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The Effect of The Safety Incentives Program on Safety Motivation in Construction Workers

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ABSTRACT

Introduction: The construction sector's pivotal role in national development hinges on mitigating workplace accidents, which significantly impact productivity and project outcomes. With 32% of Indonesia's workplace accidents linked to construction incidents, maintaining high worker motivation is crucial amidst the industry's inherent complexities and uncertainties. Implementing effective safety incentive programs can bolster employee participation and compliance with safety protocols, essential for fostering a safe and productive work environment at PT X Surakarta. This study aims to investigate how safety incentive program affect safety motivation on construction worker.
Methodes: This study utilizes a quantitative approach with a Pre-Experimental One-Group Pretest-Posttest design. Non-probability sampling used with a total sampling technique with 45 field workers at PT X Surakarta. Rewards on the safety incentive program are given to employees who actively contribute to meeting established criteria. Data were collected using a questionnaire designed to measure safety motivation. Data analysis involved both descriptive and inferential statistics.
Result: Prior to the program, workers exhibited low motivation (mean score of 60.31), attributed to the absence of systematic rewards for safety compliance. Following program implementation, safety motivation significantly increased to a high level (mean score of 96.95), reflecting an average improvement of 36.64 points. Statistic evidence by a Simple Paired T-Test yielding a p-value < 0.001, indicating substantial improvement from pre- to post-program phases. These findings underscore the efficacy of structured safety incentive programs in enhancing construction workers' motivation towards safety practices.
Conclusion: Safety incentive program showed a significant impact on safety motivation on construction worker.

Keywords: *Incentives, Motivation, Safety*

INTRODUCTION

The construction sector is a crucial industry in the development of a country. The success of construction projects is influenced by various factors, one of which is workplace accidents, which can affect productivity and the achievement of project goals. According to data from BPJS *Ketenagakerjaan*, at least 32% of all workplace accidents in Indonesia are related to construction accidents[1]. The

construction industry is inherently complex, dynamic, uncertain, and requires highly motivated workers. Employee motivation is essential as it lays a strong foundation for high performance and reduces unproductive time[2].

Motivation, derived from the Latin word for "movere," generally refers to a series of psychological processes that initiate, direct, intensify, and sustain behavior[3]. Safe work motivation is created through a safety motivation system that operates at both organizational and individual levels. Organizations must encourage workers to participate in safety efforts and comply with safety goals, standards, and procedures, given the positive effects of participation and compliance on safety motivation. Employees are the last line of defense against risks and accidents, and their behavior is crucial in avoiding accidents and material losses[4].

According to Skinner's Operant Conditioning Theory, behavior can be reinforced or weakened by external influences. This theory posits that behavior produced by individuals is affected by the consequences that follow it. Behavior followed by favorable consequences is likely to increase in frequency, whereas behavior followed by unfavorable consequences is likely to decrease[5]. Incentives are a form of reinforcement that can be used to increase the frequency of desired behaviors in the future.

Incentives are a proactive approach implemented by management to enhance employee performance related to safety. The use of incentives, which can include financial or non-financial rewards, helps to encourage workers to engage in safety programs[6]. According to research[7], the goal of safety incentive and penalty schemes is to ensure the safe completion of construction projects by penalizing workers for unsafe actions or conditions and providing incentives for excellent safety performance. Another study[8] shows that incentives can improve safety performance on construction sites. Furthermore, it is recommended that incentives be measurable and objective, with relevant benchmarks[7].

Additionally, based on the results of a safe work motivation questionnaire in the initial survey, not all workers have strong intrinsic motivation towards safety. Out of 15 field workers who participated in the initial survey, only 3 had high safe work motivation, while the remaining 80% had moderate to low safety motivation. Factors influencing this motivation include individual perceptions of safety behavior, intrinsic safety behavior, and perceptions of goal setting.

Based on the description above, this research aims to investigate how Safety Incentive Program affect safety motivation on construction worker.

METHODS

This study utilizes a quantitative approach with a Pre-Experimental One-Group Pre-test Post-test design. Pre-Experimental design is a research design where external variables still influence the formation of the dependent variable[9]. This research was conducted at the underpass construction project of PT X, located at Simpang Joglo, Banjarsari, Surakarta, from February to May 2024. The sampling technique used in this study was non-probability sampling with a saturated sampling technique, targeting population of all 45 field workers at PT X.

All participants were informed about the study's purpose and provided their consent before participating. The research was conducted following ethical guidelines by Health Research Ethics Committee Dr. Moewardi General Hospital with registry number 1.121/IV/HREC/2024, ensuring the confidentiality and anonymity of all respondents.

Rewards on the safety incentive program are given to employees who actively contribute to meeting established criteria, such as reporting findings on the

company's leading safety indicators (non-standard personal protective equipment (PPE), 5S practices, environment, and fire hazards) or providing suggestions and solutions to safety issues through the Safety Participation Card. Additionally, workers are required to regularly participate in routine Safety Morning Talks and Toolbox Meetings. The series of activities begins with a 7-day program introduction, followed by a 17-day implementation phase, and culminates in the announcement of awards on the 7th and 17th days of the intervention. Awards are given to workers with the highest cumulative participation in reporting and highest attendance at Safety Morning Talks and Toolbox Meetings. Awards are presented during the Safety Morning Talk sessions. Non-financial rewards include social recognition during announcements at Safety Morning Talks or Toolbox Meetings, while financial rewards consist of cash incentives.

Data were collected using a questionnaire developed by Neal and Griffin[10] and Hedlund et al.[3], designed to measure safety motivation. It included items on individual perceptions of safety behavior, intrinsic safety behavior, and perceptions of goal setting. The questionnaire used a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The validity of the questionnaire was assessed by comparing the calculated r value to the r table value. A questionnaire is considered valid if the calculated r value is greater than the r table value. For a degree of freedom of (n-2) at a confidence level of 0.05, the r table value is 0.514. In this study, out of 25 questions, 3 were deemed invalid because their calculated r values were smaller than the r table value. Additionally, a reliability test was performed, resulting in a Cronbach's Alpha value of 0.938. This indicates that the questionnaire is reliable, as a Cronbach's Alpha value greater than 0.6 is considered acceptable.

Data analysis involved both descriptive and inferential statistics. Descriptive statistics, such as mean and standard deviation, were used to summarize the pre-test and post-test data. Inferential statistics, including sample paired sample T-Tests, were employed to determine the significance of changes in safety motivation following the implementation of the safety incentive program.

A normality test is performed to determine whether a variable follows a normal distribution or an abnormal distribution. In this study, a normality test was conducted on data from 45 respondents using the Shapiro-Wilk Test. The results indicated that the pre-test value had a significance value of 0.65, while the post-test value had a significance value of 0.137. The results of the normality test can be considered normally distributed if the significance value is greater than 0.05.

RESULT

Respondent Characteristics

The study encompassed respondents characterized by age, gender, length of service, and highest educational attainment. The findings from 45 respondents are presented in Table 1.

Age

According to the Ministry of Health of the Republic of Indonesia, age can be categorized into early adulthood (20-25 years), late adulthood (26-35 years), and early elderly (36-45 years). The majority of respondents in this study fall into the late adulthood category (51%). As noted, age alone cannot determine someone's maturity level, but generally, as individuals age, their strength and maturity in thinking tend to improve[12]. However, contrasting views[13] suggest that work productivity and motivation may decline as individuals grow older. Skills, strength, and coordination may diminish, accompanied by boredom with work and a lack of intellectual engagement in older age.

Table 1. Distribution of Respondent Characteristics

Respondent Characteristics	Frequency (n)	Percentage (%)
Age		
20-25	7	16%
26-35	23	51%
36-45	15	33%
Total	45	100%
Highest Educational Attainment		
Elementary School	6	13%
Junior High School	12	27%
Senior High School	27	60%
Total	45	100%
Length of Service		
≤ 5 years	16	35%
> 5 years	29	65%
Total	45	100%

Source: Primary Data, 2024

Highest Educational Attainment

Respondents' highest educational levels ranged from Elementary School (SD), Junior High School (SMP), to Senior High School (SMA). The findings revealed that more than half of the respondents had completed Senior High School or its equivalent. The smallest percentage (13%) attained education only up to Elementary School level. Field workers predominantly rely on physical capabilities, emphasizing experience and skills in their work. Formal education significantly influences cognitive abilities[14]. Aligned to previous statement, higher levels of education enhance information absorption[15]. Therefore, a significant portion of respondents in this study possess strong cognitive abilities for absorbing information.

Length of Service

Respondents' length of service was categorized into more than 5 years and less than or equal to 5 years. Out of the total 45 respondents, it was found that a majority had worked in the construction sector for over 5 years (65%). Individuals with longer work experience tend to have accumulated more practical knowledge and skills, contributing to more efficient job performance[16]. Another research states that individuals with longer work experience gain broader insights and extensive experience[13]. With the majority of respondents having over 5 years of work experience, the characteristics of the respondents in this study include proficiency[13], skillfulness[17], and productivity[18].

Safety Incentive Program

Based on the Figure 1., it is noted that the total accumulation of cards amounts to 22, with 17 workers participating (38% of total workers). In Period I, there were a total of 9 cards filled out by 6 workers, while in Period II, participation increased to 13 cards filled out by 11 workers. This indicates an increase in both accumulated cards and participating workers from Period I (day's 7^{th}) to Period II (day's 17^{th}).

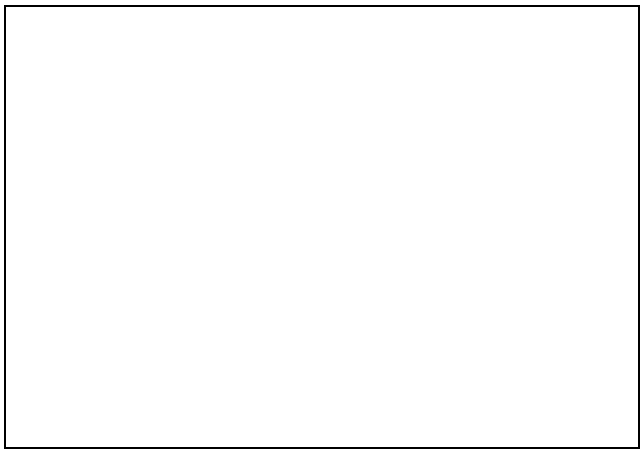

Figure 1. Accumulation of Participation Cards and Participating Workers
Source: Primary Data, 2024

Regarding the types of reports, among the five leading indicators listed on the Safety Participation Card, the majority of reports came from the working environment category, totalling 9 reports. The remaining reports were related to 5S practices (6 reports), personal protective equipment (5 reports), and 1 report concerning safety solutions and

improvements. Therefore, it can be concluded that improvements in the working environment need to be enhanced.

Worker attendance at Safety Morning Talks and Toolbox Meetings is recorded by filling out attendance sheets provided by the Safety Officer. Researchers compared attendance over a 20-day intervention period (May 17 - June 8, 2024) with attendance over a 20-day period before the intervention (April 24 - May 16, 2024). The average attendance of workers during the pre-intervention period was 88%, whereas the average attendance during the intervention period was 94%. This indicates a 6% increase in attendance during the intervention period.

Safety Motivation

Motivation for safe work practices was assessed using a questionnaire comprising 22 statements. The questionnaires were administered twice, both before and after the intervention activities, specifically on May 16, 2024 (pretest), and June 8, 2024 (posttest). Subsequently, each respondent's questionnaire scores were categorized into levels of good, sufficient, and insufficient safe work motivation. The results of safe work motivation are detailed in the following table:

Table 2. Categories of Safe Work Motivation Before and After the Safety Incentive Program.

Safety Motivation	Pre-test		Post-test	
	(f)	(%)	(f)	(%)
Good (85-110)	0	0%	45	100%
Mid (62-84)	21	47%	0	0%
Low (0-61)	24	53%	0	0%
Total	45	100%	45	100%

Source: Primary Data, 2024

Based on Tables 2 and 3, the pretest scores ranged from a minimum of 43 to a maximum of 71. According to the categorization of safe work motivation, many respondents had insufficient safe work motivation (53%), while 47% had sufficient motivation. No respondents had high safe work motivation during the pretest questionnaire administration.

Table 3. Trends in Safety Motivation Before and After the Safety Incentive Program

Calculation	Max Score	Min Score	Mean	Mode	Std. deviation
Pre-test Score	71	43	60.31	64	6.42
Post-test Score	106	85	96.95	103	5.25

Source: Primary Data, 2024

During the posttest questionnaire administration, all 45 workers (100%) exhibited high motivation for safe work practices. The lowest score from the posttest questionnaire was 85, and the highest score was 106. The average posttest score among the 45 workers was 96.95, with a standard deviation of 5.25. These findings illustrate a notable improvement in safe work motivation following the implementation of the safety incentive program, highlighting its effectiveness in enhancing workers' attitudes towards workplace safety.

Statistics Test

The normality test was conducted to determine whether a variable follows a normal distribution or not. In this study, normality tests were performed on data from 45 respondents using the Shapiro-Wilk test at a significance level of 0.05. After inputting the data into SPSS 25 software, the results are presented in the following table:

Table 4. Shapiro-Wilk Normality Test Results

	Shapiro-Wilk		
	Statistic	df	Sig.
Pretest	0.953	45	0.065
Posttest	0.961	45	0.137

Source: Primary Data, 2024

Based on the Shapiro-Wilk test output, the pretest dataset has a significance value of 0.065, and the post-test dataset has a significance value of 0.137. A normality test is considered to have a normal distribution if the significance value is greater than 0.05. From the data provided, both the pretest and post-test datasets have significance values greater than 0.05. Therefore, it can be concluded that both the pretest and post-test data are normally distributed. This indicates that the assumption of normality is satisfied for both datasets in this study.

The Paired Sample T Test was conducted on the scores of safe work motivation before and after the implementation of the Safety Incentive Program, yielding the following statistical results:

Table 5. Paired Sample T Test for Safety Motivation before and after Safety Incentive Program

	N	p-value
Pretest & Post-test	45	<0.001*

*p value < 0.005 indicated significant

The Paired Sample T Test resulted in a p-value of <0.001, indicating a highly significant statistical correlation between pretest and post-test scores. This suggests that the Safety Incentive Program had a significant effect on enhancing safety motivation among the participants, as evidenced by the significant improvement in their scores following the intervention.

DISCUSSION

Based on the findings before the implementation of the Safety Incentive Program, the overall average of safety work motivation at PT X Surakarta construction project was 60.31, classified as low. This aligns with observational data indicating a lack of compliance and participation among workers in the company's occupational safety and health efforts. Participation in workplace activities correlates with employee motivation[11].

The absence of a systematic reward program, both material and non-material, for compliance and participation in safety and health efforts is identified as one of the reasons for low safety motivation among workers. Positive attention, various awards, and encouragement can motivate workers to enhance their participation and compliance[11]. Moreover, goal-setting perception can be enhanced through elements such as managerial support, participatory decision-making, consideration of worker capabilities, use of rewards, and worker feedback[19].

Subsequently, there was an overall increase in safety motivation after the Safety Incentive Program was implemented. Previously low motivation levels significantly improved post-intervention. The intervention involved providing cash incentives to increase the frequency of behaviours such as reporting leading indicators and actively participating in Safety Morning Talks and Toolbox Meetings.

The Safety Incentive Program successfully boosted worker motivation to enhance their involvement and compliance with the company's occupational safety and health efforts. This is consistent with previous research which suggests that even small, frequent incentives positively influence safety behaviors[20].

Statistical results indicate a significant impact of the Safety Incentive Program on the safety work motivation of PT X Surakarta construction workers, with a p-value of < 0.001 ($p < 0.05$), indicating a significant difference before and after the intervention. The mean difference of 36.64 between pre- and post-incentive scores demonstrates an increase in safety work motivation post-intervention. This improvement coincided with an increase in worker compliance and participation in safety and health initiatives.

Although not significant, the compliance rate—referring to worker

attendance at Safety Morning Talks and Toolbox Meetings—increased by 6%. Factors contributing to worker absenteeism included physical discomfort, tardiness, misinformation, among others. Field workers often perform work with high workloads and unfavourable condition, increasing the risk of workers experiencing fatigue and work-related stress, which causes workers to often be absent from safety talk activities or similar safety activities[21-23]. Exposure to pollutants and hazardous gases from vehicle or engine exhaust negatively impacts field workers' health, leading to absences from work due to illness[24,25].

On the other hand, participation in filling out Safety Participation Cards increased from 6 workers in period I to 11 workers in period II. Reasons for 62% of respondents not participating included few findings to report, unfamiliarity with the card filling process, fatigue due to workload, and busy work activities during working hours. Employees' busyness can hinder their ability to adapt to changes and conditions in the work environment, potentially leading to indifference towards their own safety[26]. Occupational safety and health programs in companies need to not only control work accidents but also manage various hazard factors that can cause diseases in the workplace. This includes controlling physical, chemical, biological, ergonomic, and psychological factors[27].

The study utilized cash incentives as preferred stimuli for workers. The timing of incentive delivery was designed according to Skinner's Operant Conditioning theory with a variable interval schedule, reinforcing correct responses. This aligns with Skinner's theory, which states that presenting a pleasant stimulus after a behavior will increase the frequency of that behavior in the future[5]. This was evidenced by increased worker attendance at Safety Morning Talks and Toolbox Meetings and increased participation in filling out Safety Participation Cards between periods I and II. Several studies have shown a significant relationship between workers' knowledge, motivation and attitudes towards safety practices[28-30]. Knowledge and motivation involve a series of processes that occur when individuals respond to the information they gather about a specific subject. Behavior driven by strong knowledge and motivation is more sustainable than behavior formed without reliable information. When a person adopts a new behavior based on knowledge and awareness, leading to a positive attitude, this behavior is likely to endure over time[31,32]. Safety awareness involves understanding and recognizing potential hazards and risks in a specific environment. It also includes the ability to take proactive measures to prevent accidents or injuries. This means being aware of these potential dangers and following established safety protocols and procedures to minimize the risk of harm to oneself and others[33].

The limited duration of the study means that long-term effects of safety work motivation and the Safety Incentive Program could not be evaluated. However, shortly after adopting an incentive system, safety performance improved, but after a few months (3 or 6 months), there was a decline as the value of incentives diminished over time, with the incentive system losing attractiveness after the initial months[6]. Therefore, to maintain the value of incentives, their quantity and type need periodic evaluation and modification based on worker needs and characteristics.

CONCLUSION

The safety incentive program has been shown to significantly enhance safety motivation among construction workers in Surakarta. One of the key factors contributing to low worker motivation is the lack of a systematic reward program, as well as both material and non-material benefits for workers' compliance and participation in occupational safety and

health initiatives implemented by the company. Construction companies in Indonesia and worldwide can adopt this program to improve performance and ensure adherence to occupational safety standards. However, it is essential for companies to continuously evaluate and refine the existing incentive system to maintain quality and productivity.

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