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The effect of safety knowledge and safety motivation to work accident with work compliance as intervening variable at PT. Wijaya Karya Project Division 1, Indonesia

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Abstract:
The construction industry has the highest accidents rates of all industries and the highest rates for injuries and casualties. Work accident is significant for attention to reduce cost in a company. Factors affecting work accidents are safety knowledge and motivation and work compliance. The present study aims to investigate the influence of safety knowledge, safety motivation, safety compliance, and work accidents. This research is a descriptive type with causal research design. The number of research samples is 100 workers in PT WIKA Project Division 1. Data analysis model used Partial Least Square Structural (PLS). Empirical evidence demonstrates safety knowledge, and safety motivation has a positive and significant effect on work compliance. Furthermore, work compliance and safety motivation have a positive and significant effect on work accidents. Safety knowledge has an insignificant effect on work accident. Safety knowledge has a positive and significant influence on work accidents through safety compliance. Safety motivation has a positive and significant influence on work accident through safety compliance. Suggestions to be given are: Feedback is important to make supervisors more aware of the potential causes of accidents experienced by direct workers in the field. Applying reward for workplace-compliant employees and those who do not have adherence to occupational safety will be punished.

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Keywords: Safety Knowledge, Safety Motivation, Work Compliance, Work Accidents, Construction Industry.

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INTRODUCTION

The accident is an undesirable event that results in the loss of human and property (assets) loss (Lempow, 2014). The construction industry has the highest accidents rates of all industries and the highest rates of injury and casualties (Haadir et al., 2013). According to the latest data, in Indonesia, 103,283 (one hundred and three hundred and eighty-three) cases of work accidents were recorded that almost every day there were nine workers died due to work accidents. The current number will increase annually, if compared to the number of work accidents. In 2012 there were 103,074 cases, in 2011 there were 99,491 cases, and in 2010 there were 98,711 cases. During 2017 according to statistical data, there has been a rise in work accidents by about 20 percent compared to 2016 nationwide. The largest near miss workers were in 2015. Meanwhile, first-aid related (first aid), most first-aid workers were also available in 2015. The first aid is a preliminary action taken against emergency conditions. Hopefully, with the first aid, it can save personal condition from something more fatal or unwanted. Permanent working defects such as a broken leg or broken fractures and workers with disability remain only in 2013-2014. Fatality is a fatal accident that a worker can lose in life. Taufek et al. (2016) summarize that the point in which determining injuries and workplace accidents is the attitudes and practices of safety and health itself. This implementation can improve safety, and health practices in the workplace and employees also suffer from injuries and accidents. Then it can eventually reduce costs for an organization. This case suggests that a work accident is essential to be maintained to reduce costs in an organization or a company. Among the factors that affect work accident are safety motivation, this is based on research by Affidah & Sari (2016) that finds employees motivation and unsafe actions influence work accidents. Lakin Folajin (2001) in (Maduka & Okavor, 2014) argues, motivation as a term commonly used when someone is stimulated, the interest of a worker in order to work and bring or develop efficiency in work. Then robbins (2001) in (Maduka & Okavor, 2014) defines motivation as an energy force, directs and supports individual efforts. Behavior occurs as a result of motivation that directs the individual to act in line with the purpose (Wordsworth in Petra, 1981) in (Huda, et al., 2016) and encouragement by the importance of providing fulfillment or satisfaction of the individual's needs (Hull in As'ad, 1995) in (Huda, et al., 2016). In addition to safety motivation, safety knowledge also contributes to work accidents. Rudyarti (2017) showed that there is a significant relationship between health knowledge and works safety with the occurrence of work accidents. Rudyarti (2017) defined if knowledge of K3 is properly, then the occurrence of work accident would decrease. The results of this study were in accordance with Hendria & Fitri (2006) in research by Rudyarti (2017) stated that there was a knowledge relation owned by the workforce with the occurrence of the work accident. The results showed that the proper the knowledge level is the lower the number of work accidents. Then. Taufek et al. (2016) stated that workplace injuries could be reduced or avoided if all workers can manage errors due to human action properly and if applying appropriate safety procedures for employees. Research conducted by Tahira M. Probst and Ty L. Brubaker (2001) actually indicated that there was an insignificant relationship between safety compliance, and work safety. Researchers have also found that when work insecurity increases (working environment considered less secure), workers' knowledge and motivation to comply with safety policies and procedures will decrease, thereby affecting safety compliance. Not surprisingly, employees with unsafe jobs experience more accidents and injuries than employees with relatively safer jobs (Probst, 2014). In other words, even if we have got workplace training, it is likely to trigger a work accident.

Work safety and health (K3) in PT WIKA include safety induction, safety morning talk, first aid training basic, simulation and disaster management, project safety patrol, safety patrol department level, and safety patrol. Safety knowledge itself is characterized as an employee's understanding of safe operating procedures, adequate training, and safety instruction (Hofmann et al., 1995) in (Probst & Brubaker, 2001). According to Vitharana, et al., (2015) in (Okoye et al., 2016), one of which is a necessity in the construction industry in connection with the enhancement of professional interests in active safety management and implementation of awareness programs, which should be developed and implemented among construction workers. The activities of PT WIKA are essential to increase and enhance employee safety knowledge. Some studies have shown that safety knowledge (safety knowledge) and safety motivation are an essential factor in predicting safety compliance. Safety compliance is the safety behavior of individuals in safeguarding safety (Griffin and Neal, 2000) in (Rosalita et al., 2015). In other words, individuals will try to behave to ensure safety. Also, work safety knowledge is also obtained by employees from work experience. The longer a person works in the field of work will increase his involvement with a particular job field. The lack of knowledge management in Indonesia has led to the loss of knowledge (Grover & Frose, 2016: 1283) in (Quintero, 2017). Therefore, long-term workers will have better knowledge and experience. The workers will not lose their knowledge and experience because they are always in the project environment. Based on previous problems and descriptions, the authors attempt to investigate through this study. In this case, work accidents in PT Wijaya Karya (Persero) Tbk are still relatively high due to safety knowledge, safety motivation and safety compliance. Therefore, the authors proposed the following questions:

1) Does safety knowledge affect safety compliance?
2) Does safety knowledge affect work accident?
3) Does safety motivation affect safety compliance?
4) Does safety motivation affect work accident?
5) Does safety compliance have an impact on work accidents?
6) Does safety knowledge have an influence on work accidents through safety compliance?
7) Does safety motivation have an influence on work accidents through safety compliance?

LITERATURE REVIEW

Safety knowledge

Safety knowledge reflects the extent to which workers in the construction industry have a broad knowledge of the practices and procedures in the construction organization (Shen et al., 2017). Safety knowledge itself is characterized as an employee's understanding of safe operating procedures, adequate training, and safety instruction (Hofmann et al., 1995) in (Probst & Brubaker, 2001). Knowledge is more than just information because it involves an awareness or understanding gained through experience, familiarity or learning (Bust et al., 2014) in Okoye et al., 2016). According to Vitharana, et al., (2015) in (Okoye et al., 2016), one of which is a requirement in the construction industry in connection with the enhancement of professional interests in active safety management and implementation of awareness programs, which must be developed and implemented among construction workers. Akinwale and his origins in (Okoye et al., 2016) express his opinion that awareness of possible risks and knowledge about reducing risks between workers and contractors will enhance security sites. Therefore, safety knowledge includes the awareness of works health and safety risks, including the evaluation of health and safety programs within an organization. Knowledge of safety is employee knowledge of safety practices and procedures

(Vinodkumar and Bhasi, 2010) in (Rosalita et al., 2015). Safety knowledge is measured by three indicators of Vinodkumar and Bhasi (2010) in (Rosalita et al., 2015), namely: knowledge using safety equipment, knowledge of the types of work hazards and knowledge of emergency response. Knowledge and ability are the key determinants of workers' safety behavior, knowledge exchange among workers is most relevant. Previous workers may exchange information with new workers. Knowledge exchange involves the sharing of knowledge of workers to others and seeking knowledge and applications, for example, employing other people's knowledge in achievement tasks (Wang & Noe, 2010) in Gressgard (2014). For that to happen, the knowledge acquired by the individual must be revealed, meaning to be converted into a form that can be understood, absorbed, and applied by another (Ipe, 2003) in Gressgard (2014). The activities of PT WIKA are important to increase and enhance employee safety knowledge. Knowledge of work safety can also be obtained by employees from work experience. The longer a person works in the field of work will increase his experience in the field of work.

Safety compliance

Safety compliance is a safety behavior by individuals to safeguard (Griffin and Neal, 2000) in (Rosalita et al., 2015). In other words, individuals will try to behave in order for their safety to be assured. Safety compliance is measured by two indicators based on Griffin & Neal (2000) in (Rosalita et al., 2015) such as using safety equipment and implementing safety rules and procedures. Zin & Ismail (2011) stated that safety compliance would normally be in good ranges until it was demonstrated that adhering to safety requirements would reflect good safety compliance (being in good shape) and non-compliant safety requirements were reflected as poor safety compliance. The security and safety component involves the actual compliance or an organization's safety policy violation. Safety compliance has been defined as the extent to which employees comply with safety procedures and perform the work in a safe manner (Neal et al., 2000) in (Probst & Brubaker, 2001). Safety compliance is a significant component of safety performance behavior used in the Griffin & Neal (2000) model that shows the actual behavior of workers at work (Griffin & Neal, 2000) in (Mashi et al., 2016). Safety compliance is defined as a "generally mandated" behavior. Compliance with personal protective equipment has an important role in creating safety at work. Many examples of frequent behavior or unsafe actions found in the workplace is basically non-compliance with work or operating procedures, such as running machines or equipment without authority, ignoring warnings and security, speed errors at time of operating equipment, not using personal protective equipment and repairing equipment that are moving or not following specified work procedures.

Work accident

Work Accident is an undesirable and unexpected event that may cause casualties and property (Novianti et al., 2015). Work accident is defined as a work-related event that can cause injury or pain (depending on its severity), the occurrence of death or possibly causing death. This definition is also used for events that can cause environmental damage (Alrasyid, 2011). In addition to Gordon, Flin, and Mearns (2005) in (Taufek et al., 2016) also states that workplace injuries can be reduced or avoided and all employees can manage human error properly if applying appropriate safety procedures for employees. As such, employees must work to demonstrate positive security attitudes, good safety knowledge, and maintain safe working conditions. The above illustrates that workplace accidents can be avoided if employees comply with all health and safety procedures. Understanding the work accident

can also be derived from empirical data which suggests that in the face of negative events, people struggle to understand their environment, and engage in work-related accidents that threaten basic safety for people and no exception (Barling et al., 2003). Safety is a situation where the risk of harm to people or damage will be reduced and maintained at the lowest level, thus acceptable through the process of hazard identification and sustainable risk management. Some work accident incidents are allegedly caused because workers do not wear Personal protective equipment while working with environmental conditions that do not support workers to work on a regular basis maximum and secure

From the concepts and theories described in the previous chapter, the authors proposed the hypotheses in this study as follows:

H1. Safety knowledge has a positive and significant effect on safety compliance at PT Wijaya Karya Pangkalan Susu Project.

H2. Safety knowledge has a negative and significant impact on work accident on PT Wijaya Karya Pangkalan Susu Project.

H3. Safety motivation has a positive and significant effect on safety compliance at PT Wijaya Karya Pangkalan Susu Project.

H4. Safety motivation has a negative and significant effect on work accident on PT Wijaya Karya Pangkalan Susu Project.

H5. Safety compliance has a negative and significant effect on work accidents in PT Wijaya Karya Pangkalan Susu Project.

H6. Safety knowledge has a positive and significant impact on work accidents through safety compliance at PT. Wijaya Karya Pangkalan Susu Project.

H7. Safety motivation has a positive and significant impact on work accident through safety compliance at PT Wijaya Karya Pangkalan Susu Project.

RESEARCH METHODS

The type of research is quantitative descriptive research with a survey method where research activities start from collecting data, compiling data, organizing data, processing data, presenting and analyzing data to get an overview of variables, symptoms, events or circumstances. The population is the entire object of research to be investigated. (Sugiyono, 2010). The population in this study was the workers at PT Wijaya Karya North Sumatera, a division project of 150 employees. Based on the factor analysis requirement, the minimum sample size is 50 (10 x 5). Determining the minimum number of samples in this study refers to Hair et al., (2010). However, to increase data distribution, the number of samples in this study was increased to 100 respondents. Since each member of the population has been known, in this study, the author uses a simple random sampling. In this study, the authors collect data in general, questioner and assisted by interviews. This study analyzes data using PLS-SEM (Partial Least Square Structural Equation Modeling).

RESULTS & DISCUSSION

Result data analysis with PLS

Loading factor

Loading factor is part of convergent validity. The convergent validity test will be fulfilled when the loading factor value of each indicator> 0.7. Here are the results of the convergent validity test of all indicators in the study.

Table 1:
Summary of results from loading factor

Indicators	Loading Factor	Critical Value	Validity
X11	0,882	0,7	Valid
X12	0,851	0,7	Valid
X13	0,826	0,7	Valid
X14	0,872	0,7	Valid
X15	0,864	0,7	Valid
X16	0,845	0,7	Valid
X21	0,894	0,7	Valid
X22	0,846	0,7	Valid
X23	0,785	0,7	Valid
X24	0,862	0,7	Valid
X25	0,820	0,7	Valid
X26	0,837	0,7	Valid
Z11	0,861	0,7	Valid
Z12	0,884	0,7	Valid
Z13	0,878	0,7	Valid
Z14	0,905	0,7	Valid
Z15	0,884	0,7	Valid
Z16	0,839	0,7	Valid
Y11	0,859	0,7	Valid
Y12	0,899	0,7	Valid
Y13	0,876	0,7	Valid
Y14	0,875	0,7	Valid
Y15	0,917	0,7	Valid
Y16	0,867	0,7	Valid
Y17	0,905	0,7	Valid
Y18	0,895	0,7	Valid

In table 1 presents all valid yield indicators as it has a loading factor> 0.7. Therefore, all indicators used in this study have fulfilled convergent validity requirements.

Composite Reliability

Table 2: Summary of Results from Composite Reliability and Alpha Cronbach

Variable	Alpha Cronbach	Critical Value	Composite Reliability	Critical Value	Result
safety knowledge	0,927	0,6	0,943	0,8	Reliable
safety motivation	0,917	0,6	0,936	0,8	Reliable
safety compliance	0,939	0,6	0,952	0,8	Reliable
work accident	0,961	0,6	0,967	0,8	Reliable

Table 2 presents all the variables used are declared reliable, the value has been fulfilled that all the composite reliability value of the variables used has been higher than 0.8 and all variables have a Cronbach alpha value higher than 0.6.

Structural Model Test Results (Inner Model)

Inner model test, to determine the relationship between constructs, significance value and R2 from the research model performed concerning R2 values on endogenous latent variables and t-count values on each exogenous latent variable over the endogenous latent variable of the bootstrapping result

R^2 value in Endogenous Latent Variables

Table 3: R^2 value in Endogenous Latent Variables

Endogenous Latent Variables	R^2 value
work accident	0,795
safety compliance	0,871

Table 3 presents the work accident variables are explained by variables of work knowledge, work motivation, and work compliance by 79.5%, and other variables outside the model explain the difference. The variables of work knowledge explain work compliance variables and work motivation of 87.1%, and other variables outside the model explain the difference.

Hypothesis test

Hypothesis testing in use of the two-tailed test with an error rate of 5%, the critical value that is even fulfilled in this hypothesis test is 1.96. If the t-count value is higher than the t-table is 1.96, then there is a significant effect between the exogenous latent variables to the endogenous latent variable.

Table 4: Hypothesis test

Hypotheses proposed	t-table	t-count	P-Values	Alpha	Conclusion
The effect of safety knowledge on work compliance	1,96	3,215	0,001	0.05	accepted
The effect of safety knowledge on work accidents	1,96	0,370	0,711	0.05	rejected
The effect of safety motivation on work compliance	1,96	6,308	0,000	0.05	accepted
The effect of safety motivation on work accidents	1,96	4,924	0,000	0.05	accepted
The effect of work compliance on work accidents	1,96	3,010	0,003	0.05	accepted
The effect of safety compliance on work accidents through work compliance	1,96	1,989	0,047	0.05	accepted
The effect of safety motivation on work accidents through work compliance	1,96	2,939	0,003	0.05	accepted

Table 4 presents how the effect of each variable in the research.

The effect of safety knowledge on work compliance

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 3.215, and the t-table value is 1.96. (3.215> 1.96) and sig value (0.001 <0.05). It is concluded that the hypothesis proposed is accepted.

The effect of safety knowledge on work accidents

Empirical evidence shows that t-count value is lower than the t-table value. The t-count value is 0.370, and the t-table value is 1.96. (0.370 < 1.96) and sig value (0.711 > 0.05). It is concluded that the hypothesis proposed is rejected

The effect of safety motivation on work compliance

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 6,308, and the t-table value is 1.96. (6,308> 1.96) and sig value (0.047 < 0.05). It is concluded that the hypothesis proposed is accepted

The effect of safety motivation on work accidents

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 4,924, and the t-table value is 1.96. (4,924> 1.96) and sig value (0.000 < 0.05). It is concluded that the hypothesis proposed is accepted

The effect of work compliance on work accidents

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 3,010, and the t-table value is 1.96. (3,010 > 1.96) and sig value (0.003 < 0.05). It is concluded that the hypothesis proposed is accepted

The effect of safety compliance on work accidents through work compliance

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 1,989, and the t-table value is 1.96. (1,989> 1.96) and sig value (0.000 < 0.05). It is concluded that the hypothesis proposed is accepted

The effect of safety motivation on work accidents through work compliance

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 2,939, and the t-table value is 1.96. (2,939 > 1.96) and sig value (0.003 < 0.05). It is concluded that the hypothesis proposed is accepted

Discussion

The effect of safety knowledge on work compliance

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 3.215, and the t-table value is 1.96. (3.215> 1.96) and sig value (0.001 <0.05). It is concluded that the hypothesis proposed is accepted. The company's safety morning talk each morning gives workers knowledge to improve compliance with works safety. Workers who obtain information about the importance of work safety become more compliant with the recommended safety guidelines.

The effect of safety knowledge on work accidents

Empirical evidence shows that t-count value is lower than the t-table value. The t-count value is 0.370, and the t-table value is 1.96. (0.370 < 1.96) and sig value (0.711 > 0.05). It is concluded that the hypothesis proposed is rejected. Motivation will encourage individuals to act following the goals to be achieved in this respect achieving safety in the workplace where workers will adhere to safety guidelines.

The effect of safety motivation on work compliance

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 6,308, and the t-table value is 1.96. (6,308> 1.96) and sig value (0.047 < 0.05). It is concluded that the hypothesis proposed is accepted. Most workers have read and understood the safety signs of work, implement safety rules and procedures.

The effect of safety motivation on work accidents

Empirical evidence s indicates that t-count value is higher than the t-table value. The t-count value is 4,924, and the t-table value is 1.96. (4,924> 1.96) and sig value (0.000 < 0.05). It is concluded that the hypothesis proposed is accepted. The results of this study are consistent with Aswar et al. (2016) who found that there is a link between knowledge on work health and safety (K3) and work accidents. Also, research by Rudyarti (2017) suggests that if knowledge of K3 is properly, then the occurrence of work accident will decrease.

The effect of work compliance on work accidents

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 3,010, and the t-table value is 1.96. (3,010 > 1.96) and sig value (0.003 < 0.05). It is concluded that the hypothesis proposed is accepted. This work suggests that important motivation is given to workers such as protecting workers with safety equipment and raising individual beliefs that their behavior results in certain things.

The effect of safety compliance on work accidents through work compliance

Empirical evidence shows that t-count value is higher than the t-table value. The t-count value is 1,989, and the t-table value is 1.96. (1,989> 1.96) and sig value (0.000 < 0.05). It is concluded that the hypothesis proposed is accepted. This work suggests that if work accidents can be avoided by increasing safety knowledge to workers. However, increasing safety knowledge will indirectly affect work accident, if the knowledge provided is not accompanied by work compliance.

The effect of safety motivation on work accidents through work compliance

Empirical evidence indicates that t-count value is higher than the t-table value. The t-count value is 2,939, and the t-table value is 1.96. (2,939 > 1.96) and sig value (0.003 < 0.05). It is concluded that the hypothesis proposed is accepted. The employees who have a good intrinsic and extrinsic impulse will reduce work accidents that may be overwhelming. The best motivation is to form a compliance work. Compliance is ultimately protecting workers from work accidents.

CONCLUSIONS & SUGGESTIONS

Conclusion

Based on the research that has been done by the author it can be concluded several points of this research. Safety knowledge has a positive and significant influence on work compliance. Safety motivation has a positive and significant influence on safety compliance. Work compliance has a positive and significant effect on work accidents. Safety knowledge has insignificant influence on work accidents. Safety motivation has a positive and significant influence on work accidents. Safety knowledge has a positive and significant influence on work accidents through safety compliance. Safety motivation has a positive and significant influence on work accidents through safety compliance.

Suggestion

Based on the results of the research, the authors suggest the following: due to knowledge affect compliance, supervisors can receive feedback from workers every day. Feedback is necessary to be done because the supervisor is more aware of the potential causes of the accident experienced by the direct workers in the field. Due to motivation can affect compliance and work injury, the company can apply reward and punishment to work safety and non-compliance workers with the goal of reward and punishment. It can also be based on the working period of the employee itself. It can provide incentives, fears, and attitudes of the workers themselves. Although workers' motivation initially tends to be enforced, in fact, management itself can create workers to be more compliant with conditions that tend to recur and periodically then workers will become self-compliant. The strategies given by the authors are: management needs to define the form of protection for workers in the face of work accidents. The management can determine whether the rules about the safety of work are formal or informal. Formal rules such as official written rules and paste on regulatory boards. Informal rules such as actual rules have been established for generations and need not be formulated. It can be formed by employee experience in the field such as: helping co-workers when there is an accident and reminding colleagues to use safety devices.

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