A conceptual framework to development of construction safety culture in Indonesia

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Abstract. Working accidents in the construction industry are among the highest in the world, affecting the three levels of both macro (National) mezzo (Enterprise) and micro (Projects) that need to be integrated in building a safety culture. The purpose of this research is to develop a conceptual framework in improving safety culture in the construction industry in Indonesia. The methodology was developed using literature study and deductive analysis which then performed expert validation to ensure the concept developed. The result of this research is that policy and institution as input to build safety culture which need to be followed up with increasing of company maturity which have implication to safety performance and construction project performance.

Keyword: Regulation of Safety, Institutional, Safety Culture, Safety Maturity, Safety Performance

1. Introduction

The construction industry has unique characteristics when compared to other industries, it can even be said that every project in construction differs from one another, presenting different problems during the process [1]. Project planning and execution under limited time and budgetary pressures, are few of the mentioned characteristics that differentiate construction projects from projects in other industries. These characteristics cause construction projects to have hazardous conditions and are prone to work accidents [2].

For Indonesia The construction industry has a large contribution to the economy [3]. The role of the construction industry can be seen from the potential employment created [4]. In 2009, according to data from the Ministry of Manpower and Transmigration (Depnakertrans) shows that some 4.5 million workers in Indonesia work in the construction sector, covering 7-8% of the workforce in all sectors. Data 2015 shows the number of workers in the construction sector has even reached 7.72 million people. The development of the construction service industry becomes the strategic agenda of the government period 2014 - 2019 which directly implies domestic problems in the form of construction safety culture dynamics which is still a problem in every construction project. These challenges require regulatory efforts and reinforcement of regulatory and institutional safety of the construction services sector to ensure the construction services sector can grow and develop, have a continuous increase in value added, professionalism and competitiveness. One such effort is taken by the Government by issuing the Construction Service Act No. 2 of 2017 as a new paradigm in developing...
the construction services sector in particular the issue of occupational safety. The purpose of this study is to develop a conceptual framework in developing a safety culture in the construction industry in Indonesia.

2. Theoretical Study

[39] concludes that poor construction safety culture in Indonesia is the result of the low implementation of HSE management system policy (SMK3). What is meant by Occupational Safety Management by [6] is a set of policies, strategies, practices, procedures, roles and functions related to occupational safety. According to [5], the Safety Management System is more than just a "paper system" policy and procedures and [7] concludes that safety management is an integrated mechanism within the organization and is designed to control hazards that may affect workers' safety and health. [8] look beyond the process and conclude that safety management is a process of safety control policies, procedures and practices related to occupational safety at the project site [9]. Internationally, the regulation of Occupational Safety and Health Policy is the working order of the Occupational Safety and Health Management System issued by the ILO in 1961, while in America we are familiar with Occupational Health and Safety Assessment Series (OHSAS), in the UK with British Standard (BS) and Australia as well New Zealand with AS / NZS 4801. In Indonesia we are familiar with Occupational Safety and Health Management System (SMK3). Related to the implementation of SMK3 data policy states that construction companies that apply it only 27.43% in all regions in Indonesia with the category all unsafe. Therefore, it is necessary to evaluate the implementation of construction safety policy in the national policy of a series of rules that can be norms, standards, procedures and / criteria (NSPK). SMK3 is generally regulated in Government Regulation No.50 of 2012 on Implementation of Safety and Health Management System and for the field of construction regulated in Regulation of Minister of Public Works No. 05 / PRT / M / 2014 concerning Guidance of Occupational Safety and Health Management System (SMK3) Construction Field of Public Works.

In an effort to provide a better approach to the measurement, comparison and interpretation of a country's construction industry performance, researchers at the University of New Brunswick developed an innovative performance measurement framework using maturity level modelling and a set of project performance benchmarks [10]. The maturity model developed as part of this framework is called the Macro Maturity Model of the Construction Industry and is based on the adaptation of the concept of process maturity. While modelling maturity has been widely applied in the software manufacturing industry, particularly as a Model of Quality Maturity and in the field of project management as a Model of Organization Project Management Maturity, Portfolio Maturity Model, Program and Project Management.

[11] have established a model of maturity to assess management practices in the construction industry at the industry level. The model uses a three-tiered construction for maturity where the practice is: 1) immature in ad hoc terms of application, 2) transitional maturation in this case defined and repeated, and 3) mature as measured and corrected. The model is based on model maturation of processes and previous process improvement concepts, such as Shewhart's plan-do-check-act cycle, and Philip Crosby's quality management maturity network that "describes five evolutionary stages in adopting quality practice" [12], and Maturity Model Newer Capacity (CMM) [13]. CMM highlights the five limitations of maturity that a process must go through in order to be sustainably improved. Assessing the maturity of a process at the organizational level requires the determination of the extent to which processes are defined, managed, measured and controlled and usually achieved by observing practice. Associated with the construction industry and project management is a newer maturity model that includes the process management model of Maturity process [14], Standard Improvement Model for Service Construction Model [15], and research in the field of learning organization in construction [16].
3. Methodology
Research methods used in this study using literature studies and validation experts in the field of construction safety, as illustrated in the figure 2 below
4. Result

The conceptual model in this study builds on theories of safety culture based on relevant previous research literature that has been described in the literature study. In this study will develop the theory of [17] which says that the Safety Culture there are 4 dimensions in shaping the character that is 1) Cultural Behaviour, 2) Culture of Norm and Management, 3) Physical Culture and 4) Culture of Ideology. The theory is developed with policy variables and Institutional as a shaper of Safety Culture in Construction Industry in Indonesia. This is because previous empirical research on the development of the construction work culture culture does not explain that policy and institutional variables as something that should be integrated as macro implications or impacts that must be improved if they want to develop a safety culture in the Construction Industry. However, various literatures prove that policies and institutions can separately dimension form effective safety culture. While regulation itself is the main variable in establishing an effective and efficient safety institutions [18].

In the previous study described that One of the efforts in preventing the level of effective workplace accidents is to improve the policy or regulation of regulation of safety management system in the construction industry. [19] concluded that one of the measures to minimize the risk of accidents is that the government needs to develop, enforce and monitor safety regulations and procedures as well as strictly.

The conceptual model of the study is shown in Figure 3. Part of the conceptual model in this study, particularly the linkage between safety culture variables and safety performance is a common model in the study of development of construction safety culture. Therefore, policies and institutions are very important and become the main foundation that is expected to be able to move all the particles that exist within the organization. So the identification of problems that occur is how the Policy and Institutions can build a culture of safety and improve the maturity level of construction service companies so as to improve the performance of Project Safety and Performance.

![Fig 3 Conceptual Framework Development Construction Safety Culture in Indonesia](image-url)
5. Discussion

Policies are interconnected with the institutions. In order for the policy to proceed properly, it must be supported by strong institutions. In order for the institution to run and be obeyed by its members, it is necessary to have an intensive structure that contains sanctions and rewards so that the community will obey. [20] in [21] states that institutions have three components, namely:

1. Formal rules, including constitution, statute, law and all other government regulations. Formal rules form political systems (governance structures, individual rights), economic systems (property rights under conditions of resource scarcity, contracts), and security systems (judiciary, police)

2. Rules of information, encompassing experience, traditional values, religion and all factors that influence the form of individual subjective perception of the world in which they live;

3. Enforcement mechanisms, all such institutions will not be effective if they are not accompanied by enforcement mechanisms.

Case study based on case study conducted by [21] proves that Policy has an effect on Positive to Institutional

Security standards, laws and regulations: A good safety culture requires realistic and practically practical safety rules in all circumstances [22]; [23]. The policy here is measured by 2 attributes namely 1) national safety standards and 2) company policies and procedures.

1. National Safety Standard: [24] states that safety laws and regulations are part of the security infrastructure.

2. Work safety policies and procedures are one of the factors that can minimize accidents caused by unsafe conditions [25] because they can provide a clear picture and constraints on the implementation of safety program on construction projects. [26] discloses that the safety rules and procedures applied by the company should be easy to understand and not difficult to apply to construction projects, there is a strict sanction if safety rules and procedures are violated, and there are periodic improvements in accordance with the conditions of the construction project. A clear safety rules and procedures facilitate a positive safety culture [27].

Improving safety culture and moving towards higher levels of safety culture maturity are considered effective in preventing larger-scale accidents [28][29][30][31]. In previous measurements or research culture has become an indicator of the level of maturity of OSH management system in Indonesia. With the increase of culture will have a positive impact on the maturity of the health and safety management system itself. Can be said because of the influential culture in running the management system.

Generally, safety performance suggests the results of safe work records for the coming period [32][33]. Safety performance is a function of many factors including safety culture [34]. It also means that the attitudes, behaviours and practices of workers have a severe impact on the level of compliance with safety standards; In turn safety performance.

[35] argue that poor safety performance will increase health and safety overhead costs; It also increases the ultimate uncertainty in the costs of welfare, employee safety and health (co-operatives and managers). [36] argues that project performance is hampered by a list of accidents an organization may have acquired, and this can negatively impact the reputation of the organization so it is unlikely
the customer likes due to poor safety record. Can be said because safety performance has a positive effect on project performance.

This study is a conceptual model of research to build a safety culture in the construction industry that is currently being implemented. The results of this conceptual model will be followed by the validation by the expert in determining the variable of content and constructs variable for subsequent survey of respondents to determine the research data. The results to be achieved in this research is the integration of the process of building a construction safety culture at the macro level mezzo level and micro level so that the safety culture can be moral for every element and behavior to reduce the level of accidents in Indonesia

6. Conclusion

The results of this study indicate that in building a safety culture in the construction industry it is necessary policy and institutional as input at the macro level. In the policy there are four latent variables of safety policy, safety cost policy, reward policy and punishment policy. For institutions there are five latent variables of program objectives, benchmarks, major constraints, institutions involved and the pattern of roles and relationships. Latent variables in construction safety occupational culture include physical culture, behavioural culture, ideological culture and culture of management norms. At the mezzo level or at the level of the construction service company needs to increase the level of maturity that includes resilient, proactive, compliant, reactive and basic which if improved will significantly affect the safety performance and construction project performance as part of the micro level. This conceptual framework will be developed for further research to find out the relationship between the integrated variables and know the method of development of safety culture in the construction industry.

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