Analysis the Effect of Leadership to Safety Climate, Safety Culture and Safety Performance

Nurul Khasanah¹, Kholil¹* and Sugiarto¹

¹Post Graduate School of Sahid University, Jakarta, Indonesia.

Authors’ contributions

This work was carried out in collaboration among all authors. Author NK designed the study, collection and analysis the data using SEM (Structural Equation Model) and wrote the first draft of the manuscript. Author Kholil managed the analyses of the study and elaborated the discussion. Author Sugiarto managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

In this era of globalisation, occupational safety is the main spotlight in every industry. By implementing a safety management system in the workplace, it is hoped that it can shape the safety climate and positive safety culture, which can be assessed from zero accidents, workforce behaviour and support for the safety of oneself and coworkers.

The main objective of this research was to analyse the effect of leadership on safety climate, safety culture and safety performance. This research was conducted at a plastic packaging manufacturer, PT. Berlina Tbk Tangerang with 133 participants and used the SEM (Structural Equation Modeling) analysis method.

The results of the research analysis showed that leadership, safety climate and safety culture have a simultaneous significant effect on 83% safety performance.

Keywords: Leadership; safety climate; safety culture; safety performance.
1. INTRODUCTION

In this globalisation era, occupational safety is a top priority in the business. While the accident occurs, the loss is not only borne by the victim, the company holds loss of productivity and reputation in the industry. In 2017 there were 123 thousand workplace accident cases in Indonesia with a claim value of Rp. 971 billion and manufacturing contributed 31 per cent (BPJS TK). Besides the number of the accident, safety climate and safety culture are the outputs implementation of occupational safety that can be felt directly by the workforce. Management's commitment to occupational safety can be seen from the leaders in providing examples and influences members of their working groups to achieve organisational safety goals.

As a company that produces plastic packaging with various risks of workplace accidents, PT. Berlina Tbk Tangerang has implemented safety in the workplace. The top management's committed to achieving zero accident and still not been achieved due to several incidents, related concern various obstacles, and the responsibility to safety. This company also has a special team to handle occupational health and safety, Safety Health Environmental (SHE) Department. Based on the summary work accident in 2017 there were one case of LTI (lost time injury) and four medical treatment cases (SHE Dept. of PT Berlina Tbk Tangerang, Banten Province, Indonesia). The purpose of this study is to analyse some factors: leadership, climate safety, and safety culture to improve safety performance by reducing the number of occupational accidents.

2. LITERATURE REVIEW

2.1 Leadership

Leadership may be considered as the process (act) of influencing the activities of an organised group in its efforts toward goal setting and goal achievement [1]. Empowerment behaviours referred to leader actions that emphasised the development of follower self-management or self-leadership skills [2]. Behaviours indicative of this leadership style had been primarily developmental or person-orientated. Definitions of the leadership constructs that were generated in Table 1.

2.2 Safety Climate

Dov Zohar performed the earliest empirical study examining “safety climate” in 1980. After the Chernobyl disaster of 1986, Zohar’s findings were introduced into the literature wherein the concepts of safety climate and safety culture were being used interchangeably [4].

Safety Climate has been defined as ‘the perceptions of employees about safety in their work area’ [5]. Dedobbler and Blend [6] had also defined safety climate as ‘perceptions of people about management actions regarding safety’.

The use of the term “climate” seemed to indicate a temporary or seasonal characteristic. Definition of safety climate from the Australian States of Queensland is the perceived value placed on safety in an organisation at a particular point in time. Therefore, it can be assumed that the thinking of safety climate as the “mood” of an

| Dimension                  | Indicator                                                                 |
|---------------------------|---------------------------------------------------------------------------|
| Leading by example        | 1. Sets high standards for performance by his/her own behaviour            |
|                           | 2. Works as hard as he/she can                                           |
| Participating in decision making | 3. Encourages work group members to express ideas/suggestions               |
|                           | 4. Listens to my workgroup's ideas and suggestions                         |
|                           | 5. Makes decisions that are based only on his/her own ideas               |
| Coaching                  | 6. Teaches workgroup members how to solve problems on their own           |
|                           | 7. Helps my workgroup focus on goals                                     |
|                           | 8. Suggests ways to improve my workgroup's performance                    |
| Informing                 | 9. Explains company goals                                                |
|                           | 10. Explains rules and expectations to my workgroup                      |
|                           | 11. Explains how my workgroup into the company                            |
| Showing concern/          | 12. Shows concern for workgroup members' well-being                       |
| interacting with employees | 13. Takes the time to discuss workgroup members’ concerns patiently       |
|                           | 14. Shows concern for workgroup members' success                          |

Source: Arnold, 2000 [3]
Table 2. Operationalisation of safety climate

| Dimension                              | Indicator                                                                 |
|----------------------------------------|---------------------------------------------------------------------------|
| Management safety commitment and ability| 1. Management places safety before production                             |
|                                        | 2. Management ensures that everyone receives the necessary information on safety |
|                                        | 3. Management encourages employees here to work in accordance with safety rules - even when the work schedule is tight |
| Management safety empowerment          | 4. Management strives to design safety routines that are meaningful and actually work |
|                                        | 5. Management encourages employees here to participate in decisions which affect their safety |
|                                        | 6. Management involves employees in decisions regarding safety             |
|                                        | 7. Management listens carefully to all who have been involved in an accident event |
| Management safety justice              | 8. Management looks for causes, not guilty persons when an accident occurs |
|                                        | 9. Management treats employees involved in an accident fairly              |
| Employees' commitment to safety        | 10. We who work here take joint responsibility to ensure that the workplace is always kept tidy |
| Employees' safety priority and absence of risk acceptance | 11. We who work here help each other to work safely |
|                                        | 12. We who work here regard risks as unavoidable                         |
|                                        | 13. We who work here consider minor accidents as a normal part of our daily work |
|                                        | 14. We who work here never accept risk-taking even if the work schedule is tight |
| Learning, communication and trust      | 15. We who work here learn from our experiences to prevent accidents       |
| Trust in the efficacy of safety systems| 16. We who work here can talk freely and openly about safety               |
|                                        | 17. We who work here consider that safety rounds/evaluations help find serious hazards |
|                                        | 18. We who work here consider that it is important that there are clear-cut goals for safety |

Source: Nordic Occupational safety climate questionnaire

organisation, based on what workers experience at a specific time. Since safety climate is snapshot of safety at one point in time, it can change quickly, on a daily or weekly basis.

2.3 Safety Culture

According to Zhang et al. [7] the definitions of safety culture is the enduring value and priority placed on worker and public safety by everyone in every group at every level of an organisation. It refers to the extent to which individuals and the group would commit to personal responsibility for safety.

On the opposite safety climate, the use of “culture” assumed the existence of an acquired and developed knowledge and in this way, implying some stability [8]. Safety culture is often described as the “personality” of an organisation, as it is a shared value of safety. Factsheet from the Australian state of Queensland stated the safety culture can take time to develop, sometimes even years, and can remain unchanged for a long time.

2.4 Safety Performance

Safety performance has often traditionally been measured using self-reported and/or officially recorded accident statistics. However, safety performance has been conceptualised as two types of safety behaviours: safety compliance and safety participation [9]. Safety compliance refers to the work activities that individuals need to carry out in order to establish workplace safety. These behaviours include adhering to standard work procedures and wearing personal protective equipment. Safety participation describes behaviours that do not directly contribute to an individual’s personal safety, but that helped to develop a work environment that supports the process safety. It includes activities such as participating in voluntary safety activities, helping coworkers with safety-related issues or attending safety meetings [10].
Table 3. Operationalisation of safety culture

| Dimension                          | Indicator                                                                 |
|------------------------------------|---------------------------------------------------------------------------|
| Managers’ prioritization of safety | 1. My supervisor sets a good example when it comes to safety at my workplace |
| safety communication               | 2. Management will follow up on actions from HSE-inspection and – meetings |
|                                    | 3. Our managers will take action if safety measures are not implemented within given deadlines 4.5 |
| Individual risk assessment         | 4. In our organisation, it is common to intervene if someone works in a hazardous way |
|                                    | 5. We show care for each other in our daily work                           |
|                                    | 6. At my workplace, work operations are always stopped if there are any doubts as to whether safety is ensured |
| Supportive environment and safety rules and procedures | 7. The principle that ‘we always have the time to work safely’ is lived up to at my workplace |
|                                    | 8. I always consider the risks involved before I carry out my work         |
|                                    | 9. At my workplace, operations that involve risk are carried out in compliance with rules and regulations |
|                                    | 10. Injuries and near misses are always reported in accordance with regulations |
|                                    | 11. At my workplace, deliberate breaches of rules and regulations will always be sanctioned |
|                                    | 12. When undesirable events happen at my workplace, measures will be taken to prevent similar incidents from happening in the future |
|                                    | 13. If I make a mistake, I can report it to management without fear of negative reactions |

Source: Antosen Stian, 2009

Table 4. Operationalisation of safety performance

| Dimension       | Indicator                                                                 |
|-----------------|---------------------------------------------------------------------------|
| Compliance      | 1. I use all the necessary safety equipment to do my job.                  |
|                 | 2. I use the correct safety procedures for carrying out my job.            |
| Participation   | 3. I put in extra effort to improve the safety of the workplace.           |
|                 | 4. I point out to management any safety related matters that I notice.     |
| Accident and injuries | 5. I assist others to make sure they perform their work safely.             |
|                 | 6. How many times have you exposed to a near miss incident of any kind at work? |
|                 | 7. How many times have you suffered from an accident/injuries, which require absence from work exceeding 3 consecutive days? |

Source: Pusilo, Christine L., 2013 and Hung, K.H., 2011

2.5 Leadership and Safety Climate

Previous studies have outlined a theoretical scheme leadership were effect the safety climate. One study tested the safety climate would mediate the relationship between leadership dimensions (or variables) and behaviour-dependent injury. The results indicated that safety climate mediated the leadership-injury and suggest complete mediation because transformational leadership had no significant effect when climate ‘preventive action’ included in the regression model, Dov Zohar [5]. The result from another study ‘Research on the relationship between safety leadership and safety climate in coalmines’ suggested that the active management of safety leadership positively affects safety training of safety climate, the safety motivation of safety leadership positively could affect the safety commitment and the safety involvement of safety climate, and the safety monitor of safety leadership positively affect the safety awareness of safety climate, DU Xuesheng and SUN Wenbiao (2012).

H₁: Leadership effect the safety climate
2.6 Leadership and Safety Culture

Leadership behaviour is an important factor in achieving safety performance, as well as research conducted by B. Künzle, Kolbe & Grote [11] that stated leadership behaviour is one reason to achieve organisational safety goals. The other research conducted by Yang et al. [12] stated that the leadership can improve safety performance through messages and precise communication in achieving safety goals, so it could be stated that leadership behaviour as important tool to improve safety performance that can be done through awareness or safety programs. Another research conducted by Mavis Andoh [13] on leadership style and safety performance with the research population of a gold mine in Ghana, obtained from the results of transformational leadership style had a higher correlation value to safety climate, compared with transactional leadership styles.

H₂:2 Leadership effect the safety culture

2.7 Leadership and Safety Performance

"Improving safety culture" the book title by Dominic Cooper [14] was explained to achieve a positive safety culture, needed several components including leadership, safety management systems, safety behaviour and safety climate. Effective leadership contributions in safety management are important as company operations, productivity and quality of goods/services. Two factors of extreme importance to effective leadership is caring and controlling. The caring behaviour refers to being concerned with: people well-being; assisting people when necessary; establishing a good rapport with subordinates, establishing good two-way communications by explaining things; being generally available. The controlling refers to the setting of targets; maintaining performance standards; clarifying people’s job-roles, expectation and responsibilities; motivating people to follow rules and procedure. The previous study conducted by Cravello, H.E., [15] stated the idealised aspects of leadership driving safety motivation and ultimately good results, which included the four aspects of transformational leadership. Specifically, idealised leaders were participative or led by example, were caring and showed concern for their employee’s well-being, celebrated successes (positive feedback), and for supervisors, communicated about the importance of safety as a priority.

2.8 Safety Climate and Safety Performance

Theoretically safety climate expected to have a positive relationship with safety performance. Previous research on the relationship of climate safety and safety performance by Griffin and Neal [9]. stated that safety climate has a significant influence on safety participation, but the climate of safety does not significantly affect safety compliance. Another research by Hon Ka Hung (2011) with the title "Relationships between climate safety and safety performance of repair, maintenance, minor alteration and addition (RMAA) Works" obtained the results safety climate has a positive effect on safety performance.

H₄: Safety climate effect safety performance

2.9 Safety Culture and Safety Performance

Queensland Workplace Health and Safety paper entitled "Understanding safety culture" [16], it is stated that strong leadership and management commitment positively impact safety performance. Results from previous research conducted by Latief Yusuf, et al. [17] stated safety cost (dimensions od safety climate), as the most significant dimension affecting the safety performance.

H₅: Safety culture effect safety performance

2.10 Research Methodology

This research was conducted at plastic packaging manufacturing with Production Department as the subject. The aim of this study was to analyse the effect of leadership to safety climate, safety culture and safety performance using a questionnaire as the instrument.

The instrument was divided into five parts: general information, leadership scale, safety climate scale, safety culture scale, and safety performance scale.

The safety climate and safety culture scale encompassed primarily items in 5-point Likert-type scales ranging from 1 (strongly disagree) to 5 (strongly agree); leadership and safety performance scale encompassed primarily items in 5-point Likert-type scales ranging from 1 (never) to 5 (always).
Referring to previous leadership measurement tools [3] the empowerment leadership questionnaire considering factors: lead by giving examples, participating in making decisions, conducting guidance, providing information, and showing attention.

The safety climate measurement tools from NORDIC consists 18-items questionnaire.

Instrument safety culture (Antosen Stian, 2009) was divided: managers’ prioritisation of safety, safety communication, individual risk assessment, supportive environment and safety rules & procedure.

Safety performance measurement constructed from previous research: compliance, participation, accident and injuries (Pusilo, Christine L., 2013 and Hung, K.H., 2011).

This research shall be quantitative research, data analysis using Structural Equation Modeling (SEM). Hair, et al. [18] identified the SEM analysis as a multivariate technique that combines multiple regression aspects and factor analysis to estimate interdependent relationships simultaneously.

The steps of processing and analysing data in SEM analysis according to Ferdinand (2002) were as follows:

1. Development of theoretical models
   In the step of developing a theoretical model, what must be done was to carry out a series of scientific explorations through literature review to obtain justification for the theoretical models to be developed.

2. Development of flowcharts (Path Diagram)
   In this second step, the theoretical model that had been built in the first stage would be depicted in a flow chart, which could make it easier to see the causal relationship that someone want to test. In the flow diagram, the relationship between constructs will be expressed through arrows. A straight arrow shows a causal relationship directly between one other construct. While the curved lines between constructs and arrows at each end showed a correlation between constructs which was built in a path diagram that could be divided into two groups, namely Exogenous constructs and Endogenous constructs

3. Convert flowcharts into equations
   The equation obtained from the converted flow diagram consists of:
   a. Structural equations were formulated to express causality between various constructs.
      \[
      \text{Variable endogen} = \text{variable eksogen} + \text{variable endogen} + \text{error}
      \]
   b. The measurement model must be a determined variable that measures the construct and determine a series of matrices that showed the correlation between constructs or variables.

4. Selecting the input and estimation matrices of the SEM model used input data that only used the variance/covariance matrix or correlation matrix for the overall estimation made.

5. The possibility of identification problems:
   The problem of identification in principle was about the inability of the model developed to produce unique estimates. If each time an estimate was made an identification problem arises, then the model should be reconsidered by developing more constructs.

6. Testing of the suitability of the model was carried out by examining various criteria goodness of fit.

7. The final step was to interpret the model and modify the model for models that did not meet the testing requirements.

3. RESULTS AND DISCUSSION
   The subjects of this study were employees of PT. Berlina Tbk Tangerang with 133 respondents working at all levels in the Production Department. Table 5 is the demographics of the study sample, shows that the sample was predominantly male (84%).

3.1 Measurement Model Analysis
   According to recommendations from Hair et al. [18] the appropriate observation variable is used as an operational construct or latent variable must have loading factor that is greater than 0.4, so that the model used has a good match, in addition to the t-value. The loading factor must be greater than the critical value ( > 1.96). Leadership, safety climate, safety culture and safety performance could be accepted or valid
because the factor loading value all had a good match (> 0.50).

Good reliability requirements that had reliability constructs (>0.60) and variance extracted (>0.50) [18]. Using the calculation all variables had met the reliability requirements, the value of construct reliability in leadership is 0.91; Safety Climate 0.9; Safety Culture 0.92; and Safety Performance 0.93. In the value of variance extracted, leadership was 0.50, Safety Climate 0.50, Safety Culture 0.50 and Safety Performance 0.93. The results of the validity factor and reliability construct showed all variables were valid and reliable.

3.2 Suitability Analysis of All Models

To see the goodness of fit model there were several criteria that could be used. The results of the analysis of the goodness of fit in this research model were depicted in Table 6.

Table 5. Demographic characteristic of the sample (N=133)

| Characteristic       | Classification       | Numbers | Percentage (%) |
|----------------------|----------------------|---------|-----------------|
| Gender               |  | Man       | 112   | 84%             |
|                      |  | Women     | 21    | 16%             |
| Age (years)          | 21-30                | 36      | 27%             |
|                      | >30                   | 97      | 73%             |
| Education Level      | High school          | 125     | 94%             |
|                      | Junior college       | 8       | 6%              |
|                      | Bachelor’s degree    | 0       | 0%              |
| Years Employed       | Fewer than three years | 23   | 17%             |
|                      | Three years or more  | 110     | 83%             |

Table 6. Goodness of fit

| Group | Indicator                 | Value       | Remarks     |
|-------|---------------------------|-------------|-------------|
| 1     | Degree of Freedom         | 984         | Good fit    |
|       | Chi- Square               | 2150.06     |             |
|       | NCP                       | 1118.35     |             |
|       | Confidence Interval       | 990.16; 1254.26 |          |
| 2     | RMSEA                     | 0.093       | Marginal fit|
|       | Confidence Interval       | 7.50; 9.50  |             |
|       | P-Value                   | 0.00        |             |
| 3     | ECVI Model                | 17.40       | Good fit    |
|       | ECVI Saturated            | 16.38       |             |
|       | ECVI Independence         | 182.24      |             |
|       | Confidence Interval       | 16.43; 18.43|             |
| 4     | AIC Model                 | 2296.35     | Good fit    |
|       | AIC Saturated             | 2162.00     |             |
|       | AIC Independence          | 24055.03    |             |
|       | CAIC Model                | 2673.72     |             |
|       | CAIC Saturated            | 6367.47     |             |
|       | CAIC Independence         | 24233.98    |             |
|       | GFI                       | 0.59        |             |
|       | AGFI                      | 0.55        |             |
|       | PGFI                      | 0.54        |             |
| 5     | NFI                       | 0.91        | Good fit    |
|       | CFI                       | 0.95        |             |
|       | NNFI                      | 0.95        |             |
|       | IFI                       | 0.95        |             |
|       | RFI                       | 0.91        |             |
|       | PNFI                      | 0.87        |             |
| 6     | Critical N                | 67.93       | Poor fit    |
| 7     | Standardised RMR          | 0.099       | Marginal fit|
|       | GFI                       | 0.59        |             |
|       | AGFI                      | 0.55        |             |
|       | PGFI                      | 0.54        |             |
The results of the goodness of fit indicate that the model tested in the research was a good fit. Chi-Square value: 2150.06. The smaller the value of the model, the more appropriate between the theoretical model and sample data (Chi-Square value divided by Degree of Freedom). The ideal value of good fit was <3, the results of the divider obtained a value of 2.18.

The result of Root Mean Square Error of Approximation test was 0.093, the match was a good fit. (Where RMSEA <0.05 was close fit, RMSEA <0.08 was good fit, RMSEA <0.10 marginal fit, and RMSEA > 0.10 poor-fit).

ECVI model (17.40) compared with the ECVI saturated model (16.38) and ECVI independence model (182.24). The ECVI model was slightly larger than the ECVI saturated model and the difference was far greater than the ECVI independence model, 90% confidence interval was 16.43;18.43 indicates a good match (around the ECVI model).

Test of Akaike Information Criterion (AIC) dan Consistent Akaike Information Criterion (CAIC): The AIC model (2296.35) was slightly larger than the AIC saturated model (2162.00) and the difference is far greater than the AIC independence model (24055.03), the smaller value indicated a good match. CAIC model (2673.72) was far from CAIC saturated model (6367.47) and further from CAIC independence (24233.98), the smaller value indicated a good match.

Test of fit index: normed fit index was 0.91 and CFI was 0.95 (>0.90) indicates good fit. Fit index testing with the Tucker-Lewis Index or Non Normed Fit Index (NNFI) = 0.95 (> 0.90) (above 0.90) indicated good fit. Critical N (CN) = 67.93 <200, the model did not represent the sample size of the data or marginal fit (> 200, the model represents the data size or good fit). The goodness of Fit Index (GFI) = 0.590 showed marginal fit, above 0.90 indicated good fit and Adjusted Goodness of Fit Index (AGFI) = 0.55 showed marginal fit, above 0.90 indicated goodness fit.

Based on the seven group test, all results showed ‘good fit’ including Chi-Square, ECVI, AIC and CAIC, Fit Index. There were results in the form of ‘marginal fit’ on the RMSEA and GFI; and results in the form of ‘poor fit’ on Critical N, it could be concluded that compatibility across the models meets the goodness of fit.

Furthermore, this study produced the path diagram as follows:

### 3.3 Testing of Hypotheses

In this study, there are 5 hypotheses that are tested and based on the test results as shown in Table 7.

In the first hypothesis, it was found that the results of the analysis support the hypothesis H₁₁, leadership had a significant effect on safety climate, because of the T-value of 7.52>19.6. With a significance level of α = 5%. This result means when leadership changed, caused significant to safety climate.

In testing the second hypothesis, it was found the results of the analysis supported the hypothesis H₁₂, leadership had a significant effect on safety culture with T-values of 8.90, it could be concluded that leadership had a significant effect on safety culture. This result means when leadership changed, caused significant to safety culture.

| Hypothesis | T-Value | Remarks |
|------------|---------|---------|
| H₁₁ | Leadership has a significant effect on Safety Climate | 7.52 | Data supported |
| H₁₂ | Leadership has a significant effect on Safety Culture | 8.90 | Data supported |
| H₁₃ | Leadership has a significant effect on Safety Performance | 4.30 | Data supported |
| H₁₄ | Safety Climate has a significant effect on Safety Performance | -5.70 | Data supported |
| H₁₅ | Safety Culture has a significant effect on Safety Performance | 4.19 | Data supported |
The testing of the third hypothesis found the results of the analysis support the hypothesis $H_3$, leadership had a significant effect on safety performance with a statistical value of t-test of 4.30, that result means when leadership changed, caused significant to safety performance. In testing the fourth hypothesis was found that the results of the analysis support the hypothesis $H_4$, safety climate had an effect on safety performance with a T-value of -5.70. It means when safety climate changed, caused significant to safety performance.
Testing the hypothesis H5, safety culture had an effect on safety performance with T-value of 4.19. This showed that the effect that occurred between the safety culture and safety performance was statistically significant at the 5% significance level. That means when safety culture changed to be more positive, caused significant to safety performance.
4. CONCLUSION AND SUGGESTION

Based on the results, research to 133 respondents regarding analysis influence of leadership to safety climate, safety culture and safety performance at PT. Berlina Tbk Tangerang conclusions could be drawn as follows:

1. Leadership has a partially significant effect on safety climate.
2. Leadership has a partially significant effect on safety culture.
3. Leadership has a partially significant effect on company safety performance.
4. Safety climate has a significant effect on safety performance.
5. Leadership, safety climate and safety culture simultaneously have a significant influence on safety performance by 83%.

Further research is needed to expand the scope of research, for example by using various divisions of the company, and needed to explore the effect of leadership, the role of the occupational safety and health practitioner or adviser to safety climate or culture and corporate safety performance.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Stogdill RM. Leadership, membership and organization. Psychological Bulletin. 1950;47:1-14.
2. Pearce CL, Sims Jr. HP, Cox JF, Ball G, Schnell E, Smith KA, et al. Transactors, transformers, and beyond. Journal of Management Development. 2003;22(4):273–308.
3. Arnold JA, Sharon Arad, Jonathan A. Rhoades, Fritz Dragsgow. The empowering leadership questionnaire: The construction and validation of a new scale for measuring leader behaviors. Journal of Organizational Behavior. 2000;21:249-269.
4. Clarke S. Safety climate in an automobile manufacturing plant: The effects of work environment, job communication and safety attitudes on accidents and unsafe behavior. Personnel Review. 2006;35(4):413-430.
5. Dov, Zohar. Safety climate in industrial organizations: Theoretical and applied implications. Journal of Applied Psychology. 1980;65(1):96-102.
6. Dedobler N, Blend. Safety climate measure of construction sites. Journal of Safety Research. 1991;22:97-103.
7. Zhang H, Weigmann DA, von Thaden TL, Sharma G, Mitchell AA. Safety culture: A concept of chaos? Proceedings of the 46th Annual Meeting of the Human Factors and Ergonomics Society. Human Factors and Ergonomics Society: Santa Monica; 2002.
8. Arezes MP, Sergio MA. The role of safety culture in safety performance measurement. Measuring Business Excellence. 2003;7(4):20.
9. Griffin MA, Neal A. Perceptions of safety at work: A framework for linking safety climate to safety performance, knowledge, and motivation. Journal of Occupational Health Psychology. 2000;5:347–358.
10. Griffin MA, Neal A. A study of the lagged relationships among safety climate, safety motivation, safety behavior and accident at the individual and group levels. Journal of Applied Psychology. 2006;91(4):946-953.
11. Künzle BB, Kolbe M, Grote G. Ensuring patient safety through effective leadership behavior: A literature review. Safety Science. 2010;48(1):1-17.
12. Yang Cheng-Chia, Yi-Shun Wang, Sue-Ting Chang, Suh-Er Guo, Mei-Fen Huang. A study on the leadership behavior, safety culture, and safety performance of the healthcare industry. World Academy of Science, Engineering and Technology. 2009;29.
13. Mavis, Andoh. The relationship between leadership style and safety climate: A case study of goldfields Ghana Limited, Tarkwa-Cil Plant. School of Management, Blekinge Institute of Technology; 2013.
14. Cooper, Dominic. Improving safety culture – A practical guide. Applied Behavioral Science; 2001.
15. Cravello HE. The role of leadership safety performance and results. Welden Dissertation and Doctoral Studies Collection. Welden University Scholar Work; 2011.
16. Workplace Health and Safety Queensland. Understanding safety culture. The State of Queensland. Department of Justice and Attorney-General; 2013.
17. Latief Yusuf, Rossy A. Machfudiyanto, Rosmariani A, Yoko Y. Understanding the relationship between safety culture dimensions and safety performance of construction projects through partial least square method. AIP Conference Proceedings 1818, 020028; 2017.

18. Hair et al. Multivariate data analysis. Seventh Edition. Pearson Prentice Hall; 2010.

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