



IMPROVEMENT OF POLICIES AND INSTITUTIONAL IN DEVELOPING SAFETY CULTURE IN THE CONSTRUCTION INDUSTRY TO IMPROVE THE MATURITY LEVEL, SAFETY PERFORMANCE AND PROJECT PERFORMANCE IN INDONESIA

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ABSTRACT

The Construction Industry has immensely contributed to the development of the Indonesian economy. The most dominant problem is that the construction industry has a poor record of accidents compared to other sectors. The objective of this study includes improving the policies as well as institutions to enhance maturity, safety performance and project performance in the Construction Industry in Indonesia. The research employed the use of primary and secondary data from the literature that validated the expert and conducted a questionnaire survey of respondents who were analyzed using the SEM-PLS Method. According to the results of the research, the safety, cost of safety, reward and punishment policies are the major factors that are integrated with the institutions involved in OSH to improve safety culture concerning the elements of maturity level in developing the safety performance and performance of construction projects in Indonesia.

Key words: Regulation of Safety, Institutional, Safety Culture, Safety Maturity, Safety Performance.

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1. INTRODUCTION

According to Mohamed (2002), the construction industry is famous for its poor safety record compared to other sectors. Work safety in the construction industry poses a significant problem in many countries of the world. This is because the level of workplace accidents in the construction industry is statistically higher than other sectors (Biggs et al., 2013) The rate of accidents occurring in the world in the construction industry is more dangerous when compared to other industries (Rosenfeld et al., 2006). In the United States, even though the construction work is only 5 percent of the total workforce, it is responsible for more than 17 percent of death cases in the workplace (Goetsch, 2003). In the UK, the construction industry accounts for one-third of all death records related to construction work and an average of five construction workers are killed every two weeks. The community also records the death of one member per month as a result of construction activities (Health and Security Commission (HSC), 2003). In Thailand, work safety in the construction industry is still a significant threat due to high work accidents in the construction industry compared to other industries (Aksorn & Hadikusumo, 2007, p. 1).

Safety Culture Development is an action needed to reduce the level of work accidents in the construction industry in developing countries (Alamsari et al., 2012). A bad safety culture is one of the main factors responsible for many injuries and deaths in the construction industry worldwide (Choudhry et al. 2007). Most of these accidents are caused by migrants. They constitute 95% of employees of the construction industry. Therefore, the safety management system applications implemented to reduce or eliminate accident records will be futile unless safety culture is considered a significant problem (Blockley, 1995). Thus an effective and efficient measurement of safety culture is the first step to enhance the safety management system. Research has been carried out to build a safety culture model for that purpose.

A gap in research regarding safety culture was stated by Choudry (2013) that safety culture research in the Construction Industry is new since it covers cross-scientific issues including socio-engineering and safety psychology. Analysis has also been carried out on the improvement of the safety management system with various dimensions being developed. However, we still have research on policies and institutions as input in building a safety culture and enhancing the performance of safety and project performance.

In this research project, innovations will be made from building a safety culture model with interrelations between policies, institutions, safety culture, maturity level as a determining factor of the safety and performance performance of construction projects in Indonesia with the objective of improving the safety management system and enhancing the direction of policy and institutional safety The construction industry is a limiting factor in the improvement of the construction work safety program in Indonesia.

2. THEORITICAL STUDY

The Safety Culture Theory experiences some level of development every year. This started with the Social Cognitive Theory developed by Bandura (1986). Then Geller (1996)

developed the Total Theory of Occupational Safety Culture that connects the Environmental, Personal and Behavioral Factors. Cooper (2000) models safety culture into a reciprocal between psychological (people) construction, environment (situation) and behavior which was later developed by Choudry (2007) by incorporating elements of the Safety Climate.

Fang (2013) developed a model of interaction between owners, contractors, and subcontractors with a safety culture for construction projects with the environmental, perceptual and behavioral scope. Zhang (2014) developed a Safety Culture into 4 Elements namely Behavioral Culture, Norms and Management Culture, Ideological Culture and Physical Culture developed in this study.

The development of safety culture theory is illustrated in Figure 1 below

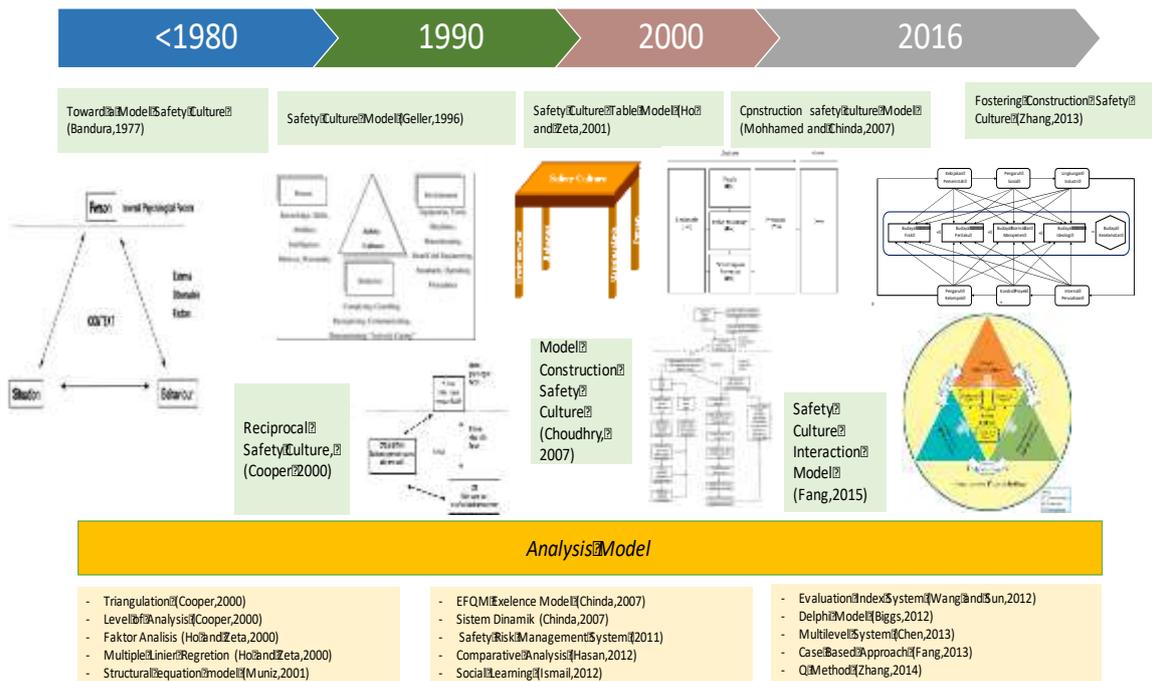


Figure 1 Development of Safety Culture Theory of Construction Safety

Safety performance is the phenomenon of work behavior proposed by Griffin and Neal (2000). Own performance definition according to Griffin & Neal (2000) is the actual behavior of individuals at work. Griffin and Neal (2000) stated that safety behavior (safety performance) is work behavior that is relevant to safety that can be conceptualized similarly to other work behaviors which are the products of work. The performance component explains the actual practice of individuals at work (Griffin & Neal, 2000)

3. METHODOLOGY

The research model was developed on several previous studies on the relationship between six research variables. These studies are both conceptual and empirical. The linkages of the summary of various earlier studies with the research model can be seen in Figure 2 below.

Improvement of Policies and Institutional in Developing Safety Culture in the Construction Industry to Improve the Maturity Level, Safety Performance and Project Performance in Indonesia

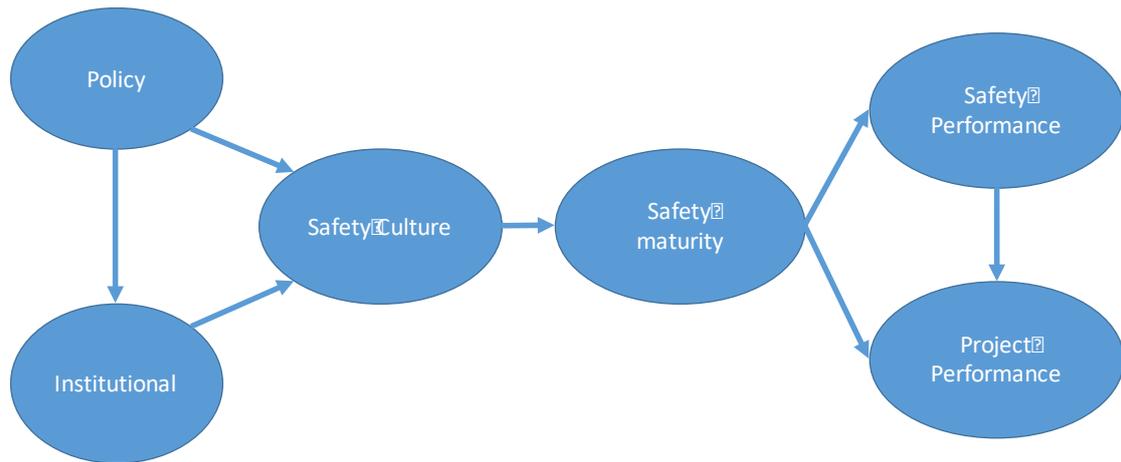


Figure 2 Conceptual Framework Developing Construction Safety Culture in Indonesia (Machfudiyanto and Latief, 2018)

In this research, the method of evaluation used is the Structural Equation Model (SEM) or Structural Equation Modeling. According to Ghazali (2008), in SEM the critical variables of concern are latent variables (latent variables) or latent constructs. A latent variable is an abstract concept of interest that is observed indirectly through its effect on observed variables, for example, behavior, attitudes, feelings, and motivation. SEM has two types of latent variables namely exogenous and endogenous. Exogenous variables are independent variables in all equations in the model, while endogenous variables are dependent variables on at least one equation in the model, although in all the remaining equations these variables are independent variables. According to Narbuko and Achmadi (2004: p. 119-120) in SEM (Structural Equation Model) the dependent variable is called the endogenous variable and the independent variable is called the exogenous variable.

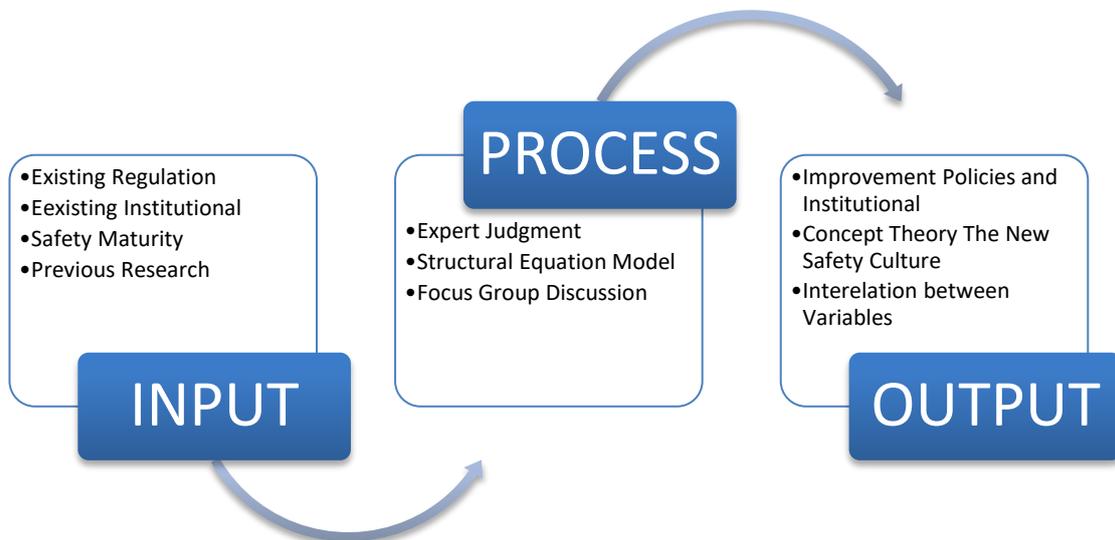


Figure 3 Research Operational Model

This study uses six main variables to describe the definition of the six variables. These variables are the main variables in this research.

Table 1 Latent Variables of Research

Variables	Definition	Reference
Policy	Rules and targets (goals) of an organization related to safety and which are officially stated by the leader	OHSA, Wieke (2012) Endroyo 2013
Institutional	Rules that facilitate institutions or organizations in coordinating and collaborating to achieve the desired common goals	Ruttan (1984) Ostorn (1985) North (1990) Thaha (2011) Dwinanto (2016)
Safety Culture	Safety culture is a combination of attitudes, values, beliefs, norms and perceptions of students who are prospective workers in an organization, who have a joint connection to safety, safe behavior, and practical application in the production process	Cooper (2000) Ho et al (2011) Clarke (2000) Choudhry (2007) Chinda (2007) L.Zhang (2012) Fang (2014)
Safety Maturity	the process of achieving maturity in an organization accompanied by behavioral changes	Mayes (1992) Monks (1996) Khalida 2007 Flemming, Hudson (2013)
Safety Performance	How do organizations / companies have awareness of high-risk things, are prone to work mistakes, which can cause accidental reductions	Sorensen, (2002); McDougall, (2004) ; Ho dan Zeta, (2004) M. Lu et al, (2016).
Project Performance	how to work by comparing the results of the real work with the estimation of the workings on the work contract agreed upon by the owner and the implementing contractor which includes costs, quality, scope of time and safety.	Garnito (2013) Hasan et al (2012) Moolenar (2009)

4. RESULT AND DISCUSSION

In the path coefficient, to derive the significance of the influence between variables, it is necessary to see the value of its t-value (T Statistics) which has a value of > 1.96. For example, Investigation of Events Affecting Safety Performance has a value of 4.982 > 1.96, so it can be concluded that the Investigation of Events on Safety Performance has a significant influence.

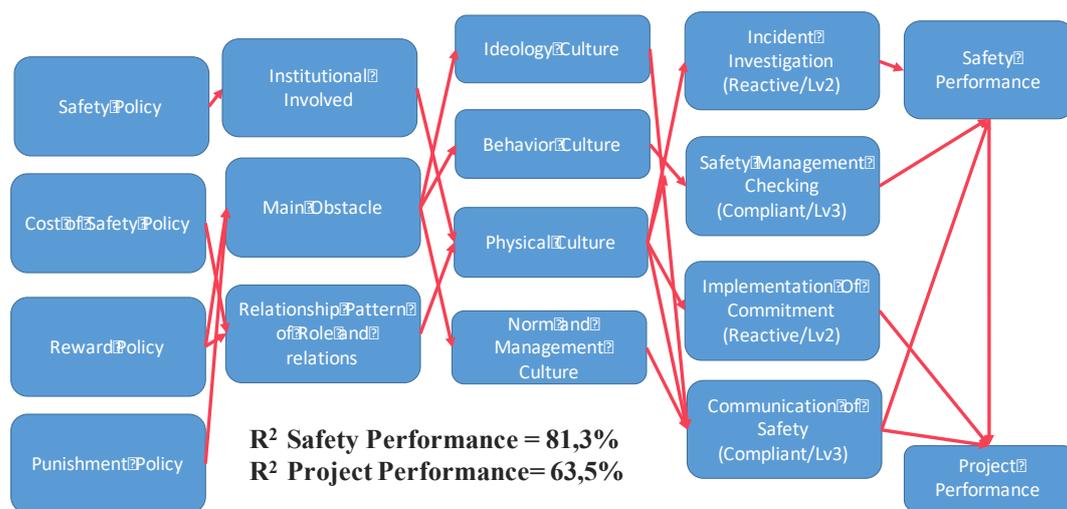


Figure 4 Safety Culture Model based on relationship between variables

Based on figure 3 above, we obtained the R-Square value of Safety Performance as 0.813 and Project Performance as 0.635, This can be concluded that the construct variability of Safety Performance and Project Performance can be explained by incident investigations, Work Safety Based on SMS, Leadership & Accountability, Communication & Consultation, Reporting and Improvement of Deficiencies, Development and Guaranteed Implementation of Commitments, Product Purchasing and Control, Creation and Documentation of OSH Plans, SMS Inspections, Material Management and Transfer, Skills Development and Capability, Document Control, Data Collection and Use, Contract Review, and Monitoring Standards of 81.3% and 63.5%.

Table 3 Result Relationship between variable of Research

No	Policy	Institutional	Safety Culture	Safety Maturity	Safety Performance	Project Performance
1	Safety Policy	Institutions involved	Physical Culture	Safety Management System Checking (Compliant /Lv3)	Safety Performance	Project Performance
2	Safety Policy	Institutions involved	Norm and Management Culture	Communication of Safety (Compliant /Lv3)	Safety Performance	Project Performance
3	Safety Policy	Institutions involved	Ideology Culture	Communication Of Safety (Compliant /Lv3)	Safety Performance	Project Performance
4	Cost of Safety policy	Main Obstacle	Behavior Culture	Safety Management System Checking (Compliant /Lv3)	Safety Performance	Project Performance
5	Punishment Policy	Main Obstacle	Physical Culture	Incident investigation (Reactive /Lv2)	Safety Performance	Project Performance
6	Reward Policy	Main Obstacle	Ideology Culture	Communication Of Safety (Compliant /Lv3)	Safety Performance	Project Performance
7	Safety Policy	Institutions involved	Physical Culture	Implementation of Commitment (Reactive Lv2)	Safety Performance	Project Performance
8	Cost of Safety policy	Relationship Pattern of Role and Relations	Physical Culture	Implementation of Commitment (Reactive /Lv2)	Safety Performance	Project Performance
9	Cost of Safety policy	Main Obstacle	Physical Culture	Implementation of Commitment (Reactive /Lv2)	Safety Performance	Project Performance
10	Reward Policy	Main Obstacle	Physical Culture	Implementation of Commitment (Reactive/Lv2)	Safety Performance	Project Performance

4.1. Relationship between Safety Culture and Safety Maturity

The relationship between safety culture and dominant Safety Maturity is between cultural variables, norms, and management significantly affect communication and consultation. The Culture of Norms and Management is a significant indicator of safety culture. The improvement of safety culture is considered useful in preventing more massive scale accidents (Fleming, 1999; Glennon, 1982; Lawrie et al., 2006; Schroder, 1970). In previous studies, research culture has been observed to be an indicator of the maturity level of the OHS management system in Indonesia. With increasing culture a positive impact will be on the

maturity of the OSH management system itself. Hence it can be said that culture is influential in running the management system.

The recommendation for the relationship between these variables is that the Leader imposes a reward system on workers who carry out OSH regulations well. Punishments should also be imposed on workers who violate the rules with the basis in making decisions on policies in the company.

4.2. Relationship between Safety Culture and Safety Performance

The relationship between Safety Culture and dominant safety performance are the variables of Culture Norms and Management that significantly affects safety performance. Many international experts concurred that safety culture is a vital factor for the well-being of an organization (Pidgeon, 1998). Safety culture is also a fundamental guarantee to achieve high performance from safety management. Safety culture on safety outcomes such as accidents, casualties, and other incidents, experts have shown an increased interest in safety culture research in the construction industry (Pidgeon, 1998; Choudhry et al., 2007).

The recommendation for the relationship between these variables is to implement a reward system (for employees who carry out safety regulations consistently) and Punishment (for employees who violate the rules)

4.3. Relationship between Safety maturity and project performance

The relationship between safety culture and dominant project performance is between cultural norms and management variables that majorly affects the project performance.

Cultural indicators of norms and management are the provision of equipment and work facilities that support certification. Generally, safety performance implies the results of a safe work record for future periods (Atak and Kingma, 2011; Fogarty and Shaw 2010, p.1455). Safety performance is a product of many factors, including safety culture (Morrow et al., 2014). This means that the character, behavior, and implementation of workers have a significant impact on the level of compliance with safety standards; in turn, safety performance.

The recommendation for the relationship between these variables is to record the results of the investigation and the results of the audit report as material for review and improvement. The incident can be used as a benchmark for the scope of the next project.

4.4. Relationship between Institutional and Safety Maturity

The dominant relationship between Institutional and Safety Performance is between the Benchmark Variables to Assess each Goal was significantly influencing the Contract Review. A good contract document is a document that will guarantee the completion of the project on time in its implementation and within budget constraints. It also ensures fair payment requirements to both the giver of Duty and the contractor (Feydy Bonenehu, 2008). One of the contents of the contract document for construction work must have a Contract of Work Safety and Health Plan (RK3K).

The recommendation for the relationship between variables is that a performance analysis system must be implemented. For instance, in hazard identification and risk assessment before and during project implementation. This is performed for the RK3K that has been prepared to be properly implemented to ensure that the project performance is achieved.

4.5. Relationship between Institutional and Safety Performance

The dominant relationship between Institutional and Safety Performance is between the Benchmark Variables to Assess each Goal was significantly influencing Safety Performance. The implementation of the OHS program in the company will always be linked to the legal basis for the implementation of the OHS program. The legal basis is the primary step in interpreting the rules in determining what or how the OSH program must be implemented

(Anhar, 2013). The implementation of safety is carried out to ensure construction safety; the company has good control of all aspects such as security objectives, mechanism of construction assessment procedures and resource mobilization (Wu et al., 2015).

Recommendations for the relationship between these variables is the implementation of a system of occupational safety and health assessment (Safety Management System Audit). This must be put in place in the company so that the safety and productivity of project performance are achieved.

4.6. Relationship between Safety Maturity and Safety Performance

The relationship between the Safety Maturity Level and the dominant Safety Performance is between the variables of the Investigation Event which has a significant influence on Safety Performance. The objective of accident investigation from Occupational Safety and Health is to detect the real picture of the accident so that it can get a picture of the immediate cause and the causes of the expected occurrence which are not repeated in the same event. Investigations from significant accidents are grossly caused by multiple factors, so comprehensive accident investigations must evaluate all factors that affect the occurrence of the accident.

The accident investigation is an effective technique required for the prevention of the same accident in the future. Accident investigations are carried out to find out the cause of accidents as well as reduction and total elimination (National Safety Council, 1985). The accident investigation is an action to enrich information about accidents, find causes, the most important things in an incident and find errors responsible for accidents. (Bird, 1990).

The primary focus of accident investigation is to collect information as analytical material to determine the real cause of the accident so that appropriate corrective actions can be made for prevention of similar accidents (Lu et al., 2016). With improved safety performance, workers will comfortably work without panicking about the accident. Improved safety performance has also increased productivity.

The recommendation for the relationship between these variables is to investigate the accident quickly to determine the cause of a clear accident and a solution to avoid similar events in the future.

4.7. Relationship between Institutional and Project Performance

In this research, the primary indicator of the institutions involved in program implementation is the safety institution in the company. Based on the Decree of the Minister of Manpower No.KEP 155 / MEN / 1984 concerning the improvement of the Decree of the Minister of Manpower and Transmigration NO KEP.125 / MEN / 82, concerning the Formation, Structure and Work Procedure of DK3N, DK3W, and P2K3, DK3N has its primary duties to provide advice and consideration requested or not requested. Minister on issues in the field of safety and assisting safety development at the national level. Its role is to collect and process all data and safety problems at the nationally and help the minister in fostering DK3W, carrying out research, education, training, development, and efforts to socialize and cultivate OSH (Zakky, 2017).

The recommendation for the relationship between these variables is to enhance the functions of project management in the implementation of the OSH program so that it is more clear since it will affect project performance.

4.8. Relationship between Safety Maturity and Project Performance

The relationship between the Safety Maturity Level and the dominant Project Performance is between the variables of the Investigation of Events that significantly affect Project Performance. The reason for accident investigation from Occupational Safety and Health is to

identify the real picture of the accident so that it can get a picture of the immediate cause and the causes of the expected occurrence which are not repeated in the same event. Investigations from significant accidents are caused by multiple factors, so comprehensive accident investigations must analyze all factors responsible for the occurrence of the accident.

The accident investigation is a useful technique required for the prevention of the same accident in the future. Accident investigations are performed to determine the cause of the accident, how the accident can be reduced and eliminated (National Safety Council, 1985). The accident investigation is an effort to enrich information about accidents, find causes, the most important things in an incident and detect errors that occur cause accidents. By performing a rapid accident investigation, the construction project time schedule resulting in a loss of work time will be minimized so that the project performance is not disrupted (Florence, 2013).

The recommendation for the relationship between these variables is to investigate the accident quickly to determine the cause of a clear accident and a solution to avoid similar events in the future.

5. CONCLUSIONS

Safety programs affect productivity significantly in a positive manner. There is no peculiar independent institution under the Ministry that handles the issue of certification and special regulations on the implementation of the Safety Management System in construction service companies. The company must issue a warning letter in the form of a warning of a violation of regulations (such as not using PPE) and work discipline with Golden Rule's safety (e.g. compliance, care and intervention) in enhancing work safety. At the micro level, each project organization must establish clear authority to handle OSH. Explicitly between Safety stakeholders.

There needs to be a revision of the Act that regulates work safety and reinforces the institutional structure of safety in Indonesia in the Act. The authority between the institutions involved is described in the Government Regulation in regards to the implementation of State Safety Management System. The Ministry of Manpower as a stakeholder develops a safety incentive program indicates the Reward policy variable. The Ministry of Manpower also acts as a stakeholder with the shouldered responsibility of determining the safety assessment system. That is the basis for OSH Institutions in the Company/project in performing safety audits. This institution also actively coordinates with the Ministry of Public Works. Application of reward and punishment for companies that focus on construction safety, and supported by laws and regulations by revising PP 50 of 2012 concerning Implementation of Safety Management System and incorporating elements of the application of reward and punishment supported by institutions that specifically deal with Construction Safety.

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