Study of Evaluation OSH Management System Policy Based On Safety Culture Dimensions in Construction Project

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Abstract. Safety Culture in the construction industry is very influential on the socio economic conditions that resulted in the country's competitiveness. Based on the data, the accident rate of construction projects in Indonesia is very high. In the era of the Asian Economic Community (AEC) Indonesian contractor is required to improve competitiveness, one of which is the implementation of the project without zero accident. Research using primary and secondary data validated the results of the literature experts and questionnaire respondents were analyzed using methods SmartPLS, obtained pattern of relationships between dimensions of safety culture to improve the performance of Safety. The results showed that the behaviors and Cost of Safety into dimensions that significantly affect the performance of safety. an increase in visible policy-based on Regulation of Public Work and Housing No 5/PRT/M/2014 to improve to lower the accident rate.

Introduction

Based on the research International Labour Organization (ILO, 2003) mentioned that working accident in a country was mostly related to the rate of the competitiveness in that country. That research concluded that there was that points out the rate of working accident is inversely proportional with competitivenss in this case Indonesia is placed in the second lowest rate of the fatal working accident, in the 40 out of 100.000 workers (The Global Competitiveness Index, 2011). The research of ILO (2009) concluded that Indonesia had bad record on working accident with the record of number 152 of 153 Nations with the worst working accident aspect as showed in the Figure 1.
The working accident, particularly in the construction works has its impact either in micro, messo or macro level (Firdaus Ali, 2016). In the micro level, working accident may could make construction project hampered, over expenses, opportunity loss in the result in fatal injury of the workers. In the messo level, the impact of the working accident is influencing the construction service provides and the legal liability. In the macro level the working accident is influencing national product, competitiveness index, and the loss expenses (Firdaus Ali, 2006).

Based on data from Badan Penyelenggara Jaminan Sosial (BPJS) Ketenagakerjaan, from 2007 to 2015 indicated that the numbers fluctuate and an increasing trend as showed in the figure 2. Those figures show the highest working accident that compared to those of other South East Asian Nations (Anshori, 2008 in the Abduh’s research, 2010). National Journal (2009) recorded that Indonesian construction industry contributed the highest working accident compared to that of other industry to the amount of 32% as showed in the Figure 3.

Figure 2. Working Accident Chart in Indonesia
Source: (BPJS Ketenagakerjaan), 2016

Figure 3. The Accident rate in a range of industries
Source: National Journal, 2009

The frequency of accidents in Malaysia has declined from 11.0 accidents per 1,000 workers in 2000 to 6.1 accidents per 1,000 workers in 2007. While the frequency of fatalities increased from 9.5 deaths per 100,000 workers in 2002 to 12.9 deaths per 100,000 workers in 2004, but has reduced the range of approximately 12.4 to 12.5 per 100,000 during the period 2004 to 2007. The Occupational Safety and Health Act 1994, enacted in February 1994, is the main law involving occupational safety and health in the manufacturing industry. The main purpose of this legislation would establish a health, safety, and welfare to health and safety hazards of work activities, protect people at work, adapting the work environment appropriate to meet the needs of physical and mental labor, and offers steps to develop regulations and code associated with this legislation to regulate and improve work health and safety standards. Occupational Safety, Health, and Work Environment Act (2011) showed that the duty of companies to manage and maintain safe working conditions and healthy and the environment, including preventing employees from health and safety hazards in all forms. Employees also a duty to cooperate with the company to manage and maintain safe working conditions and healthy.

Based on the literature study, the rate of working accident which so high especially in construction industries, it is because of not having been formed of safety working culture yet. Based on the high working accident problems as well as yet on optimum safety culture, in this case, it is necessary be investigated by analysis. The analysis method which is used to observe the relation pattern and interaction or that is related to the various dimension to adapt the Research of Chinda et al (2007), Chinda (2011), dan Ismail et al (2012), is by being formed model and doing examination by using Structural Equation Modeling (SEM). This study aims to evaluate the safety management system of occupational health and safety based on cultural dimensions that are formed by the method of benchmarking.
2. Theoretical Overview

2.1 Safety Culture

Practicing safety culture is the combination of attitudes, values, norms, and perception of the students or worker candidates in one organization that have connection. Together with safety culture, safety behavior and its application to practical use in the production process (Clarke, 2000). Similar definition was done by The Advisory Committee on The Safety of Nuclear Installations (ACSNII, 1993) and then will be adapted, and clarifies that safety culture in one organization is the product of values, attitudes, perception, competence, and behavior pattern of individual and groups that have commitment to the safety culture. The basic culture of safety culture is attitude and perception to the safety culture (Gadd and Collins, 2002).

2.2 Safety Culture and Occupation Health in the Construction Industry

Some research study has been done in the department of safety culture of construction, Kartam et al (2000) such as studying problems, procedure, and construction safety problem in Kuwait and declared that upgrading the safety culture, especially in the department of management training and the commitment in the safety is required to prevent construction injury and accident. Little (2002) identify 14 elements and four topics (ownership and commitment, system and procedures, training and competence, and communication) for upgrading safety culture in UK construction. Ho and Zeta (2004), analyze safety culture in Hong Kong construction industry and make four factors of culture’s key (surrounding, behavior, organization, and human) that affect safety culture.

Based on the previous research, can be concluded that dimension in the making of safety culture in the State-Owned Enterprises are 1) Leadership, 2) Policy, 3) Strategy, 4) Employee, 5) Process, 6) Behaviour, 7) Safety Culture Expenses, 8) Contract System, 9) Value System. Each dimension will be observed its influence towards safety culture, also its correlation between each dimension as well.

Based on the source which earned the author from journal, dissertation, and thesis, then obtained safety culture dimension. Following are safety cultural dimension that could potentially affect the performance of safety culture in the construction project.

3. Research Method

This research method using expert validation and benchmarking. Expert validation is done to determine recommendations for the improvement of results-based policy pursued structuring dimensions of safety culture. Method of benchmarking conducted to determine the right strategy compared with other countries in implementing measures already improved safety culture.

Benchmarking is the comparative method in which the company finds the best practices in a particular area and then tried to take his own performance in the region was in line with best practice. It is a reference point for measurement purposes and when implemented will produce superior results. Therefore, the company would have to be superior to that in the benchmark.

According to the American Productivity and Quality Center (APQC), benchmarking is the process of systematic and continuous measurement; the process of measuring and comparing sustainability on the business processes of an organization with figures of business processes anywhere in the world, to get information that will help the company’s efforts to improve its performance (APQC, 1993).

Meanwhile, another definition of benchmarking is said by Westinghouse, benchmarking is the search and application practices are actually better continuously, which leads to superior competitive performance.

4. Research Results

4.1 Influential Correlation Pattern

Based on the result at SmartPLS 3.0 with Bootstrapping method (Path Coefficient) as big as 33 correlation between dimensions which meet significantly (T statistics > 1.96) is as big as 14
correlation between dimension, significantly, and interplayed each other, then obtained influential relationship pattern as follows:

![Correlation Pattern Diagram](image)

**Figure 4.** Correlation Pattern Between Dimension Significantly and Influence Each Other (Source: Latief, Machfudiyanto, Yogiswara, 2016)

| No. | Correlation                          | Explanation               |
|-----|-------------------------------------|---------------------------|
| 1   | Leadership → Policy                 | Significant and interplayed|
| 2   | Leadership → Employee               | Significant and interplayed|
| 3   | Leadership → Rate System            | Significant and interplayed|
| 4   | Policy → Strategy                   | Significant and interplayed|
| 5   | Employee → Strategy                 | Significant and interplayed|
| 6   | Employee → Process                  | Significant and interplayed|
| 7   | Employee → Behavior                 | Significant and interplayed|
| 8   | Rate System → Process               | Significant and interplayed|
| 9   | Rate System → Behavior              | Significant and interplayed|
| 10  | Process → Behavior                  | Significant and interplayed|
| 11  | Strategy → Contract System          | Significant and interplayed|
| 12  | Contract System → Safety Culture Cost| Significant and interplayed|
| 13  | Safety Culture Cost → Performance of Safety Culture | Significant and interplayed|
| 14  | Behavior → Performance of Safety Culture | Significant and interplayed|

With the result of the above research, so it is necessary to recommend additional duties, responsibilities, and authority on Regulation Ministry Public of Work and Housing No. 05/PRT/M/2014 as follows:

a. To develop good leadership in taking the job, responsibility and authority on the level of the head coaching body construction, structural official echelon 1 of the technical working unit,
structural official echelon 2 of the technical working unit, immediate supervisor working unit head, official commitment maker, and working unit ULP on the article 11,12,13,14,15,16, and 17 Permen PU No. 05/PRT/M/2014.

This leadership development could be met with the criteria:
1. To allocate safety responsibility on the entire organization effectively and efficiently
2. To support and motivate to the all organization member to create safety and healthy working
3. Give example safety and positively behavior and a role model in safety
4. Establish a good communication between organization member, supervisor and subordinates
5. Maintaining a commitment to the safety of the entire organization member, assets and environment

b. To motivate / support the worker engagement in safety and healthy work on the article 19 Permen PU No. 05/PRT/2014.

Work engagement could be met with the criteria:
1. To unite the same exception and awareness in the safety between organization and workers.
2. High involvement of workers creates positive effect on the safe working behavior.
3. To maintain good relationship and to develop habits to give each other advice / remaining about safety between workers.
4. Maintaining the level of pressure and a stable work and proportion in the climate of organization.
5. Working should have a proper knowledge about safety, skill, and competent that may minimize accident.
6. Provide safety equipment support as well as good working environment.

c. Developing strategy in implementing organization working safety on article 15 Regulation Ministry Public of Work and Housing 05/PRT/M/2014.

Developing strategy can be met with the criteria:
1. Safety is an integral part in formulating decision and goal of the organization.
2. Carrying out audit program implementing working safety as part of improvement policy of working safety.
3. To promote productivity harmoniously with the safety.
4. To reward incentive to the worker who has successfully implementing a good working safety culture.

d. Responsible for the certainty of safe behavior of worker in performing their duties, that is mentioned in article 19 Permen PU No. 05/PRT/M/2014.

Certainty of safe behavior worker can be met with the criteria:
1. Any individual on the project are obliged safety procedure
2. Applied the high discipline towards safety equipment storage
3. Implementing the high discipline towards safety equipment usage.
4. Ensuring workers have followed entire instruction from organization.
5. The creation of conditions in which the workers can freely report the accident and almost wretched.
6. The creation of conditions in which the workers remind each other about the danger and safety working.

e. Extra cost of implementing SMK3 in construction of PU department is allocated in the general cost in article 20 verse 1 of Regulation Ministry Public of Work and Housing No. 05/PRT/M/2014 are:
1. The cost of working accident compensation
2. Cost for maintaining safety equipment
3. Cost for external audit SMK3
f. Developing safety organization values which able to create the safe working climate on article 12 Regulation Ministry Public of Work and Housing No. 05/PRT/M/2014.

Developing safety values can be met with the criteria:
1. Make identification and analysis of the risk towards accident working potential as baseline start planning the safety.
2. Developing psychological morality which determines how much a person’s attention to safety work.
3. Safety aspect as a topic that cannot be separated from the material discussed on any meeting agenda.
4. Understanding that safety is a shared responsibility.

5. Discussion

Based on benchmark results, for the regulation of sanctions in force until today still needs to be improved because the penalties that apply are still relatively light and to enhance the deterrent effect of the company in case of accidents. As for the reward, need to be made regarding this policy regulations in the form of incentives if it reaches the target zero accident that motivates the company to continue to give priority to safety in the work environment.

According Wirahadikusumah (2006) supervision by the regulatory Directorate of Occupational Health and Safety Norms (PNK3), the Ministry of Labor is still lacking due to a lack of supervisory personnel. According to the Secretary General of the Ministry of PUPR, intensive surveillance may facilitate the implementation of OSH because during this new surveillance carried out if there are events. In Malaysia, the government served as a policy maker, regulator and enforcer. In line with that principle, government agencies will be a role model for OSH. Not only government agencies tasked with monitoring the implementation of OSH, but also working with social agencies with roles and responsibilities clearly.

Recommendation for policy improvement associated with safety culture performance is as follows:

a. Responsible for certainty safe worker behavior in implementing duty on the chapter 19 Regulation Ministry Public of Work and Housing No. 05/PRT/M/2014. Certainty safe worker behavior can be met with the criteria:
   - Any individual in the project are obliged to follow the procedure of safety as follow.
   - Applying the high discipline towards the storage of safety equipment.
   - Applying the high discipline towards the usage of safety equipment.
   - To ensure the workers have followed the instruction from organization.
   - To create condition which the workers can freely report the accident and almost wretched.
   - The creation of condition which the workers remind each other about danger and safety working.

b. Extra cost for implementation of SMK3 for construction in the department of PU that is allocated to the general cost on the chapter 20 article 1 Permen PU 05/PRT/M/2014 as follows:
   - The cost for working accident compensation
   - The cost for maintaining safety equipment
   - The cost for SMK3 external audit

Suggestion

As for the suggestion of the research are as follows:
1. The research can be used to arrange safety culture dimension especially in the construction industry that has high rate working accident.
2. Supervision of the central government especially the ministries that related to the construction works on the construction industry for tighter supervision in working accident and...
collaboration of all parties (stakeholder) in construction industry to pay attention and organize safety culture continuously.

3. The cost of safety culture is not incorporated with the implementation of the project.

4. Further research needs to be done towards the effect on the safety culture cost towards safety culture performance and behavior that involving parties with government policy makes through focus group discussion Delphi round in order that this research recommendation result becomes a policy improvement which can be applied in Indonesia some day.

5. The next research needs to be done deeply associated with the review and complementing the existing safety culture regulation, like Government Regulation 50/2012, Regulation Ministry Public of Work and Housing. 05/PRT/M/2014, and others.

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References
[1] Aksorn, T. and Hadikusumo, B.H.W., 2006. Critical success factors of safety programs implementation in Thai construction projects. In: D. Fang, R.M. Choudhry and J.W. Hinze, eds. Proceedings of the CIB W99 2006 international conference on global unity for safety and health in construction, 28-30 June 2006, Beijing, China. Beijing: Tsinghua University Press, 328-336.

[2] Andi et.al. 2005, ‘Model Persamaan Struktural Pengaruh Budaya Keselamatan Kerja pada Perilaku Pekerja di Proyek Konstruksi’, Jurnal Teknik Sipil, [online], Vol. 12 No. 3. Dari: http://www.ftsl.itb.ac.id/. [1 Mei 2014]

[3] Clarke, S. (2000). “Safety Culture: Underspecified and Overrated?”. International Journal of management Reviews, 2(1), 65-90.

[4] Cooper, D., (2002), “Safety Culture – A Model for Understanding & Quantifying Difficult Concept”, Professional Safety, 47(6), 3036.

[5] Gadd, S. and Collins, A.M., 2002. “Safety culture: a review of the literature”. Report by the Health & Safety Laboratory, UK: Sheffield University.

[6] Ghozali, Prof. Dr. Imam, M.Com., Ak. 2005. Model Persamaan Struktural. Semarang: Badan Penerbit Universitas Dionegoro.

[7] Glendon, A.I. and Litherland, D.K., 2001. Safety climate factors, group differences and safety behaviour in road construction. Safety science, 39, 157-188

[8] Ho, J.K.L. and Zeta, K.C., 2004. Cultural factors and their significance to the Hong Kong construction industry [online]. Available from: http://www.ic.ployu.edu.hk/esh/культура/Ho&Zeta.pdf [Accessed 20 September 2004].

[9] Kartam, N. A., Flood, I, and Koushki, P. (2000). “Construction safety in Kuwait: issues, procedures, problems and recommendations”. Safety Science. 36. 163-184.

[10] Lingard, H. and Blismas, N., 2006. “Building a safety culture: the importance of shared mental models in the Australian construction industry”. In: D. Fang, R.M. Choudhry and J.W. Hinze, eds. Proceedings of the CIB W99 2006 international conference on global unity for safety and health in construction, 28-30 June 2006, Beijing, China. Beijing: Tsinghua University Press, 201-208.

[11] Little, A.D., 2002. “Improving safety culture in the construction industry”. A workshop for senior management in construction contracting and client companies. Cambridge: University Press.

[12] Molenaar, K., Brown, H., Caile, S. and Smith, R., 2002. Corporate culture: a study of firms with outstanding construction safety. Professional safety, July, 18-27.

[13] Mohamed, S. and Chinda, T. (2011), System dynamics model of construction safety culture, J. of Engineering Construction and Architectural Management, 18(3), 266-281.
[14] Mohamed, S., 2002. Safety climate in construction site environments. *Journal of construction engineering and management*, 128(5), 375-384.

[15] Niskanen, T., 1994. Safety climate in the road administration. *Safety science*, 17, 237-255.

[16] Paparan Staff Ahli Kementerian Pekerjaan Umum dan perumahan Rakyat (PUPR), Firdaus Ali, pada Seminar Nasional Keselamatan dan Kesehatan Kerja (K3), di Jakarta, Kamis (11/2/2016).

[17] Peraturan Pemerintah Nomor 50 Tahun 2012 tentang Penerapan Sistem Manajemen Keselamatan dan Kesehatan Kerja

[18] Peraturan Menteri Pekerjaan Umum Nomor 5 Tahun 2014 tentang Pedoman Sistem Manajemen Keselamatan dan Kesehatan Kerja (SMK3) Konstruksi Bidang Pekerjaan Umum

[19] Surat Edaran Menteri Pekerjaan Umum dan Perumahan Rakyat Nomor 66 Tahun 2015 tentang Biaya Penyelenggaraan Sistem Manajemen Keselamatan dan Kesehatan Kerja (SMK3) Konstruksi Bidang Pekerjaan Umum

[20] Soeharto, Imam. (1995). Manajemen Proyek, dari Konseptual sampai Operasional, Penerbit Erlangga, Jakarta.

[21] Teo, E.A.L., Ling, F.Y.Y. and Chong, A.F.W., 2005. “*Framework for project managers to manage construction safety. International journal of project management*”, 23(4), 329-341.

[22] Williamson, A.M., Feyer, A., Cairns, D. and Biancotti, D., 1997. The development of a measure of safety climate: the role of safety perceptions and attitudes. *Safety science*, 25(1-3), 15-27.