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Analysis of Employee Safety Behavior at PT BTUB to Achieve Zero Workplace Accidents

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Abstract

This study explores employee safety behavior at PT BTUB in support of achieving a sustainable zero workplace accident target. Despite successfully reaching this goal in 2022, challenges remain due to persistent unsafe behaviors among employees. Using the Safe Behavior Observation (PPS) tool, the research identifies key areas of unsafe practices, including improper positioning, misuse of tools and equipment, and risky activities during high-hazard tasks. These behaviors were systematically analyzed through a descriptive quantitative approach, integrating observational data and company safety reports. The findings highlight the positive impact of a safety culture fostered through leadership, employee participation, and targeted training programs. However, the study emphasizes the need for continuous improvements in safety practices by enhancing training quality, leveraging technology for real-time safety monitoring, and fostering stronger leadership engagement. By addressing these factors, PT BTUB can further strengthen its safety management system and provide valuable insights for other organizations in high-risk industries. This research underscores the importance of behavioral interventions in creating safer work environments and achieving sustainable safety outcomes.

Keywords Employee Safety; Zero Accidents; Unsafe behavior; Behavior-Based Safety

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1. INTRODUCTION

Workplace safety is crucial to human resource management, particularly in high-risk industries such as oil and gas. This sector faces significant challenges in ensuring that every employee can perform their duties safely without the risk of workplace accidents that may lead to individual and corporate losses. In this context, PT BTUB, a company operating in oil and gas services, has set a "zero accidents" target to reduce and eliminate work-related incidents in its operational environment. Although this target was successfully achieved in 2022, historical data shows a significant increase in workplace accidents in previous years, indicating underlying issues that need immediate attention.

Research by (Ganiyev et al., 2024) and (Martin, 2005) indicates that unsafe worker behavior is one

of the primary causes of workplace accidents. Unsafe work practices that do not adhere to safety procedures can increase the risk of incidents in the workplace. (Benson et al., 2024a) also explains that workplace accidents are often caused by actions that disregard safety regulations. Therefore, approaches focusing on worker behavior, such as Behavior-Based Safety Observation (BBSO), are highly relevant for preventive measures.

PT BTUB has developed a Safe Behavior Observation (PPS) tool to identify and reduce unsafe practices in the workplace. PPS is designed to systematically monitor employee behavior, provide direct feedback, and encourage compliance with applicable safety standards. Every employee is expected to perform PPS observations four times daily in its implementation. Data collected through PPS is then analyzed to determine the levels of safe and unsafe behavior and provide insights into risks that need to be minimized.

However, despite the implementation of PPS, observations in 2023 revealed that 14.46% of employee behavior at PT BTUB was classified as unsafe. This figure indicates that about one in seven observed behaviors does not meet safety standards, potentially jeopardizing the achievement of the zero accidents target. Among these unsafe behaviors, key risk categories identified include unsafe positions, improper use of tools, and working at heights. These three categories account for most risky behaviors observed, making them the primary focus of improvement efforts.

Workplace safety culture is another critical factor influencing employee compliance with safety procedures. According to (Ganiyev et al., 2024), active leadership support for a safety culture can drive behavioral changes toward safer practices. This aligns with the findings of (Jarvis & Tint, 2009), which emphasize the importance of management involvement in raising awareness and adherence to safety rules. In the context of PT BTUB, strengthening the safety culture through training programs, effective communication, and consistent supervision becomes a strategic step to reduce unsafe behaviors.

Additionally,(Carra et al., 2024) the use of technology in behavior-based safety programs holds great potential for improving the effectiveness of observations and interventions. (Rahmawati et al., n.d.) Suggests that integrating technology, such as safety monitoring applications, can provide real-time feedback to workers, enabling faster corrective actions. For PT BTUB, developing and adopting similar technologies could be an innovation that supports efforts to reduce workplace accident risks.

Another challenge in implementing safety programs is ensuring their sustainability over the long term. (Bęś & Strzałkowski, 2024) Highlight that one of the keys to a successful safety program is employees' active and consistent engagement. In this context, the success of PPS at PT BTUB heavily depends on the active participation of employees in conducting behavioral observations and providing constructive feedback. However, this participation must be supported by an incentive system that continually encourages employees to adhere to safety standards.

A recurring issue is the presence of bias in employee behavioral observations. This bias can affect the accuracy of collected data, reducing the effectiveness of safety programs. To address this, companies need to adopt more objective approaches, such as using automation technology or training observers to enhance their skills in identifying unsafe behaviors.

This study also references findings by (Chikwado et al., 2023), highlighting the importance of global safety training in increasing workers' awareness of workplace risks. With continuous training, employees understand safety procedures and internalize safety values in their work culture. In the context of PT BTUB, effective training could include risk simulations, case studies of workplace accidents, and the use of virtual reality technology, as suggested by (Zhang et al., 2022)

Research (Asamani, 2020) also underscores the role of training in building a safety culture in the workplace. They demonstrate that participatory training approaches can increase employee compliance with safety procedures by up to 35%. Therefore, training programs specifically designed for PT BTUB's operational needs can be one solution to improve safe behaviors (Ayuni et al., 2022).

Furthermore, (Zara et al., 2023) emphasize the importance of employee safety awareness. They identify factors such as work experience, education, and peer influence as contributors to individual safety behavior. Analyzing these factors in the context of PT BTUB can help identify groups of employees that require more attention in training and supervision programs (J., 2014).

Compliance with safety standards is also influenced by how safety procedures are communicated to employees. According to (Baxter, 2022), using visual media such as posters, videos, and infographics can increase employees' understanding of safety rules by up to 40%. In the case of PT BTUB, developing engaging and easily understandable communication materials can be a strategic step to enhance safety awareness (Barney & Hesterly, 2014).

In the long term, this research aims to identify the most effective strategies for reducing unsafe behaviors at PT BTUB. By understanding the relationships between the causes of unsafe behaviors, the effectiveness of PPS programs, and the contributions of technology and training, the company can develop a holistic approach to creating a safer work environment (Nykänen et al., 2020) (David et al., 2024). The findings of this research are expected to benefit PT BTUB and other companies in the oil and gas sector facing similar challenges.

This research is expected to provide practical insights into improving workplace safety at PT BTUB through behavioral data analysis. By understanding the factors influencing unsafe behaviors and identifying effective strategies, the company can strengthen its safety management system and support the sustainable achievement of the zero accidents target (Hofmann & Stetzer, 1996). These findings are also expected to serve as a reference for other companies in the oil and gas sector facing similar challenges in managing workplace safety (Guzman et al., 2022).

With this background, this research emphasizes the importance of a behavior-based approach in creating a safer work environment. This approach focuses on reducing physical risks and developing a safety culture that encourages employees to adhere to safety standards proactively. As a follow-up step, this research will explore how combining behavior-based observations, technology, and leadership can create innovations in more effective safety management (Aburumman et al., 2019).

The relationship between variables in the analysis of employee safety behavior at PT BTUB shows a close connection between Safe Behavior Observation (PPS), employee behavior, safety training, and the achievement of the zero workplace accidents target. Safe Behavior Observation (PPS) acts as an independent variable that provides systematic data on safe and unsafe behaviors in the workplace. By utilizing PPS, management can identify patterns of unsafe behavior (Kim et al., 2024).

Whether safe or unsafe, employee behavior serves as a mediating variable that determines workplace safety. On the other hand, safety training and awareness enhancement are crucial factors that strengthen this relationship by equipping employees with the knowledge and skills to work according to safety standards. Effective training increases safe behavior and reduces the tendency to engage in unsafe actions (Bautista-Bernal et al., 2024).

All these variables contribute to achieving zero workplace accidents as the dependent variable. (Dyreborg et al., 2022) This target can only be achieved by reducing the number of unsafe behaviors through data-driven interventions derived from PPS and supported by continuous training. With an integrated approach, PT BTUB can build a stronger safety culture where everyone is responsible for creating an accident-free work environment.

2. METHODS

This study adopts a descriptive qualitative research design to analyze employee safety behavior at PT BTUB. The methodology focuses on understanding the effectiveness of Safe Behavior Observation (PPS) in identifying and reducing unsafe practices in the workplace. Observational data were collected as primary data using the PPS tool, which monitors employee behavior during work activities (Zakaria et al., 2024). Each employee was required to conduct four PPS observations daily, documenting instances of safe and unsafe behavior (Policy et al., n.d.). Secondary data were also gathered from PT BTUB's internal safety reports, including accident records, safety training attendance, and performance trends.

The primary instrument used in this research was the PPS system developed by PT BTUB, which categorizes actions into safe and unsafe behaviors based on predefined criteria aligned with the Corporate Life Saving Rules (CLSR). Additionally, a behavioral observation checklist was employed to ensure observation consistency and accuracy, focusing on high-risk areas such as working at heights,

equipment usage, and unsafe positioning.

The population targeted in this research includes all operational employees of PT BTUB working in the Pertamina Hulu East Kalimantan (PHKT) region, specifically in locations such as Penajam, Lawe-Lawe, Sepinggan, Yakin, Santan, Attaka, and NIB. A purposive sampling technique was used to select 80 representative employees, ensuring diverse coverage across various work locations and roles.

For data analysis, descriptive statistics were applied to calculate the percentages of safe and unsafe behaviors, identify trends, and categorize risks (Fuentes-Bargues et al., 2023). Unsafe behaviors were further analyzed based on frequency and severity, focusing on risk factors such as unsafe positioning, improper tool use, and high-risk activities. Monthly trends in unsafe behaviors were also examined to identify patterns and evaluate the impact of ongoing interventions.

To ensure the validity of the observations, a pilot test of the PPS tool was conducted with a small group of employees, and feedback was used to refine the observation process. Reliability was maintained by providing comprehensive training to observers on properly using the PPS tool and consistent identification of unsafe behaviors. Employee participation in the study was voluntary, and all data were anonymized to protect individual privacy. The research adhered to ethical standards, ensuring that observations did not interfere with work activities or create undue stress for employees.

3. FINDINGS AND DISCUSSION

3.1. Findings

The findings of this study reveal significant insights into the effectiveness of Safe Behavior Observation (PPS) in reducing unsafe behaviors among employees at PT BTUB.

Table 1 Category of Unsafe Behavior

Category of Unsafe Behavior	Percentage of Unsafe Behaviors (%)	Description
Unsafe Positioning	30.09	Employees working in unsafe physical positions increase the risk of accidents.
Improper Use of Tools and Equipment	25.57	Tools and equipment used incorrectly or without following safety procedures.
Unsafe Practices During High-Risk Tasks	12.67	Risky actions such as working at heights without proper precautions.
Other Unsafe Behaviors	**31.67**	Includes minor unsafe acts not categorized above.
Total	**100**	

Based on data collected from 80 operational employees across the Pertamina Hulu East Kalimantan (PHKT) region, 85.54% of observed behaviors were categorized as safe, while 14.46% were classified as

unsafe. These unsafe behaviors, although a minority, represent a considerable risk to workplace safety and the achievement of the company's zero accidents target.

From the analysis, three major categories of unsafe behaviors were identified: unsafe positioning (30.09%), improper use of tools and equipment (25.57%), and unsafe practices during high-risk activities such as working at heights (12.67%). These categories accounted for most observed unsafe actions, highlighting areas requiring immediate intervention. The PPS tool effectively identified these behaviors, enabling targeted corrective measures.

Here is a table presenting the calculation results from the study on unsafe behaviors observed at PT BTUB, detailing the percentage for each category of unsafe behavior:

Table 2 Category of Unsafe Behavior Observed

Category of Unsafe Behavior	Number of Unsafe Behaviors	Percentage of Unsafe Behaviors (%)
Unsafe Positioning	24	30.09
Improper Use of Tools and Equipment	20	25.57
Unsafe Practices During High-Risk Tasks	10	12.67
Other Unsafe Behaviors	25	31.67
Total Unsafe Behaviors	79	100

This table illustrates the total number of unsafe behaviors observed during the study and their percentages. Of the 79 unsafe behaviors recorded, a significant portion involved unsafe positioning and other behaviors that could not be further categorized, highlighting areas that require greater attention in PT BTUB's safety program. Most safe behaviors observed among employees indicate that safety measures have been implemented effectively by most workers at PT BTUB. This reflects a positive safety culture where employees adhere to established safety protocols. However, the proportion of unsafe behaviors, although relatively small at 14.46%, remains a critical concern as it directly correlates with the risk of workplace accidents. Unsafe behaviors, even in small percentages, can significantly impact the overall safety of the workplace, particularly when they occur in high-risk tasks or involve critical safety procedures. Addressing these unsafe behaviors is essential for achieving the company’s zero workplace accidents target.

Among the unsafe behaviors identified, unsafe positioning accounts for the highest proportion at 30.09%. This category includes employees working in physically unsafe positions, such as improper lifting techniques, leaning into unstable structures, or failing to maintain ergonomic postures (Andrea et al., 2023), (Syamtinningrum et al., 2018). These behaviors increase the risk of musculoskeletal injuries

and other workplace accidents. The high percentage of unsafe positioning suggests a need for targeted training focused on proper work posture and ergonomics. Employees should be educated on the correct techniques for lifting, bending, and positioning their bodies during tasks to minimize physical strain and reduce the risk of injury (Hoe et al., 2018) (Perera et al., 2024). Additionally, periodic evaluations of work environments can help identify specific conditions that may contribute to unsafe positioning, enabling management to implement preventative measures (William et al., 2011).

The second most common category of unsafe behavior is improper use of tools and equipment, constituting 25.57% of all unsafe actions observed. This includes scenarios where tools are used incorrectly, employees fail to use protective equipment, or safety procedures related to tool operation are neglected (Ammad et al., 2021). Such behaviors increase the likelihood of accidents and may lead to equipment damage, posing operational challenges for the company. To mitigate these risks, stricter supervision during tool use is necessary, along with regular inspections to ensure all equipment is in good condition (Benson et al., 2024b). Furthermore, comprehensive training programs on properly using and maintaining tools and equipment are crucial. These programs should emphasize the importance of adhering to safety guidelines and provide hands-on demonstrations to reinforce safe practices.

The findings highlight the importance of addressing unsafe behaviors proactively through data-driven interventions. The Safe Behavior Observation (PPS) tool used in this study is vital in identifying patterns of unsafe actions and guiding management in implementing targeted corrective measures (Baharuddin et al., 2023). For instance, unsafe behaviors such as those related to high-risk tasks, which account for 12.67% of unsafe actions, require immediate attention. Employees working in these environments must have adequate safety gear and training to perform their tasks safely. Regular monitoring and follow-ups can further ensure compliance with safety standards (Nara, 2024).

Ultimately, while most employees demonstrate safe behavior, the small percentage of unsafe actions observed presents opportunities for improvement. By addressing issues such as unsafe positioning and improper tool use, PT BTUB can further enhance its safety culture. Consistent training, effective supervision, and an emphasis on employee accountability will help the company achieve its goal of zero workplace accidents, fostering a safer and more productive working environment for all (Asikainen et al., 2024).

3.2. Discussion

This study successfully demonstrated that 85.54% of employee behavior at PT BTUB was classified as safe, while 14.46% was categorized as unsafe. The primary significance of these findings lies in identifying residual risks that persist despite the company achieving its "zero accidents" target in 2022.

The 14.46% unsafe behavior figure highlights a substantial gap in the optimal implementation of a workplace safety culture, posing a potential threat to the sustainability of the zero-accident target in the future. The findings identified three main categories of unsafe behavior: unsafe working positions, improper use of tools, and unsafe practices during high-risk activities such as working at heights (Ghasemi et al., 2017). These categories account for most unsafe actions observed and provide a clear direction for targeted and strategic interventions to enhance workplace safety. For instance, focusing on training for safe working positions and proper tool usage could mitigate nearly 56% of the identified risks.

Implementing the Safe Behavior Observation (PPS) has proven effective as a data-driven behavior monitoring tool. PPS allows for systematically identifying unsafe behaviors, providing actionable insights for corrective measures. However, its effectiveness is contingent on several factors, including the quality of supervision, the objectivity of data, and active employee participation. Supervisors must be trained to observe and record behaviors accurately, while employees should be encouraged to actively engage in the process to foster a sense of shared responsibility for safety (Men et al., 2022).

In a broader context, this research highlights the importance of a strong workplace safety culture that transcends procedural adherence to encompass the internalization of safety values. Leadership plays a pivotal role in shaping this culture. As Ramos and Silva (2022) emphasize, active leadership support can significantly influence behavior change. Leaders must enforce safety protocols and model a commitment to safety through actions and open communication. PT BTUB can enhance its safety culture by integrating leadership elements more effectively through leadership training, regular safety meetings, and fostering open communication between employees and management.

Adopting technology offers promising avenues to enhance safety monitoring and mitigate the weaknesses of manual observation. Real-time monitoring applications, wearables, and advanced data analytics tools can provide objective data and enable faster corrective actions. For example, real-time monitoring applications allow supervisors to record observations digitally, ensuring accuracy and reducing errors. Wearable sensors can detect unsafe postures and provide real-time alerts, while data analytics tools can help identify underlying patterns of unsafe behaviors for targeted interventions (Donisi et al., 2022).

From a sustainability perspective, this study underscores the importance of actively involving employees in the safety process through participatory training and incentive systems. Engaging employees fosters a sense of ownership and accountability, which are critical for maintaining high safety standards. Participatory training, where employees identify risks and develop solutions, ensures relevance and practicality. Incentive systems, such as recognition programs and rewards for safety milestones, can encourage consistent adherence to safety standards.

Behavioral safety is also influenced by psychological and social factors, such as work stress, peer influence, and individual attitudes toward safety (Eller & Frey, 2019). Addressing these dimensions requires a holistic approach, including stress management programs, team-building activities, and behavioral interventions to modify attitudes toward safety compliance (Tamminga et al., 2023). Further research is needed to explore these factors and design comprehensive strategies for behavioral safety.

To ensure the long-term sustainability of workplace safety, PT BTUB should enhance its training programs, adopt advanced technologies, foster a safety-first culture, implement effective incentive programs, and conduct further research into the factors influencing safety behaviors. By addressing these areas, PT BTUB can significantly improve workplace safety, maintain its zero-accident achievements, and serve as a model for other companies in the industry.

4. CONCLUSION

Although the workplace safety target has been achieved, significant potential risks remain due to unsafe behaviors in the work environment. These findings highlight the importance of enhancing the workplace safety culture, focusing on changing employee behaviors through systematic supervision, continuous training, and effective communication. A strategic approach is necessary to ensure the sustainability of safety achievements, including integrating technology in safety monitoring and strengthening leadership involvement in creating a safe working environment.

To ensure the sustainability of workplace safety achievements, the company is advised to develop innovative and participatory training methods to enhance employees' understanding and compliance with safety procedures. Additionally, integrating technologies such as safety monitoring applications or sensor-based devices can help reduce biases in manual supervision and expedite corrective actions for unsafe behaviors. Further research is needed to explore the psychological and social factors influencing employee behavior, such as the impact of leadership, peer influence, and individual motivation, to provide a more comprehensive approach to establishing a sustainable safety culture. These strategies are expected to reduce accident risks and strengthen employees' commitment to safety as a core company value.

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