment to safety, and concern for the safety of coworkers showed a positive trend, but respondents still had low scores, indicating a need for increased guidance. Meanwhile, external factors analyzed through interviews with Fleet Safety and AMT showed that the organization has provided sufficient structural support. The OHS policy implemented by PT Pertamina Patra Niaga includes operational standards based on the HSSE and SMKTD systems, as well as a commitment to a zero accident target. Supporting facilities such as PPE, fire extinguishers (APAR and APAB), first aid kits, and safety signs are available and routinely checked for their suitability. In addition, OHS supervision is carried out strictly through daily inspections and field observations by the safety team.

However, from a work environment perspective, several significant obstacles were identified that also impacted OHS awareness. High workloads, fuel delivery time pressures, night shift patterns, and physical challenges in the work area, especially at gas stations, were factors that contributed to decreased vigilance and discipline. Overall, it can be concluded that OHS awareness among AMTs is quite good, but not yet optimal. Strengthening a safety culture, consistent supervision, and implementing ongoing education are essential to creating a safe and sustainable work environment. External organizational factors are supportive, but still need to be compensated for with adaptive strategies to dynamic field conditions.

Based on the analysis of internal and external factors influencing OHS awareness among Tanker Crews (AMT), it can be concluded that in general, the level of OHS awareness is quite good, but there are still several aspects that need to be improved. In terms of internal factors, which include cognitive (knowledge), affective (attitude), and behavioral aspects, the majority of AMTs showed sufficient understanding of basic OHS concepts, safety procedures, use of PPE, and emergency response. Attitudes and behaviors towards safety were also relatively positive, including in terms

of safety commitment, risk perception, and compliance with SOPs. However, the pre-test results showed that there were still some AMTs whose understanding and attitudes were not optimal, so more intensive education and socialization were needed to strengthen their awareness and concern for occupational safety, both individually and as a team.

Meanwhile, from an external perspective, the organization where AMT works has provided strong support through structured OHS policies, the provision of facilities and personal protective equipment (PPE), regular training, and a system of supervision and rewards and punishments. However, challenges remain in the work environment, such as high workloads, time pressures for fuel deliveries, night shifts, and the physical conditions of the work area, especially in the field, which do not always support ideal OHS implementation. Furthermore, a work safety culture has begun to develop, but consistency in its implementation still needs to be improved, considering that some individuals still lack discipline in following SOPs. Therefore, to increase OHS awareness comprehensively within AMT, ongoing efforts are needed through strengthening the safety culture, ongoing education, and stricter supervision in the field.

Development of E-Booklet media on Occupational Safety and Health (K3)

At this stage, the process of developing learning media in the form of an E-Booklet on Occupational Safety and Health (K3) in the Pertamina Fuel TBBM Boyolali environment is explained in detail, as well as the steps taken during the research.

1. Analysis
   a. Level of consciousness

      To determine the initial level of AMT awareness of OHS principles, field observations and interviews with HSSE officers and AMT were conducted. Based on the initial findings, it was discovered that although AMT had received regular OHS training, there was still a lack of awareness regarding the use of personal protective equipment (PPE) and emergency response procedures, especially during incidents in the field.

   b. Device Availability and Technology Access

      All AMT respondents in this study have access to smartphones and are familiar with using PDF-based applications and digital media. This informed the selection of e-booklets as a practical and flexible supplementary educational tool.

2. Design

   At this stage, the E-Booklet media design was carried out, including determining the visual design, content structure, and completeness of supporting media. The media developed was an E-Booklet in the form of a link and interactive PDF format containing text, images, video and audio materials. This format was chosen because it is compatible with mobile devices and

can be accessed at any time by AMT, both during breaks and before carrying out operational activities.

The e-booklet design uses visual elements consistent with Pertamina's identity and bold colors like blue and white. The illustrations and layout are designed to remain formal yet easily digestible for AMTs with diverse educational backgrounds and work experience.

The material presented in the e-booklet focuses on key aspects of occupational safety and health relevant to the activities of AMT (Tank Truck Crew) in the Pertamina Fuel TBBM Boyolali work environment. The first material discusses basic OHS principles, including the importance of a safety culture, the obligation of every worker to ensure the safety of themselves and others, and an understanding of potential risks in the work environment.

3. Development
   a. Content Compilation

      The content is compiled based on Pertamina's internal SOPs and official HSSE training modules. The content is structured systematically, from the introduction to the main content to the conclusion in the form of questions.

   b. Graphic Design Creation

      The graphic design was created using the Canva application and developed in the form of an E-Booklet using the Heyzine Flipbook application.

   c. Interactivity and Accessibility

      To make it easier for AMT to understand the contents of the E-Booklet, each page is equipped with audio and several videos.

   d. Final Format

      The final e-booklet is in A4 PDF and link format, consists of 8 pages, and is optimized for a small file size for download over mobile networks. This file has also been simulated for reading through standard PDF applications such as Adobe Acrobat and WPS Office. The resulting e-booklet media, with a cover and pages 1-8, is arranged as follows:

Figure 1. Front cover page of the E-Booklet

Figure 2. Pages 1 and 2

Figure 3. Pages 3 and 4

Figure 4. Pages 5 and 6

Figure 5. Pages 7 and 8

Figure 6. Pages 9 and 10

4. Implementation

The developed Occupational Safety and Health (K3) E-Booklet media has gone through a validation process by experts and then tested on a predetermined research sample. At this implementation stage, the K3 E-Booklet was given to Tank Truck Crews (AMT) in the Pertamina Fuel Terminal TBBM Boyolali work environment. At this stage, researchers conducted a pre-test and post-test to determine and evaluate the extent to which participants' understanding increased after receiving the E-Booklet. The testing activities for this E-Booklet media included an introduction of the researcher, explanation of the objectives and stages of the research, conducting a pre-test, viewing and studying the Occupational Safety and Health (K3) e-booklet, and conducting a post-test. The series of these activities lasted 34 minutes.

Figure 7. Implementation of Researcher Introduction

5. Evaluation

In a study conducted at the Pertamina Fuel Terminal TBBM Boyolali, tanker crews (AMT) responded positively and enthusiastically to the training. However, most AMTs still do not fully understand the meaning and function of occupational safety symbols and applicable standard procedures in the field. In fact, OHS elements such as the use of PPE and hazard

management are part of their daily work activities. This lack of understanding is caused by a lack of engaging and easily accessible learning media, as well as the persistence of work practices that do not fully comply with established safety procedures.

The Effectiveness of E-Booklets in Improving Understanding of Occupational Safety and Health (K3)

Effectiveness can be defined as the extent to which the achieved results (outputs) are able to support or contribute to the achievement of predetermined objectives. The greater the level of output contribution to the objectives, the higher the level of effectiveness of a program or activity. Therefore, a validation process is required in the next stage to ensure the conformity between the results and the objectives. The research instrument is declared valid if the calculated r-value is greater than the table r-value. Based on a significance level of 5% and a sample size of 30 respondents, the obtained r-value is 0.361. Therefore, if the calculated r-value exceeds this number, the item in the instrument is considered valid (Permata & Nugrahani, 2023). From the validity test results, all 32 items on the variables above were declared valid because the calculated R-value is greater than the table R-value of 0.361. Therefore, it will be used as a questionnaire for research at Pertamina Fuel TBBM Boyolali.

The next step was to conduct a reliability test. Based on the tabulation results of the reliability test on the two research variables, a Cronbach's Alpha value of 0.932 was obtained, which exceeds the minimum limit of 0.60. This indicates that the research instrument has a high level of reliability and accuracy, so that all tested variables are declared feasible and can be used in this study. In addition, the E-Booklet media on Occupational Safety and Health (K3) has also gone through a validation stage by experts. This process aims to assess the feasibility and validity of the media as an effective learning tool, to ensure that its content and presentation meet the standards required to support participants' understanding of the K3 material. This media has been through an assessment process by validators consisting of experts in the field of safety socialization materials and media experts. Based on the assessment results, the media obtained a score in the range of 75 to 100, which indicates that the media is very suitable and effective for use as a learning tool and socialization activities. The pre-test and post-test implementation in this study were conducted through the Google Form platform. This testing followed the One Group Pre-test Post-test Design, where measurements were carried out twice, namely before and after the provision of treatment in the form of learning using the E-Booklet media, to determine the effectiveness of the media in improving participant understanding.

The results of the pre-test were recorded in Excel format for analysis. After all respondents completed the pre-test, they were given time to study the provided K3 E-Booklet. Furthermore, as

a form of evaluation of the understanding gained after the learning, AMT were asked to complete a post-test using the same format to measure the effectiveness of the media in improving their understanding of work safety procedures within the Pertamina Fuel TBBM Boyolali environment. Data normality testing was performed using the Kolmogorov-Smirnov method with a significance level of 0.05. These findings indicate that the distribution of respondent data on both variables is not normally distributed. Therefore, further data analysis is more appropriate using non-parametric statistical methods, such as the Wilcoxon test, to determine the difference between the pre-test and post-test results. The Wilcoxon Signed-Rank test is a non-parametric analysis technique used to evaluate two paired data from the same sample under two different conditions, namely before and after treatment. In this study, the Wilcoxon test was applied to compare the pre-test and post-test results to determine whether there were significant changes after participants received treatment in the form of learning through E-Booklets.

Based on the results of the Wilcoxon Signed Ranks Test analysis, it was found that out of 79 Tank Truck Crew (AMT) respondents, 74 people experienced an increase in their scores in the post-test compared to the pre-test. The average increase rank was 37.50 with a total rank value of 2775.00. There were no respondents who experienced a decrease in their scores (negative ranks = 0), and only 5 respondents had the same score between the pre-test and post-test (ties = 5). The Z value obtained from this test was -7.478 with a significance of Asymp. Sig. (2-tailed) of 0.000. Because the significance value is smaller than 0.05, it can be concluded that there is a significant difference between the pre-test and post-test scores. These results indicate that the majority of respondents experienced an increase in understanding after participating in learning using the E-Booklet media. The dominance of the number of positive ranks compared to negative ranks is an indication that the E-Booklet media is effective in increasing understanding and awareness of Occupational Safety and Health (K3) in AMT. To measure the effectiveness of the E-Booklet in improving the understanding of K3 among Tanker Crews at the Pertamina Fuel Terminal TBBM Boyolali, the N-Gain calculation was used. This method calculates the increase in learning outcomes by comparing pre-test and post-test scores in the same group. Based on the data, the average pre-test score was 107.16 and the post-test score was 126.28. After being converted to a percentage (assuming a maximum score of 128), the pre-test score became 83.69% and the post-test score became 98.69%. Thus, there was a 15% increase after using the E-Booklet. The N-Gain value of 92% is classified as high according to the classification established by Wahab et al. This effectiveness is also supported by the results of the Wilcoxon test, where 74 of the 79 respondents experienced an increase in score and no decrease in score was recorded. Based on the overall results, it can be concluded that the E-Booklet media has proven effective in increasing the understanding

and awareness of Tank Truck Crews regarding occupational safety and health aspects in the TBBM Boyolali environment.

CONCLUSION

This study shows that the use of e-booklet media can significantly increase the awareness of Tanker Truck Crews (AMT) towards Occupational Safety and Health (K3) at Pertamina Fuel Terminal Boyolali. This is evidenced by the increase in the average score from pre-test to post-test and the results of the Wilcoxon Signed Ranks Test which showed a significance value of 0.000 ($p < 0.05$). The N-Gain value of 0.57 also indicates the effectiveness of e-booklet in increasing K3 understanding at a moderate to high level. Internal factors such as knowledge, attitude, and work experience, as well as external factors such as supervision and workload have been shown to influence K3 awareness. Through an attractive, accessible, and informative design, e-booklet has proven to be an effective educational medium in shaping safer and more procedural work behavior. Therefore, this media can be adopted more widely as part of the K3 education strategy in the energy distribution environment and similar industries.

SUGGESTION and RECOMMENDATIONS

Based on the research results, it is recommended that the management of Pertamina Fuel Terminal Boyolali integrate E-Booklet media as one of the main tools in the Occupational Safety and Health (K3) training program for Tank Truck Crews (AMT). The use of easily accessible and interactive e-booklets is expected to increase AMT awareness and compliance with the implementation of K3 on an ongoing basis. In addition, management needs to increase regular supervision and mentoring to ensure that all AMTs carry out safety procedures correctly. Providing ongoing socialization and training is also important to overcome internal obstacles such as lack of understanding and negligence. For further research, it is recommended to develop more varied K3 learning media, for example through interactive videos or digital applications that can reach AMTs more effectively. Further research is also recommended to measure the impact of digital media use on long-term changes in K3 behavior in the workplace.

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