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The Relationship Between Construction Workers' Perception of Accidents and Risk Management

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ABSTRACT

Occupational accidents often result from inadequate implementation of preventive measures designed to ensure a safe work environment. Research into accidents often overlooks workers' perspectives, leading to solutions that solely reflect the company's perspective. By incorporating workers' perceptions, a new approach to accident prevention can be developed to optimize risk management and introduce innovative prevention strategies. This research study aimed to determine the relationship between workers' perceptions of accidents and risk management within a construction company. A non-experimental quantitative approach was used and surveys were employed to gather accurate data. The study tested the direct relationship between construction workers' perception of accidents and the company's risk management strategies.

Keywords: perception, management, risk, accidents, prevention.

INTRODUCTION

The construction industry is among the most hazardous sectors. According to the Peruvian Ministry of Labor and Employment Promotion (MTPE, in Spanish), there were 346 reported accidents in this sector alone during May 2022 (MTPE, 2022). In response to this, several studies have been conducted to identify the causes and characteristics of accidents and develop effective strategies for reducing their occurrence.

Legal regulations on Occupational Health and Safety in the construction sector mandate that companies implement a safety management system that guarantees worker participation and fosters a safety culture. Although adherence to these regulations is mandatory, only a few companies manage to comply fully, partly because the methods for achieving compliance are not well-defined.

The Occupational Safety and Health Act (Ley N°. 29783, 2011) mandates that all companies conduct hazard identification, and risk assessment, and implement controls. Therefore, effective risk management is crucial for companies to adhere to these regulations.

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While economic growth within companies has been observed, it has unfortunately also been accompanied by fatal accidents, albeit at a statistically low rate; therefore, strategies must be implemented that balance the economic growth of organizations with the promotion of a preventive culture, ensuring greater worker participation in accident prevention efforts (Gutiérrez, 2023).

Although accident prevention is crucial, training levels in this area remain low. Research by Ahumada et al. (2019) highlighted low levels of accident and occupational disease prevention among workers in the metalworking sector. Their study pointed to a lack of government intervention and insufficient resources from employers to comply with existing regulations.

The perception of risk among workers significantly influences their behavior. Research conducted by Fajardo-Zapata et al. (2019) indicated that individuals with limited information about risks are less likely to take risks than those with greater knowledge. This underscores the crucial role of perception and information in effective accident prevention.

Due to the nature of the work, construction workers often operate under hazardous conditions and use dangerous equipment that can impact their health or cause occupational accidents. Their perception of danger influences the way they respond to these risks. Research indicates that when workers understand the serious consequences of these risks, they adopt a preventive attitude. Conversely, when they are unaware of the potential harm, they are more likely to engage in unsafe behaviors (Alcívar, 2019). This highlights the importance of prevention and understanding how workers perceive risks and the potential damage these risks may cause.

Uribe-Salazar et al. (2019) found that as workers gain more experience, their perception of risk in the workplace tends to decrease. This increased tolerance results from prolonged exposure to dangerous conditions. The way workers perceive safety practices and their influence on occupational accidents emphasizes the need to consider the psychological and social aspects of workplace safety. Workers' perceptions directly affect their safe behaviors and their willingness to prevent accidents from affecting others (Aguilar et al. 2020).

Accident prevention education is essential to promote positive attitudes towards occupational risks and accidents. Companies that do not take adequate preventive measures are more vulnerable to accidents and occupational diseases. Therefore, enhancing training programs on prevention and raising awareness of risk perception is crucial to mitigate these occurrences (Granados & Echavez, 2023).

Many organizations fail to establish their processes adhering to safety standards related to occupational safety and health, thereby hampering their risk management efforts. As Gonzales and Aduvire (2022) note, workers must comply with safety standards, for which actions must be oriented to improve training on safety regulations and cultivate a safety culture that encourages workers to follow procedures.

Implementing an occupational health and safety management system provides the necessary guidelines for reducing risks that may affect health and lead to occupational accidents. Navarro-Claro et al. (2021) concluded that workers' perceptions largely limit risk management in the construction sector; it often revolves around compliance with legal regulations and documentation management, lacking sufficient controls and measures to reduce hazards and improve employee working conditions.

One effective method for preventing occupational accidents in companies is involving workers in reporting unsafe acts and conditions at work. It is important to recognize that the perception of workers on this reporting method influences its effectiveness in identifying potential hazards, as it involves both employees and managers (Molocho, 2023).

According to Colque (2022), effective management of work risk prevention is closely related to the perceived safety climate within the organization. Enhancing risk management can positively influence this safety climate, thereby improving the company's core production processes and leading to an increased awareness of safety among workers.

However, various studies indicate that many employees have a low perception of the safety policies offered by their companies. Godoy et al. (2022) highlight this issue, emphasizing the need to foster a culture of prevention through collaboration between employers and employees, aiming to improve worker safety.

This study aims to expand knowledge on accident prevention and risk management by promoting more active worker participation. The perception of workers within a company can improve organizational management, as it provides valuable innovative insights based on their experiences and knowledge.

Involving workers in management decisions can lead to the development of innovative actions that may be replicable in other organizations. Additionally, this study serves as the first step toward future research aimed at expanding knowledge on reducing occupational accidents by fostering inclusion among all organizational participants.

METHODOLOGY

This research was conducted at a construction company with headquarters in Lima. This company is currently executing a reconstruction project to prevent or mitigate the effects of floods caused by the El Niño phenomenon in the northern region of Peru.

The study followed a quantitative correlational approach to determine the degree of relationship between the variables and to establish whether the behavior of one variable influences the other (Hernández et al. 2014). The findings will help companies define strategies to enhance employee commitment and achieve the much sought-after safety culture.

Objective

The primary objective of this research study is to determine the relationship between the perception of accidents among workers in a construction company and the organization's risk management practices.

Description of Variables

The variables used in this study are described in Table 1.

Table 1. *Description of Study Variables.*

Type of Variable	Variable Name	Dimensions
Independent Variable	Accident Perception	Substandard Conditions
		Substandard Acts
Dependent Variable	Risk Management	Risk Identification
		Training

Source: Prepared by the authors.

Research Hypothesis

The following hypotheses were proposed:

General hypothesis: The perception of accidents among construction workers is related to risk management.

- Specific hypothesis 1: Substandard conditions are related to risk management.
- Specific hypothesis 2: Substandard acts are related to risk management.

Sample and Instrument

A representative sample of 100 workers was considered, comprising men and women aged between 19 and 63. This sample also includes workers with varying levels of work experience, as detailed in Table 2.

Two questionnaires designed to measure accident perception and risk management were used in this study. Both questionnaires used a 5-point Likert scale, with the following response options: (1) never, (2) seldom, (3) often, (4) almost always, and (5) always.

These questionnaires were validated through expert judgment, and their reliability was assessed using Cronbach's alpha, yielding positive results as shown in Table 3.

Table 2. *Characteristics of the Sample.*

Sample Size	Sex		Work Experience		
	Female	Male	1 year	2 years	2 years+
100	8	92	15	8	77

Source: Prepared by the authors.

Table 3. *Cronbach's Alpha of the Instruments Used for Each Variable.*

Accident Perception	Risk Management
0.927	0.944

Source: Prepared by the authors.

The results were analyzed using SPSS statistical software version 25 (Romaina, 2012). Descriptive statistical analysis was used to examine the behavior of the collected survey data, whereas inferential statistical analysis, specifically Spearman's correlation, was used to determine the relationship between the main variables of interest in the research.

RESULTS

Normality Testing

To begin the analysis of the data collected, we first evaluate evaluate whether a normal distribution is followed. The analysis is performed using the Kolmogorov-Smirnov test, as the sample consists of 100 workers, which is greater than the minimum threshold of 50. The hypotheses are stated as follows:

- Null hypothesis (H_0): The data follow a normal distribution.
- Alternative hypothesis (H_1): The data do not follow a normal distribution.
- Significance level (α) = 0.05

If the significance result is greater than α, the null hypothesis (H_0) is accepted.

The results presented in Table 4 show that for all variables and dimensions, the significance values exceed 0.05; therefore, the null hypothesis (H_0) that suggests that the data exhibit normality is accepted.

Table 4. *Test of Normality*

Variable Name	Kolmogorov - Smirnov		
	N	Statistics	Sig.
Working Conditions	100	0.066	0.200
Worker's Actions	100	0.096	0.252
Accident Perception	100	0.108	0.059
Risk Identification	100	0.081	0.104
Training	100	0.096	0.259
Risk Management	100	0.071	0.200

Source: Prepared by the authors.

Descriptive Measures of the Variables

A summary of the most relevant descriptive measures of the independent variable and its dimensions can be found in Table 5. It is observed that the variable with the highest average is accident perception, with 56.34 points. In contrast, the lowest average corresponds to risk management, with 50.01 points. The results indicate a positive skewness, suggesting that most values are clustered on the right side of the distribution. Additionally, both variables exhibit negative kurtosis, suggesting greater uniformity in their values.

The graphic representation of the frequency distribution of the variables is illustrated in Figures 1 and 2.

Hypothesis Testing

The Pearson correlation test was used to determine the degree of association between the two quantitative variables. Both variables exhibit a normal distribution, and the instruments used for data collection employ an interval-type scale. Moreover, the Pearson test does not aim to establish causality between the variables; instead, it focuses on covariance to assess whether the values of the variables are directly or inversely proportional.

Specific Hypothesis 1

A correlation analysis was performed and applied to the first specific hypothesis of the research. The following statistical hypotheses were proposed for this analysis:

- Null hypothesis (H_0): Substandard conditions are not related to risk management.
- Alternative hypothesis (H_1): Substandard conditions are related to risk management.
- Significance level (α) = 0.05

The first analysis examined the relationship between the substandard conditions dimension and the risk management variable. The Pearson correlation test was conducted to assess the significance of this correlation, and the results are presented in Table 6. The data revealed a correlation coefficient of 0.933, indicating a very strong positive correlation. Furthermore, the associated *p*-value is lower than the predetermined significance level, which suggests with a 95% confidence level that the perception of working conditions is indeed related to risk management. Therefore, the alternative hypothesis (H_1) is accepted.

Table 5. *Summary of the Independent Variable Descriptive Measures.*

Variable	N	Mean	Standard Deviation	Skewness	Kurtosis
Accident Perception	100	56.340	21.695	0.023	−1.160
Risk Management	100	50.010	18.272	0.027	−0.871
Valid N (listwise)	100				

Source: Prepared by the authors.

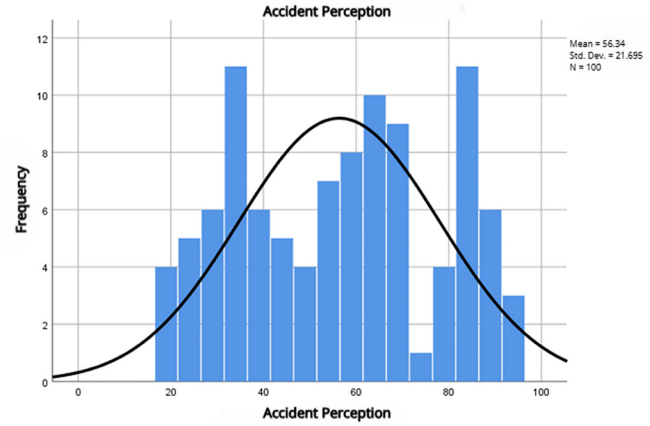

Figure 1. Frequency distribution graph of accident perception.
Source: Prepared by the authors.

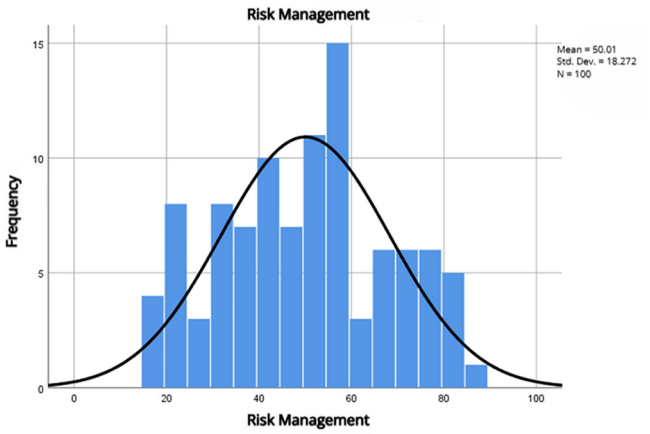

Figure 2. Frequency distribution graph of risk management.
Source: Prepared by the authors.

Based on the information presented, we conclude that the perception of the working environment or working conditions significantly influences risk management among workers of a construction company.

Specific Hypothesis 2

The second correlation analysis was conducted for the second specific hypothesis outlined at the beginning of this research. The following statistical hypotheses were proposed for this analysis:

- Null hypothesis (H_0): Substandard acts are not related to risk management.
- Alternative hypothesis (H_1): Substandard acts are related to risk management.
- Significance level (α) = 0.05

The second analysis examined the relationship between the substandard acts dimension and the risk management variable. As shown in Table 7, the data revealed a correlation coefficient of 0.928, indicating a very strong positive correlation.

Furthermore, the associated *p*-value is lower than the predetermined significance level, which suggests with a 95% confidence level that the perception of substandard acts is also related to risk management. Therefore, the alternative hypothesis (H_1) is accepted.

Based on the information presented, we conclude that the perception of worker behavior and acts significantly influences risk management among workers of a construction company.

General Hypothesis

The final correlation analysis aimed to confirm the general hypothesis for this study, which examines the correlation between two variables: perception of accidents and risk management. The following statistical hypotheses are proposed for this analysis:

- H_0: The perception of accidents among construction workers is not related to risk management.
- H_1: The perception of accidents among construction workers is related to risk management
- $(\alpha) = 0.05$

The Pearson correlation test was conducted to assess the significance of this correlation, and the results are presented in Table 8. The data revealed a correlation coefficient of 0.947, indicating a strong positive correlation. Furthermore, the associated

Table 6. *Correlation Between Substandard Conditions and Risk Management.*

Correlations		Working Conditions	Risk Management
Working Conditions	Pearson Correlation	1	0.933**
	Sig. (2-tailed)		0.000
	N	100	100
Risk Management	Pearson Correlation	0.933**	1
	Sig. (2-tailed)	0.000	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Prepared by the authors.

Table 7. *Correlation Between Substandard Acts and Risk Management.*

Correlations		Worker's Acts	Risk Management
Worker's Acts	Pearson Correlation	1	0.928**
	Sig. (2-tailed)		0.000
	N	100	100
Risk Management	Pearson Correlation	0.928**	1
	Sig. (2-tailed)	0.000	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Prepared by the authors.

Table 8. *Correlation between Accident Perception and Risk Management.*

Correlations		Accident Perception	Risk Management
Accident Perception	Pearson Correlation	1	0.947**
	Sig. (2-tailed)		0.000
	N	100	100
Risk Management	Pearson Correlation	0.947**	1
	Sig. (2-tailed)	0.000	
	N	100	100

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Prepared by the authors.

p-value is lower than the predetermined significance level, which suggests with a 95% confidence level that the perception of accidents is related to risk management. Therefore, the alternative hypothesis (H_1) is accepted.

Based on the results, it is demonstrated that the perception of accident prevention significantly influences risk management among workers in a construction company.

DISCUSSION

The main finding of this study is the validation of a statistically significant correlation between the perception of accidents and risk management. This result is supported by several authors, such as Colque (2022), who notes that occupational risks are closely related to the workers' perception of a company's safety climate. According to Colque, the primary benefit of this relationship is more effective risk management, which leads to lower accident rates and improved production processes. This point is further reinforced by Gonzales and Aduvire (2022), who stress the importance of guiding actions toward enhancing training activities related to safety regulations and ensuring the implementation of a safety climate. Both authors agree that focusing on training and raising awareness among workers is essential to increasing their commitment to occupational safety.

Another of the findings of this research refers to the perception of workers concerning risk training and risk management, which is influenced by their work experience. Workers tend to have more positive perceptions when they have received more training in accident prevention. In that regard, Granados and Echavez (2023) argue that education aimed at accident prevention is crucial for fostering positive attitudes regarding occupational risks and accidents, highlighting the need to strengthen prevention training programs.

The perception of the worker's behavior and actions has a significant influence on risk management. Aguilar et al. (2020) state that a worker's perception of a situation can affect safe behavior at work, as well as their actions to prevent others from potential occupational accidents.

To assess the benefits of implementing adequate safety management, researchers consider not only fatal accidents but also those of lesser severity. This approach reflects the effectiveness of the controls implemented and how top management handles safety within the work environment. According to Navarro-Claro et al. (2021), controls and measures to reduce hazards and improve working conditions are insufficient in the construction sector.

CONCLUSIONS

The main conclusion drawn from this study is that workers play a crucial role in the safety within organizations. Therefore, it is essential to actively involve them in the management and implementation of safety controls, not just to meet regulatory requirements, but as an integral part of the organizational culture.

The perception workers have regarding the safety of their work environment can indicate potential risks; organizations should consider the perception of their employees when implementing risk management programs. Additionally, workers who observe unsafe behaviors among their co-workers are more prone to risks and less likely to adhere to safety measures. Clearly communicating expectations for safe behavior can enhance the effectiveness of risk management within the organization.

When workers perceive the safety controls established by the company are effective and practical, they are more likely to use them and encourage their adoption in the workplace. In contrast, individuals who consider safety measures to be unnecessary may be tempted to take shortcuts, increasing the likelihood of accidents. The incidence of adverse events can be reduced by promoting the idea that accident prevention is a shared responsibility between the company and the workers. This improvement will be reflected in the organization's performance indicators.

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Authors' contribution

Lorena Paola Sevillano Monterroso (first author): Conceptualization, data curation, formal analysis, fund acquisition, investigation, methodology, project management, resources, software, supervision, writing (original draft), and writing (review & editing).

Lucila del Carmen Vallejo Romo (co-author): Formal analysis, methodology, project management, software, validation, visualization, and writing (review & editing).