



# Factors of Safety Culture and their Implication to Job Satisfaction in the Construction Industry

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## ABSTRACT

**Objective** - Human Resources Management has a significant role in a construction company. Also, a professional or competitive workforce facilitates a construction project, which has a high level of risk. Therefore, a well-developed work safety culture is required for risk management. This study determines the factors that influence Safety Culture, which is limited to leadership, communication, competence, and work environment, as well as their influence on job satisfaction in the Indonesian construction industry.

**Methodology/Technique** – A Total of 392 valid respondents out of 400 who answered the questionnaire were construction workers with one-year experience or more. Furthermore, the data were tested for validity and reliability using SPSS 25.0, and the hypothesis model was analyzed using the Amos 23.0 Structural Equation Model (SEM).

**Finding** – Statistical data showed leadership, competence, and the work environment are critical factors that affect safety culture, while communication does not. Also, work safety culture has a significant effect on job satisfaction level in the construction industry.

**Novelty** – Therefore, it is recommended to build a safety culture that pays attention to leadership, competence, as well as work environment, which have implications for job satisfaction.

**Type of Paper:** Empirical

**JEL Classification:** J28, J29.

**Keywords:** Safety Culture; Job Satisfaction; Construction Industry; SPSS; SEM Amos

**Reference** to this paper should be referred to as follows: Hutajulu, R.S; Susita, D; Usman, O; Eliyana, A. (2021). Factors of Safety Culture and their Implication to Job Satisfaction in the Construction Industry, *GATR Global J. Bus. Soc. Sci. Review*, 9(2), 174 – 181. [https://doi.org/10.35609/gjbssr.2021.9.2\(7\)](https://doi.org/10.35609/gjbssr.2021.9.2(7))

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## 1. Introduction

The Directorate General Secretary to Construction Development of Public Works and Housing (PUPR) ministry stated that the Indonesian construction sector is the largest contributor to work accidents by around 32%. This contrasts with the transportation sector of 9%, forestry 4% and mining 2% (Merdeka.com, 2018).

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\* Paper Info: Revised: March 27, 2021

Accepted: June 30, 2021

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Meanwhile, according to the Minister of Manpower, the high number of work accidents is caused by human factors, including less than optimal Safety Culture, such as weak competence, discipline, training, communication, and more (Okefinance.com, 2020). Previous studies have been conducted in many countries, but few were carried out on safety culture, particularly in Indonesia. Several of these studies have different viewpoints and variables, especially concerning human resources in the construction industry. Furthermore, other studies focus on occupational safety, employee job satisfaction, and project construction performance. This study examined 28 articles sourced from scientific journals indexed by Scopus as a theoretical reference. The articles were obtained by searching google scholar, with the keyword "Safety Culture in the Construction Industry". Machfudiyanto et al. (2018), Huang et al. (2018), Grill et al. (2017), and Usukhbayar et al. (2020) focused only on analyzing leadership influence on the safety culture of construction companies without considering other relevant variables. Also, Machfudiyanto et al. (2017), Aburumman et al. (2019), Guangdong et al. (2017), and Tengilimoglu et al. (2016) focused on analyzing the impact of communication on the safety culture. Furthermore, Loosemore et al. (2019), Gruden et al. (2018), Feng (2019), and Xiang et al. (2018) Loosemore et al. (2019) Tengilimoglu et al. (2016), Lyu et al. (2018), Newaz et al. (2018), and Wen et al. (2018) analyzed the relationship between the influence of work environment on construction companies with respect to safety culture variables. In addition, Cooper et al. (2019), Jaafar et al. (2018), and Xiang et al. (2018) analyzed the influence of work culture on job satisfaction related to communication.

This study further synthesizes four variables that simultaneously influence safety culture, which were not considered in previous literature. The variables, which include leadership, communication, competence, and work environment are measured by their influence on safety culture, as well as impact on job satisfaction. Therefore, this study aims to determine the similarities and differences in variables between previous literature, namely that no study simultaneously analyzes the effect of leadership, communication, competence, and work environment on safety culture, as well as their impact on job satisfaction. Furthermore, this study aims to ascertain a hypothetical model to be tested and obtain empirical results about the critical factors influencing safety culture as well as its effect on satisfaction. These results are helpful for academics and practitioners to reference safety culture models in the construction industry. Therefore, the original contribution of this study lies in a hypothetical model and a questionnaire which was adapted to the conditions of Indonesian work culture. Based on previous studies, the six relevant variables were adopted and adapted as the independent and dependent variables. The relationship between the variables is shown in Table 1. After adopting and adjusting the relationship between variables from previous studies, a new empirically tested hypothetical model was created for the factors influencing safety culture and its impact on job satisfaction in the construction industry:

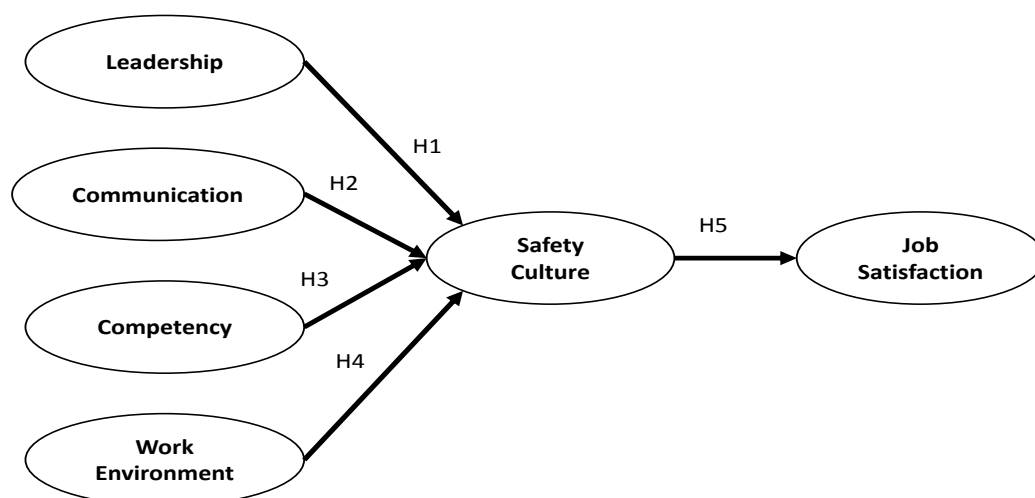


Figure 1. Hypothetical Model

- Hypothesis 1 (H1): Leadership influences work safety culture  
Hypothesis 2 (H2): Communication influences work safety culture  
Hypothesis 3 (H3): Competence affects work safety culture.  
Hypothesis 4 (H4): Work environment affects work safety culture.  
Hypothesis 5 (H5): Work safety culture affects job satisfaction.

## 2. Method

This study used a quantitative causal approach to measure the effect and significance of independent on the dependent variable. Furthermore, data collection was carried out through an online questionnaire to construction workers in Indonesia with at least one year working experience. Also, inferential statistical methods were used for data processing. Solomon (2002: 78) stated that the minimum sample for SEM Amos is 200 respondents or ten times the number of indicators. Therefore, the expected sample is possible with a minimum target of 250 valid respondents (10 times 25 indicators). Meanwhile, the number of respondents who completed the questionnaire within a waiting period of 30 days was 400 people, while 392 employees met the criteria. In addition, the questionnaires were received, and the data obtained were tested for validity and reliability using SPSS 25.0 software, while the hypothesis model was verified using SEM Amos 23.0.

### 2.1. Questionnaires

Assuming the respondents have at least one year of experience and are qualified in the construction industry (according to SKA LPJK, <https://lpjk.pu.go.id/>), they are justified to answer the questionnaire. The most effective way of surveying during the COVID-19 pandemic is by using social media to collect data from respondents who have internet or mobile access and Google Form application as a questionnaire format.

To measure the variables above, an identification code was created for each indicator, therefore, a 6-point Likert scale is measured as:

- 1 = Strongly Disagree
- 2 = Disagree
- 3 = Slightly Disagree
- 4 = Slightly Agree
- 5 = Agree
- 6 = Strongly Agree

### 2.2. Data Analysis

Bentler & Chou (1987) stated that the minimum sample size should be at least five respondents per indicator. In this study, there were a total of 36 indicators. Therefore, the minimum size should be 180 respondents. According to Solomon (2002: 78), the minimum for SEM Amos is 200 respondents or ten times the number of indicators. Hence, the expected sample is possible with a minimum target of 360 valid respondents (10 times 36 indicators). A total of 392 respondents in this study met the requirement, and satisfies the recommendation for SEM analysis as presented in Table 3:

## 3. Result

### 3.1. SPSS Test for Validity & Reliability Analysis

This study refers to Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) method (Coakes & Steed, 2009), which is used to conduct Explanatory Factor Analysis (EFA). The standard factor load should

be above 0.5, indicating that the construct validity has been achieved. Meanwhile, the average variance extract (AVE) of each variable is above 0.5, which is the minimum requirement for convergent validity (MacKenzie et al., 2011). Also, the coefficient of leadership, communication, competency, work environment, safety culture, and job satisfaction are very stable and reliable. The all-composite reliability scores and Cronbach's Alpha values of each variable exceeded 0.7, which indicates the data passed the reliability test according to Hair et al. (2010). Therefore, it is concluded that the indicator instrument passed validity and reliability test when the results reach the required standard value. The results of the validity and reliability tests on the instrument are shown in table 4.

### 3.2 CFA Test (Confirmatory Factor Analysis)

This study refers to Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) method (Coakes & Steed, 2009), which is used to conduct Explanatory Factor Analysis (EFA). The standard factor load should be above 0.5, indicating that the construct validity has been achieved. Meanwhile, the average variance extract (AVE) of each variable is above 0.5, which is the minimum requirement for convergent validity (MacKenzie et al., 2011). Also, the coefficient of leadership, communication, competency, work environment, safety culture, and job satisfaction are very stable and reliable. The all-composite reliability scores and Cronbach's Alpha values of each variable exceeded 0.7, which indicates the data passed the reliability test according to Hair et al. (2010). Therefore, it is concluded that the indicator instrument passed validity and reliability test when the results reach the required standard value. The results of the validity and reliability tests on the instrument are shown in table 4.

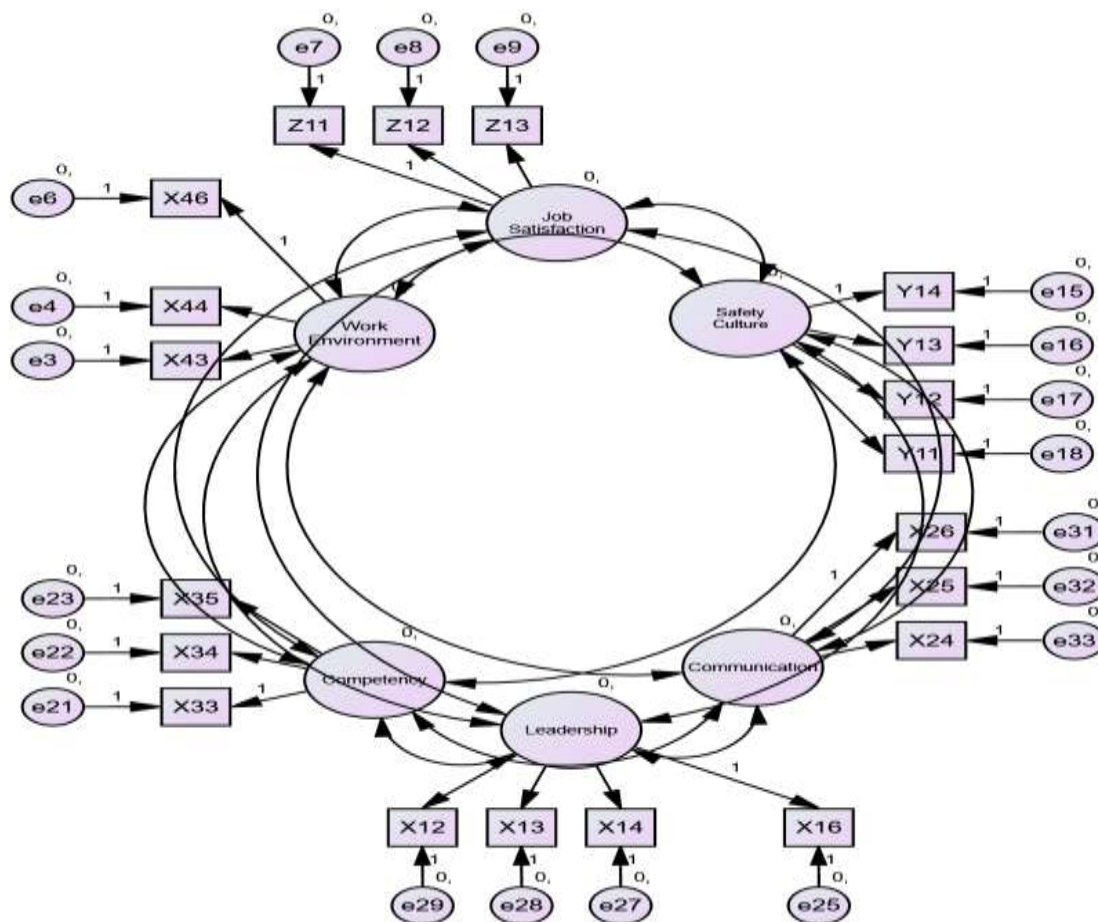


Figure 2. CFA Model Fit

The processed CFA with 20 items resulted in a model fit ( $P \geq 0.050$ ). Table 6 shows the CFA was adjusted to a fit model.

### 3.3. SEM (Structural Equation Modeling) Amos

After passing the confirmatory factor analysis, path analysis was subsequently conducted to test the hypothesis model. A model meets the fit criteria (the final structural model suitability index meets the fit) when  $CR \geq 1.98$ . Figure 3 shows the standard path coefficient of the final structural model, which is used to verify the previous hypothesis.

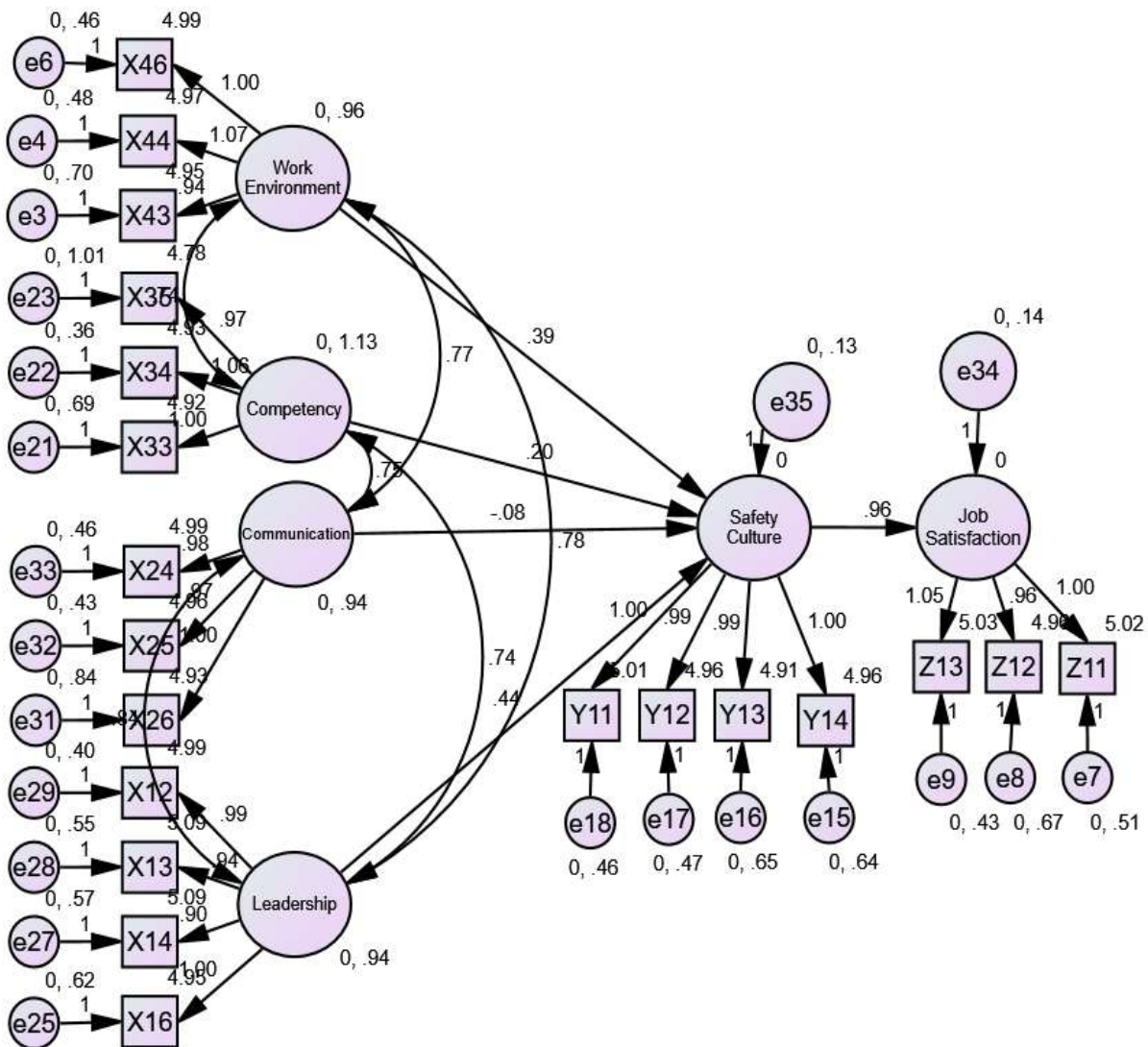


Figure 3. Final Structural Model

Table 7 shows 4 hypothesis tests resulted in significant and positive effects, while 1 hypothesis test was rejected. The significance is seen from both critical ratio (CR) and P-value. Therefore, the effect is significant when the critical ratio (CR value)  $> 1.96$  and  $P\text{-value} < 0.05$ . P-value \*\*\* means its significance equals  $P < 0.001$ . A further explanation of each path analysis is seen in the discussion section below:

H1 (CR = 4,095).

The analysis showed leadership significantly and positively affected job satisfaction.

H2 (CR = -0.794)

The analysis showed communication negatively and insignificantly affected safety culture.

H3 (CR = 4.090).

The analysis showed competency significantly and positively affected safety culture.

H4 (CR = 5.279).

The analysis showed work environment significantly and positively affected safety culture.

H5 (CR = 15.390).

The analysis showed safety culture significantly and positively affected job satisfaction.

#### 4. Discussion

This study showed the implications of safety culture factors, namely leadership, competence, and work environment on job satisfaction. The authors explained that communication does not significantly affect safety culture factors in the Indonesian construction industry. Furthermore, this study found a new model that strengthens and supports several previous literature such as Tengilimoglu et al., (2016), Grill et al., (2017), Huang et al., (2018), Gruden et al., (2018), Lyu et al., (2018), Newaz et al., (2018), Wen et al., (2018), Machfudiyanto et al., (2018), Feng (2019), Loosemore et al., (2019), and Usukhbayar et al., (2020), which stated that leadership, competence, and work environment are essential aspects for improving safety culture. It also supports the arguments of Grill et al., (2017), Wen et al., (2018), Lyu et al., (2018), Newaz et al., (2018), Huang et al., (2018), Machfudiyanto et al., (2018), Gruden et al., (2018), Feng, (2019), Loosemore et al., (2019), Tengilimoglu et al., (2016), and Usukhbayar et al., (2020), that essential aspects in improving safety culture are leadership, competence, and work environment. As expected, safety culture has a direct positive impact on job satisfaction, convincingly demonstrating that it needs to be enhanced through leadership, competence, and work environment. The results also support Cooper et al. (2019). In contrast to the empirical perceptions of Aburumman et al. (2019) and Guangdong et al. (2017), this paper showed the communication hypothesis affecting safety culture is rejected. In conclusion, safety culture increases with job satisfaction, therefore, factors related to leadership, competence, and the work environment should be continuously improved to enhance work culture and better job satisfaction. This will reduce the risk of work accidents and support construction industry development in Indonesia.

#### 5. Conclusion

This study stated some specific measures, such as strengthening effective leadership, improving abilities through training, and maintaining a more comfortable working environment. These suggestions should be made to the organization in the safety culture management and determined from the beginning of the project. Furthermore, this study contributes to the construction industry regarding management of work safety culture, especially the critical factors affecting job satisfaction in Indonesia. The implication of this study in the construction industry practice is a reference model for the management of safety culture to achieve job satisfaction, and appropriately considering factors of the project manager leadership, work environment, as well as employee competence (especially K3 training).

**Disclaimer:** The author stated that there was no conflict of interest in the process and results of this study.

#### Acknowledgments

Although this study makes new contributions to improving safety culture, there are some limitations. Therefore, due to the limitations of study variables, time, and funds, this paper only surveyed construction employees through an online questionnaire. Also, despite being a company representative, some critical

information may be missed. This limitation needs to be added with a larger data sample, sufficient time, and the development of variables for subsequent studies.

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