

Conference Paper

Analysis of Safety Culture Maturity Level in Construction at PT. MK Gelora Bung Karno Main Stadium Renovation Project

Marina Kartikawati and Zulkifli Djunaidi

Occupational Health and Safety Department, Faculty of Public Health, Universitas Indonesia, Jl. Margonda Raya, Beji, Pondok Cina, Kota Depok, Jawa Barat 16424, Indonesia

Abstract

Safety culture not only affects the productivity but also the competition between similar core businesses. The concept of safety culture is a new concept in the construction sector. Construction sector has a narrow building period and high employee turnover. PT. MK Building Department won the tender for the Renovation of Gelora Bung Karno Main Stadium with 14-months term. This study aims to determine the level of safety culture maturity of PT. MK on the Renovation Project of Gelora Bung Karno Main Stadium (SU-GBK). Data were collected qualitatively (FGD, observation and in-depth interview) and processed by quantitative method for in-depth analysis during May–July 2017. The sample in this study was chosen by stratified random sampling and determined by representation in population. Safety culture maturity score was grouped by variable and job level groups. Safety culture maturity level was grouped based on Bells Curve in five level of maturity that are pathologic, reactive, calculative, proactive and generative. PT. MK SU-GBK Renovation Project focuses on system planning, but the score of implementation and evaluation in safety management system is still weak. Project's managements have realized the importance of humans in a system. Workers are an important asset for the company. The awareness of the safety built by project leaders (management and supervisors) is still in the early stages and has not been felt by most workers. Safety is not reflected in daily activities because this project still needs organizing the work organization. From one to five, safety culture maturity level in PT. MK SU-GBK project can be categorized into calculative level with an average value being 3.19. The safety management system runs based on existing data. It is fully controlled by the management without the active participation of workers. Calculative-level organization is an organization that is not ready for the safety culture.

Keywords: safety culture, construction, safety

Corresponding Author:

Zulkifli Djunaidi
zul@ui.ac.id

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1. Introduction

Safety culture not only affects to productivity but also to compete between similar businesses. The companies and government agencies (Ministry of Public Works) are currently implementing a qualification system using Occupational Safety and Health assessment on its projects. Dominic Cooper's opinion [1] state that the company/client will prefer companies that have implemented OHS in their company as it will win more contracts [1]. Companies that implement behavior-based safety programs can save costs due to accidents that eliminate working hours of 180,000 to 360,000 euros to compensate accidents for one year [1].

The achievement level of Norm, Standard, Procedure and Criteria of Occupational Safety and Health (NSPK-K3) has reached more than 60 percent. But the case of work accidents in the construction sector still happening. According to the Director General of the ILO, Juan Somavia, there are 60,000 work-related deaths every year in the construction sector. Every 10 minutes there is a death caused by work related accident, one in 6 events of workplace mortality occurring in the construction sector. In industrialized countries, although the construction sector only employs 6–10 percent of the total employees but 25–40 percent of occupational injuries occur in the construction sector, whereas 30 percent of construction workers work with low back pain or other musculoskeletal disorders (Somavia 2005) (Arifin & Rahman 2014). Based on the research conducted by Haslam in 2004 on 100 construction workers, more than two-thirds (70%) of work accidents occur because of the unsafe actions and unsafe behaviors of workers. Such of unsafe acts beside targets to be pursued are caused by additional burdens, so workers choose shortcuts to reduce time and energy also workers' perceptions that accidents will not happen to the worker [2].

The concept of safety culture is a new concept in the construction sector, both in service users and service providers including PT. MK. PT MK is a state-owned enterprise (SOE) provider of construction services. Construction works have a narrow settlement period and high employee turnover. PT. MK which has several lines of construction business divided into 6 departments and 3 subsidiaries. Building Department is one department with the largest number of employees and workers in PT. MK. The Building Department won the tender for the Renovation Project of Gelora Bung Karno Main Stadium with a project term of 14 months. With a long period of time, this project is expected to develop a safety culture that represents PT. MK in particular and the construction sector in general [3].

Based on the aforementioned problems, this study aims to determine the level of safety culture maturity in PT. MK on the Renovation Project of Gelora Bung Karno Main Stadium (SU-GBK).

2. Theoretical Review

Organizational culture is defined as the values, beliefs, customs, traditions and methods disseminated by its members. Organizational culture is a belief system that shared by members of an organization that is also a hierarchy of interrelated values disseminated with stories, myths and slogans [4]. A positive safety culture can go hand in hand with a quality improvement culture if in its development involves all workers at every stage, but if in its development a quality culture is used as a marketing strategy or as an attempt to reduce the cost of safety, the result will neglect the safety issue. Safety culture is also seen as an extra cost that does not have a rapid and tangible return on investment, so culture and safety issues are often ignored and not determined as performance indicator. However, safety culture is believed to have a positive impact on the quality, reliability, competitiveness and profitability of the organization (Cooper 2002). Companies could see and measure their ability to implement safety culture because members can see which culture/ladder is easier to achieve within an organization.

The model initiated by Hudson has five levels:

1. Pathological is the stage where safety is the responsibility of the worker and safety is a business interest that is not supported by policy. Stages where there is no one concern why accidents can occur and how accidents can be prevented. Pathological levels usually avoid reporting.
2. Reactive is the stage where an organization begins to seriously implement safety. Managements' attention are given when accident/incident occurred.
3. Calculative is the stage where the safety management system is run based on existing data. The main role is held by management and does not involve workers to participate actively in decision making. Workers will feel safe if it is in accordance with the user manual.
4. Proactive is a stage that sees uncertainty as a challenge to moves the workers. The policies are not top-down at all.

- Generative is the stage where active participation has emerged at all levels of workers. Safety is not a separate thing, but something that integrated in the business. It's characterized by not satisfied with the results obtained quickly, high feedback and seen change as a positive thing that must happen.

Parker et al. (2006) developed 18 elements of safety culture, which then divided into 2 categories, namely: 11 real elements (safety management system) and 7 abstract elements (with attitude and behavior).

3. Methods

3.1. Research design

This study used qualitative data retrieval method and processed using quantitative method, then analyzed by in-depth analysis. This study used the academic approach, where researcher look at the ethnographic data or cultural evidence which available in the SU-GBK Renovation Project. Qualitative ethnographic information obtained by field document analysis, in-depth interview with key informants and also focused group discussion. The data obtained in this study oriented in the past.

TABLE 1: Element of safety culture divided by 2 categories.

[t!]	[t!]
“Concrete” Elements	“Abstract” Elements
Benchmarking, Trends & Statistics	Who causes accidents in the eyes of management?
Audits & Reviews	What happens after an accident? Is the feedback Loop being closed?
Incident/Accident Reporting, Investigation & Analysis;	How do safety meetings feel?
Hazard and Unsafe Act reports	Balance between HSE & Profitability?
Work planning including PTW, Journey Management	Is management interested in communicating HSE issues with the workforce?
Contractor Management	Commitment level of the workforce and level of care for colleagues.
Competency/Training	What is the purpose of procedures?
Work-site Job Safety Techniques	
Who Checks Safety on a day to day basis?	
What is size & status of the HSE Department?	
What are the rewards of good safety performance?	

3.2. Time and place

Research conducted at PT. MK Gelora Bung Karno Main Stadium (SU-GBK) renovation project. Bung Karno Main Stadium project is matched with the literature from Cooper that the safety culture maturity model will be relevant only to organizations with the following criteria [1]:

1. Adequate Safety Management System
2. The majority of accidents occur not by technical error
3. The company meets the regulation/regulation of occupational safety and health
4. Safety is not to avoid demands but attempts to prevent accidents.

The research conducted in May – July 2017.

3.3. Population and sample

The population in this study are 115 people, consist of managements, staff and foreman on SU-GBK project. The sample in this study was selected by stratified random sampling determined by representation in the population. Participant criteria are:

1. Positions in the project organization structures such as managers (Project Manager, Quality Control Manager, Health Safety Environment Manager, Project Production Manager, Project Engineering Manager and Project Finance Manager), job inspectors/supervisor (Electrical Mechanical Supervisors, Architectural and Administrative Supervisors) and job executors (Mandor)
2. Placement, the proportion of participants will be more in the field worker group and less on the administrator group.

The workers are grouped into 3 FGD groups with the following divisions: Top Management group, Supervisor group and Foreman group.

1. Inclusion criteria: registered as worker of PT. MK at Gelora Bung Karno Main Stadium Renovation Project.
2. Exclusion criteria: Guests/people who visit and are on site at the time of data retrieval.

3.4. Data collection and processing

The data collection in this study used the questionnaire of Safety Culture Maturity Model from The Keil Center which is a pragmatic approach in safety culture maturity level research. In the theoretical framework there is a tool named Nordic Occupational Safety Climate Questionnaire (NOSACQ). This tool only captures the safety climate within the organization. This research uses data of result from Focus Group Discussion (FGD) of each worker group according to level of position also in-depth interview with informant as primary data and result of observation as secondary data. This study used a safety culture maturity survey questionnaire.

3.5. Data validity

Validity data testing from data collection result used the following triangulation:

1. Resources Triangulation

This study has been triangulated by retrieve data from 3 different groups, which are the top management group, the supervisor group and the job foreman group.

2. Method Triangulation

This study has been triangulated by 3 ways of data retrieve process which are FGD, in-depth interview and observation.

3.6. Data analysis

The result from FGD and observations processed and analyzed using in-depth analysis method with sorting and classifying data, editing and coding the data, assumption testing, presentation, and conclusion withdrawal.

4. Results

4.1. Respondents distribution

This study conducted in May-July 2017 when the progress reached 78 percent, while the sample described as follows:

TABLE 2: Distribution of FGD respondents based on level of position.

Level	Qty	Percentage
Top Management	6	6.67%
Supervisor	30	33.33%
Foreman	54	60%
TOTAL	90	100%

TABLE 3: Distribution of FGD respondents by section.

Section	Qty	Percentage
Administration	12	13.3%
Production/Engineering	78	86.7%
TOTAL	90	100%

TABLE 4: Distribution of FGD respondents by working period.

Working Period	Qty	Percentage
0-5 Years	57	63.3%
> 5-10 Years	26	28.9%
> 10 Years	7	7.8%
TOTAL	90	100%

4.2. Safety culture maturity level profile at PT MK – Gelora Bung Karno main stadium renovation project

The average value from FGD in PT. MK The SU-GBK Renovation Project is 3.19, according to the normal curve it is found that the value falls into the calculative category.

4.3. Safety culture maturity level profile based on job title

4.4. Safety culture maturity level profile based on working unit

4.5. Safety culture maturity level profile based on working period

As shown in Table 6, workers with 5-10 years of working period has the highest score (3.7) than workers with more than 10 years of working period (3.4) and less than 5 years of working period (2.5).

TABLE 5: Safety culture maturity level profile based on job title.

Variable	Grade			Average
	Management	Supervisor	Foreman	
Safety Commitment	4	3.2	1	2.7
Safety Priority	4	4.3	5	4.4
HSE Unit Presence	4	3.7	3	3.6
Accident Trend and Statistic	1	1.8	1	1.3
Accident Reporting, Investigation and Analysis	2	2.7	1	1.9
Audit and Review	3	3	1	2.3
HSE Reporting	3	2.7	2	2.6
HSE Inspection	3	3.3	4	3.4
Work Planning	4	2.7	1	2.6
Subcontractor Management	3.2	2.7	1	2.3
Standard Usage	2	2.8	2	2.3
Procedure Development	4.4	3.8	4	4.1
Procedure Purpose	2	1.7	1	1.6
Competition	3	3.2	3	3.1
Risk Management	4	4.5	5	4.5
Safety Share	4.8	4.1	3	4.0
Feedback and Lesson Learn	2	2.3	1	1.8
HSE Award	3	3.3	3	3.1
Accident Cause Analysis	4	4	3	3.7
HSE Meeting	3.6	4.2	4	3.9
Average	3.2	3.9	2.5	3.19

5. Discussion

5.1. Safety culture maturity level profile at PT MK – Gelora Bung Karno main stadium renovation project

The average value from FGD in PT. MK The SU-GBK Renovation Project is 3.19, according to the normal curve it is found that the value falls into the calculative category. Hudson [5] explains that organizations with calculative level runs the safety management

TABLE 6: Safety culture maturity level profile based on working unit.

Variable	Production/Engineering	Administration	Average
Safety Commitment	3.7	2.7	3.2
Safety Priority	5	3.6	4.3
HSE Unit Presence	4.3	3.1	3.7
Accident Trend and Statistic	2.1	1.5	1.8
Accident Reporting, Investigation and Analysis	3.1	2.3	2.7
Audit and Review	3.5	2.5	3
HSE Reporting	3.1	2.3	2.7
HSE Inspection	3.8	2.8	3.3
Work Planning	3.1	2.3	2.7
Subcontractor Management	3.1	2.3	2.7
Standard Usage	3.2	2.3	2.75
Procedure Development	4.4	3.2	3.8
Procedure Purpose	2	1.4	1.7
Competition	3.7	2.7	3.2
Risk Management	5	4	4.5
Safety Share	4.7	3.4	4.05
Feedback and Lesson Learn	2.7	1.9	2.3
HSE Award	3.8	2.8	3.3
Accident Cause Analysis	4.6	3.3	3.95
HSE Meeting	4.8	3.5	4.15
Average	3.7	2.7	3.19

system based on existing data. Management hold the main role of organization and does not involve workers to actively participate in decision making. Workers will feel safe if it is in accordance with the user manual [5].

Keypersons explained that the authority given to the work safety unit (HSE) is very large and there is a full delegation of management. The enormous powers granted by top management in the project have an impact on decisions made by the safety unit in the project, where decisions are usually applied top-down with minimal discussion of the workers. HSE unit should be more manful consider the low awareness of workers as it is more concerned with progress than the safety so that workers only follow the instructions of the safety unit without providing input for the development of safety

TABLE 7: Safety culture maturity level profile based on working period.

Variable	0-5 yrs.	> 5-10 yrs.	> 10 yrs.	Average
Safety Commitment	2.5	3.7	3.4	3.2
Safety Priority	3.4	5	4.6	4.33
HSE Unit Presence	2.9	4.3	4	3.73
Accident Trend and Statistic	1.4	2.1	1.9	1.80
Accident Reporting, Investigation and Analysis	2.1	3.1	2.9	2.70
Audit and Review	2.4	3.5	3.2	3.03
HSE Reporting	2.1	3.1	2.9	2.7
HSE Inspection	2.6	3.8	3.5	3.3
Work Planning	2.1	3.1	2.9	2.7
Subcontractor Management	2.1	3.1	2.9	2.7
Standard Usage	2.2	3.2	3	2.8
Procedure Development	3	4.4	4.1	3.83
Procedure Purpose	1.3	2	1.8	1.7
Competition	2.5	3.7	3.4	3.2
Risk Management	3.6	5	4.8	4.47
Safety Share	3.2	4.7	4.4	4.1
Feedback and Lesson Learn	1.8	2.7	2.5	2.33
HSE Award	2.6	3.8	3.5	3.3
Accident Cause Analysis	3.2	4.6	4.3	4.03
HSE Meeting	3.3	4.8	4.5	4.2
Average	2.5	3.7	3.4	3.19

in the project. Other data that can support this assessment can be further seen in the data on the safety culture maturity based on job title, work units and working period.

5.2. Safety culture maturity level profile based on job title

Safety culture maturity score grouped by variable and job level groups. Safety culture maturity level grouped based on Bells Curve in five level of maturity that are pathologic, reactive, calculative, proactive and generative. As shown in table 4, the

supervisor has the highest perception grade about safety culture that is 3.9, while the management 3.4 and foreman 2.5. The observation results support this FGD data. The supervisor is responsible person for every job step. Supervisors are the ones who best understand job standards and safety standards within the project. Supervisors are directly involved in meetings with managements as well as with foremen. Supervisors are directly involved in the field as well as in an administrative meeting. So, it appears that the supervisor is a bridge from managements to the foremen. In the second place of safety culture maturity is management level. Project management represent of head office management. Managements aware and committed to safety but have not been able to provide direction and motivation to foremen. Management gives delegation of field duty to the supervisor. Management didn't actively presence in daily activities. We found that foremen set progress as a priority rather than safety based on the number of ID Card who have tagged on SP1.

Project management realized the importance of people as an asset to the company, but it didn't feel by the foremen so there was no active participation from workers/foremen. Many meetings have to be followed but there is no active participation from the foremen of the work. Foremen tend to be passive in a meeting and accept every decision made by the management (top-down), safety has not been reflected in daily activities in this project because it is still in the organizing stage of the organization.

5.3. Safety culture maturity level profile based on working unit

Production and engineering unit has higher score (3.7) than administration unit (2.7) as shown in table 5. Observation result shows that administration unit did not take an active participation in HSE inspection/Safety Patrol that held once in a week. Production and engineering unit has higher score because of their activity has many intersection with safety activity in the field.

5.4. Safety culture maturity level profile based on working period

Workers with 5–10 years of working period based on job title and position now in supervisor (level 3) in the project. This group achieve the delegation of authority from the management which has more than 10 years of working period. This group always feel their responsibility for safety, so they always be the first to know and high understanding in safety rules and standards.

6. Conclusion

Safety culture maturity level score in PT. MK on Gelora Bung Karno Main Stadium Renovation Project is 3.19. This project categorized in calculative stage where the safety management system fully handled by management based on existing data. Organization in calculative stage require no active participation from workers. This stage means organization does not ready to implement safety culture. Supervisors have the highest score in FGD (3.9) rather than management group (3.4) and foremen (2.5). Supervisors are responsible for every key job steps where it needs knowledge and understanding in rules and standards. Production and engineering unit has the higher score (3.7) than administration group (2.7). It caused by production and engineering unit has a lot of interaction and intersection with safety activities. Workers with 5–10 years of working period has the highest score (3.7) based on FGD result. This group works as supervisor in this project and achieve safety delegation and responsibility from project managements for safety matters.

This organization understands that human is an important company's asset, but they did not reflect it in their daily activities. Implementation of safety management system did not run well because of low awareness and low participation from workers. Decision implemented top-down. Accidents elements such as trend and statistic, reporting, investigation and analysis have low score in FGD in every unit, job title or working period. It shows that management still ignore the importance of implementing safety. Safety is being a business tool and cosmetic.

Consider the low score of variables related to accident occurrence, the company should provide training on accident investigation and awareness socialization about the importance of learning from an accident. Another variable that needs attention is the purpose of the procedure. There should be a review of the philosophy of procedure-making, so that the existing procedures can be better applied and have a better understanding on the purpose of determining the procedures that exist in the organization.

Acknowledgement

This research limited to the building, but it is possible to do in infrastructure construction sector and EPC. Research limited to one project and cannot be generalized to the overall PT. MK. If further research will be conducted for one of PT. MK must involve the Board of Directors to be the respondent for in-depth interviews.

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