Global Scientific JOURNALS

GSJ: Volume 8, Issue 12, December 2020, Online: ISSN 2320-9186
www.globalscientificjournal.com

SAFETY CULTURE FACTORS AND THEIR IMPLICATION TO JOB SATISFACTION IN THE CONSTRUCTION INDUSTRY

Richard S. Hutajulu
Doctoral Management Program, Postgraduate Faculty, Jakarta State University,
Jakarta, Indonesia

Abstract

Human Resources has a very important role in a construction company because, absent a professional/competitive workforce, the company cannot perform its activities optimally even though all the necessary modern equipment is available. In Indonesia, construction projects have a high level of risk of work accidents, this can occur because the Work Safety Culture has not been well established. Among other things, because the project leader is still pursuing short-term financial performance or profit, the low-level of worker awareness of workplace safety. The construction industry is not only product-oriented like many other industries, but this industry is also processed-oriented and has enormous risks.

This study analyzes the factors of leadership, communication, competency, and work environment that influence work safety culture and their implications for job satisfaction in construction companies in Indonesia. A total of 392 valid respondents out of 400 who answered the questionnaire came from the construction industry in Indonesia with at least 1 year of work experience. The data were tested for validity and reliability with SPSS 25.0 software, and then the model was analyzed using Structural Equation Model (SEM) using AMOS 23.0 software. Based on statistical data processing, it was found that leadership, competence, and the work environment are critical factors that influence work safety culture, while communication does not affect the formation of a workplace safety culture. Work safety culture significantly affects the level of job satisfaction in the construction industry. For further research, the researchers suggest more specifically analyzing the communication factor deeper, namely why there is no positive influence on Work Safety Culture.

Keywords: safety culture; leadership; communication; competency; work environment; job satisfaction; validity and reliability test; structural equation model; construction industry

1. Introduction

Research on corporate culture has been carried out both in Indonesia and abroad. However, research on occupational safety culture is still not widely carried out, especially in Indonesia. Several previous studies have related and variable differences in researching human resources in the construction industry. Some are oriented towards work safety, some focus on employee job satisfaction and some researchers see construction project performance as an objective. Research conducted by Huang, et al, (2018), Grill, et al, (2017), Machfudiyanto et al., (2018), and Usukhbayar, et al., (2020), analyzed the influence of leadership on work safety culture in a construction firm, and not related to other variables.

Research conducted by Aburumman et al., (2019), Guangdong, et al, (2017), Machfudiyanto et al., (2017), and Tengilimoglu, et al, (2016), analyzed the influence of communication on the culture of safety at work. -construction company, and not related to other variables. Research conducted by Gruden, et al, (2018), Feng, (2019), Loosemore, et al, (2019), and Xiang, et al., (2018), analyzed the influence of competence on work safety culture in construction companies, and not related to other variables. Research conducted by Lyu, et al, (2018), Newaz et al., (2018), Tengilimoglu, et al, (2016), and Wen et al., (2018), analyzed the influence of the work environment on work safety culture in the construction company, and not related to other variables. Meanwhile, research conducted by Cooper et al., (2019), Jaafar et al., (2018), and Xiang, et al, (2018), analyzed the influence of work culture on job satisfaction in construction companies and is not related to other variables.

Based on these previous studies, the researcher synthesized the similarities and differences in variables between previous studies, namely that no study analyzed the effect of 4 variables simultaneously (leadership, communication, competence, and work environment), on work safety culture and its implications for job satisfaction in construction companies.The aim of this research is:

1. Analyzing the influence of leadership on work safety culture.
2. Analyzing the influence of communication on work safety culture.
3. Analyzing the influence of competence on work safety culture.
4. Analyze the influence of the work environment on work safety culture.
5. Analyzing the effect of work safety culture on job satisfaction.

This research examines as many as 28 previous research articles from scientific journals indexed by Scopus, which are obtained from google scholar, with the keywords Safety Culture in Construction Industry. Based on the research journal article, 10 variables are interrelated and have differences and similarities between previous researchers. Of the 10 variables, 6 variables were selected in this study, to analyze the relationship and its influence empirically.

The variables selected from previous research sources were adapted as independent variables and the dependent variable in this study, and then the following table was made:

Table 1. Adaptation of variables from previous research

Independent Variable		Dependent Variable	Researchers
Leadership	→	Safety Culture	Huang, et al, (2018), Grill, et al, (2017), Machfudiyanto et al, (2018), Usukhbayar, et al, (2020)
Communication	→	Safety Culture	Aburumman et al, (2019), Guangdong, et al, (2017), Machfudiyanto et al, (2017), Tengilimoglu, et al, (2016)
Competency	→	Safety Culture	Gruden, et al, (2018), Feng, (2019), Machfudiyanto et al, (2019), Loosemore, et al, (2019)
Work Environment	→	Safety Culture	Lyu,et al, (2018), Newaz et al, (2018), Tengilimoglu, et al, (2016), Wen et al, (2018)
Safety Culture	→	Job Satisfaction	Cooper et al, (2019), Jaafar et al, (2018), Xiang, et al, (2018), Wen, et al, (2019)

The variables adapted from previous research are as follows:

Independent Variable:
- ✓ Leadership
- ✓ Communication
- ✓ Competency
- ✓ Work Environment

Dependent Variable:
- ✓ Safety Culture
- ✓ Job Satisfaction

After determining these 6 variables, a model hypothesis can be made in this study, namely:

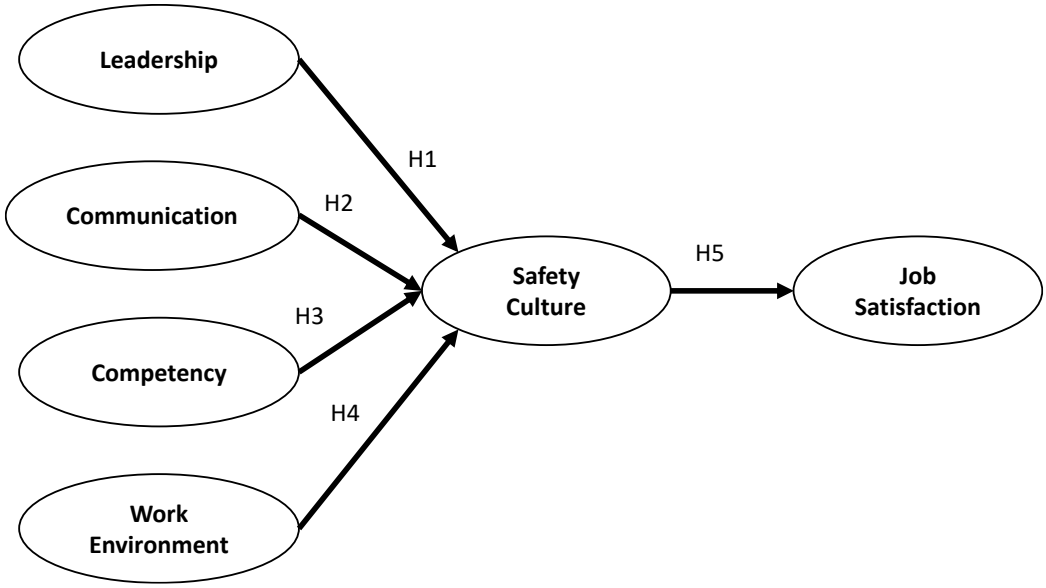


Figure 1. Hypothetical Model for Safety Culture Factors

- 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 the job satisfaction

2. Method

2.1. Questionnaires

To measure the variables in this study, indicators were selected from previous studies, which were then adapted to suit them. This study used six subscales for each variable, which is shown in table 2.

Table 2. Measurement Scales of Six Study Variables

Leadership		Communication		Competency		Work Environment		Safety Culture		Job Satisfaction	
Huang, et al, (2018, p.360)		Guangdong, et al, (2017, p.1474)		Loosemore, et al, (2019, p.237)		Lyu, et al, (2018, p.12)		Xiang, et al, (2018, p.5)		Wen, et al, (2019, p.15-16)	
I feel comfortable discussing safety issues with my supervisor.	X11	The frequency of communication with other team is very high, and the effects is also very good	X21	Do you feel that safety training courses are necessary?	X31	Sufficient resources are available for health and safety here	X41	I use safe equipment to do my job	Y11	Effectively capable of problem-solving in the work.	Z11
I feel that my supervisor openly accepts ideas for improving safety.	X12	Team members can adopt a simple and feasible evaluation in the process of communication	X22	Do you agree that completing a safety training course will make you competent?	X32	There are always enough people available to get the job done according to the health and safety procedures	X42	I use the correct procedure to finish the job	Y12	Good feeling of a current job, and confident in the future prospects of work	Z12
Safety information is always brought to my attention by my supervisor.	X13	Information platform provides adequate access to make everyone get the required knowledge	X23	If you knew something was unsafe but it meant getting the job done, would you still do it?	X33	Staff are praised for completing jobs are reasonable	X43	Try to be as safe as possible in my job	Y13	Done beyond the actual job requirements.	Z13
My supervisor does not always inform me of current concerns and issues	X14	The team can take effective methods in communication, such as charts, tables, lists, etc.	X24	Do you personally feel that you need to attend a safety course each time you work on a new site?	X34	There is good preparedness for emergency here	X44	I take part in additional activities to improve workplace safety.	Y14	High personal happiness from work	Z14
I am reluctant to discuss safety-related problems with my supervisor.	X15	The team can abide by integrity and do not deceive each other in the process of communication	X25	Would you pay for a safety training course if it meant improving your personal safety?	X35	The company encourages suggestions on how to improve health and safety	X45	I volunteered to take part in activities to improve workplace safety	Y15	Strong sense of accomplishment	Z15
I try to avoid talking about safety issues with my supervisor.	X16	The team respect each other's feelings in the process of communication what is expected	X26	Would you feel more safe working with someone who has completed an accredited safety course?	X36	My immediate boss often talks to me about health and safety matters on site	X46	I volunteered to raise the security level of the organization	Y16	Full of confidence in the future work due to continuously improved regulatory system and mechanism	Z16

As a measuring tool for the variables above, an identification code is made for each indicator, and it is measured by a 6-point Likert scale, namely:
1 = Strongly Disagree
2 = Disagree
3 = Slightly Disagree
4 = Slightly Agree
5 = Agree
6 = Strongly Agree

2.2. Data Analysis

In total 400 participants responded to the survey, 392 valid questionnaires (total effective rate of 98%).

Table 3. Respondent Characteristics

Description		No. of respondent	Percentage (%)
Work experience	1 - 5 Years	159	40.6
	6 - 10 Years	99	25.3
	11 - 15 Years	93	23.7
	> 15 Years	41	10.5
	Total	392	100
Gender	Male	356	90.8
	Female	36	9.2
	Total	392	100
Age	17 - 25 Years	109	27.8
	26 - 35 Years	66	16.8
	36 - 45 Years	190	48.5
	> 45 Years	27	6.9
	Total	392	100
Last education	Primary School	17	4.3
	Junior High School	30	7.7
	Senior High School	176	44.9
	Diploma / Bachelor degree	97	24.7
	Masters / Ph.D	72	18.4
	Total	392	100

To ensure that the questionnaire was applied to this study, reliability analysis and validity analysis were conducted using SPSS 25.0. Then the methods of structural equation modeling (SEM) were chosen to analyze the data. The type of data analysis has been widely applied in various fields (Su and Yang, 2010). Compared with other methods, the greatest advantage of SEM is the ability to simultaneously measure the relationship between potential variables in the case of errors (Hair, 2006). Thus, the hypothesis of the relationships between the six variables was verified by using the computer program AMOS 23.0 to estimate path coefficients. Before this, a measurement model of six variables was assessed by Confirmatory Factor Analysis (CFA), and some items with low factor loading were deleted (Bandalos, 2002).

3. Results

3.1. Validity & Reliability Analysis

The results of validity and reliability analysis are shown in table 4.

Table 4. Result of Validity & Reliability Analysis

Variable	Indicator	Validity Value	Reliability Value
Leadership	X11	0.870	0.906
	X12	0.851	
	X13	0.835	
	X14	0.807	
	X15	0.766	
	X16	0.819	
Communication	X21	0.776	0.876
	X22	0.803	
	X23	0.808	
	X24	0.768	
	X25	0.807	
	X26	0.760	
Competency	X31	0.755	0.875
	X32	0.788	
	X33	0.799	
	X34	0.849	
	X35	0.752	
	X36	0.771	
Work Environment	X41	0.762	0.897
	X42	0.807	
	X43	0.808	
	X44	0.850	
	X45	0.805	
	X46	0.841	
Safety Culture	Y11	0.831	0.912
	Y12	0.836	
	Y13	0.827	
	Y14	0.813	
	Y15	0.871	
	Y16	0.827	
Job Satisfaction	Z11	0.844	0.912
	Z12	0.805	
	Z13	0.856	
	Z14	0.849	
	Z15	0.823	
	Z16	0.830	

The Cronbach's alpha reliability value (used SPSS 25.0) for most items had a coefficient of greater than 0.7. Although the coefficient of leadership, communication, competency, work environment, safety culture, and job satisfaction are very stable and reliable for the study. Validity Value is greater than 0.5, which implied the data were well suited for factor analysis.

3.2. Confirmatory Factor Analysis

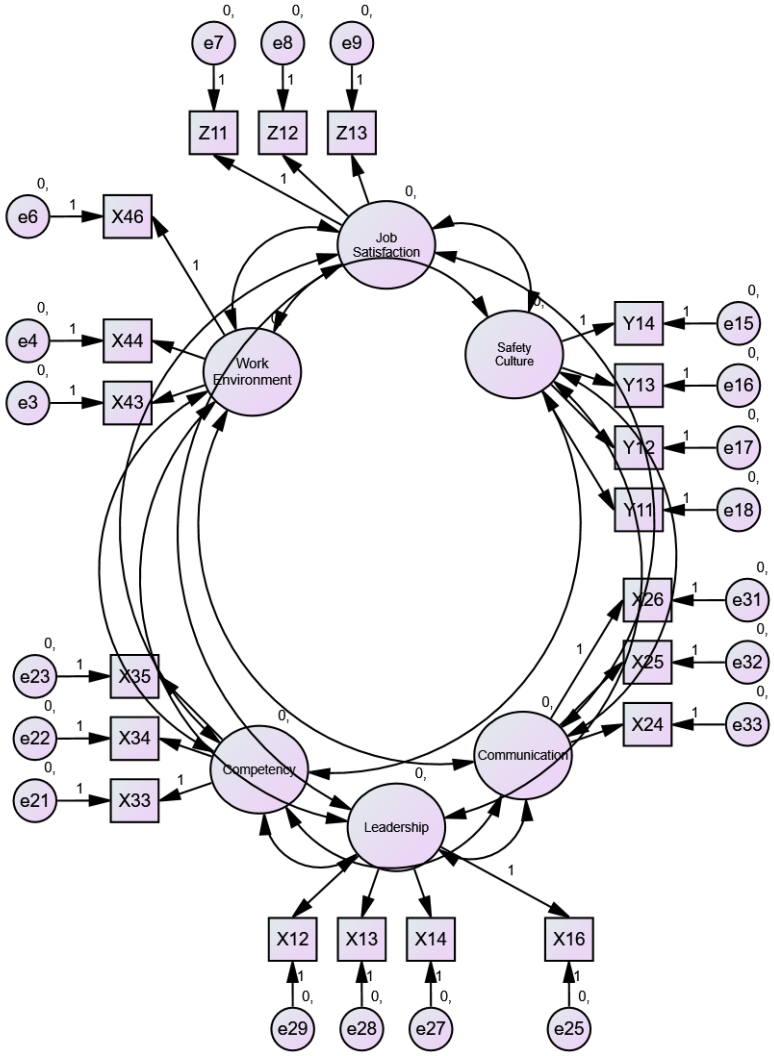
CFA is a measurement model part of SEM and is mainly used to test whether the structure of the scale fits the actual data (Spicer, 2005). Initially, the measurement model in which the six variables were connected with double-headed arrows was completed used AMOS 23.0. However, table 5 shows that the fit indexes of the model were unreasonable. Therefore, some items with low factor loadings were deleted (Hsu et al, 2012).

Table 5. CFA - Initial Model (36 Items)

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	123	1454,170	579	,000	2,512
Saturated model	702	,000	0		
Independence model	72	11428,656	630	,000	18,141

To get a fit model, the initial indicators were 36 items totaling 16 items, namely X11, X15, X21, X22, X23, X31, X32, X36, X41, X42, X45, Y15, Y16, Z14, Z15, and Z16, so the total indicators to 20 items, as shown in Figure 2.

Figure 2. The goodness of Fit CFA Model



Then, the CFA model with 19 items was retested and yielded a suitable fit (P ≥ 0.050). Table 6 describes the CFA model was adjusted to a fit model

Table 6. CFA - Model Fit (20 Items)

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	75	185,008	155	,050	1,194
Saturated model	230	,000	0		
Independence model	40	5267,145	190	,000	27,722

3.3. SEM and Hypothesis Testing

Based on the previous hypothesis, the initial structural model with a null correlation among errors was tested using maximum likelihood (ML). The fit index of the final structural model satisfied conformity (CR ≥ 1.98), Figure 3 shows the standardized path coefficients of the final structural model, which was used to verify the previous hypothesis.

Figure 3. Standardized path coefficients of the final structural model

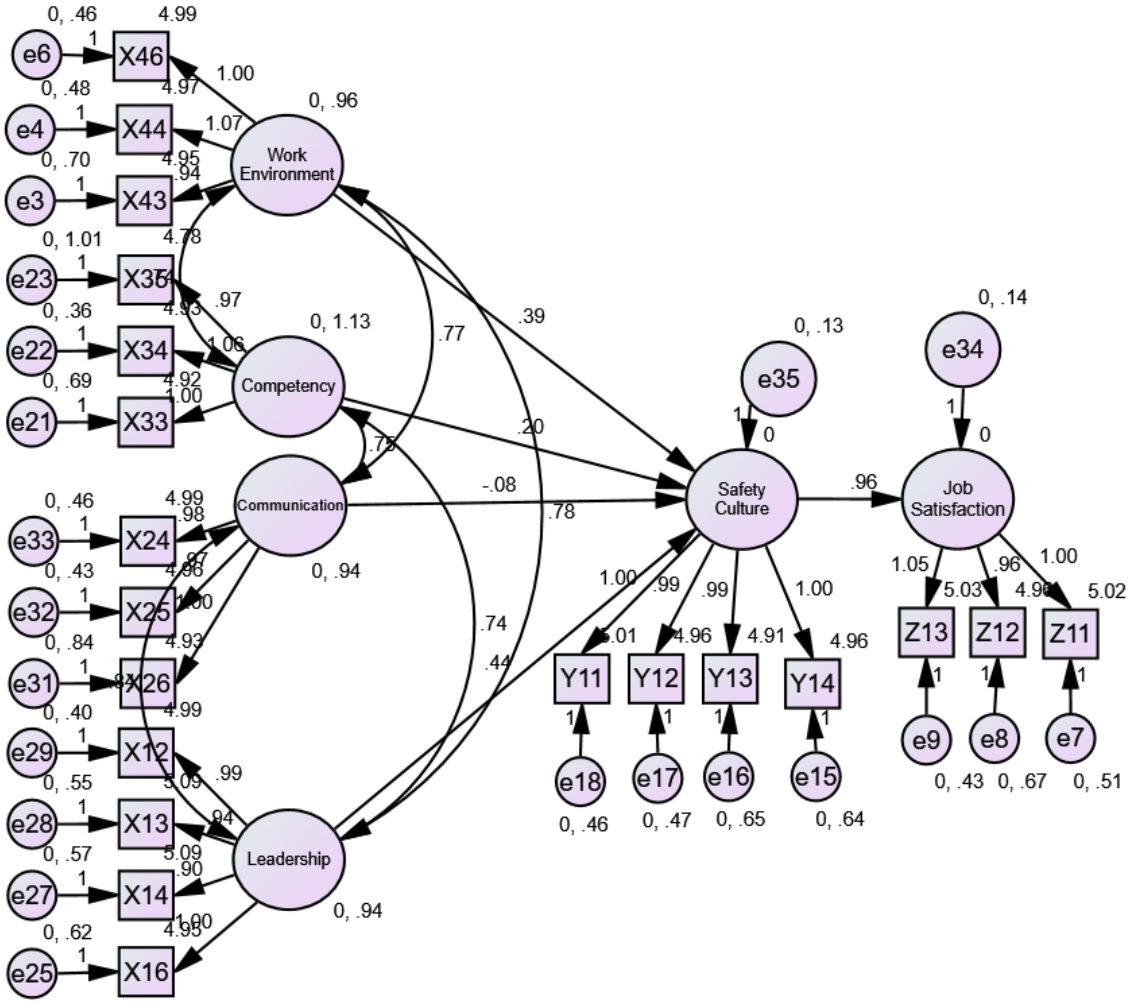


Table 7. Critical Ratio (CR) among the six dimensions

Hypothesis			Estimate	SE	CR (≥ 1.98)	P	Final Result
Safety Culture	<---	Leadership	.437	.107	4,095	***	Accepted
Safety Culture	<---	Communication	-.084	.106	-794	.427	Rejected
Safety Culture	<---	Competency	.201	.049	4,090	***	Accepted
Safety Culture	<---	Work Environment	.393	.074	5,279	***	Accepted
Job Satisfaction	<---	Safety Culture	.961	.062	15,390	***	Accepted

H1 was supported. Leadership was found to have a direct positive effect on Safety Culture (CR = 4,095).
H2was rejected. It is not a significant hypothesis, Communication was not directly positively related to Safety Culture (CR = -0.794).
H3 was supported. Competency was found to have a direct positive effect on Safety Culture (CR = 4,090).
H4 was supported. Work Environment was found to have a direct positive effect on Safety Culture (CR = 5.279).
H5 was supported. Safety Culture was found to have a direct positive effect on Job Satisfaction (CR = 15.390).

4. Discussion

In this research, the authors contribute to explaining of Safety Culture Factors and their implication to Job Satisfaction in the Indonesia Construction Industry. This includes Leadership, Communication, Competency, and Work Environment.
These results support the arguments of other researchers (Huang, et al, 2018; Grill, et al, 2017; Machfudiyanto et al, 2018; Usukhbayar, et al, 2020; Gruden, et al, 2018; Feng, 2019; Loosemore, et al. al, 2019; Lyu, et al, 2018; Newaz et al, 2018; Tengilimoglu, et al, 2016; Wen et al, 2018), that a vital aspect of improving safety culture is Leadership, Competency, and Work Environment.

As expected, Safety Culture had a direct positive impact on Job Satisfaction, which conclusively demonstrated that the safety culture needs to be improved through Leadership, Competency, and Work Environment. This finding also confirmed the conclusion of Cooper et al, (2019). In contrast to empirical perceptions of Aburumman et al, (2019) and Guangdong, et al, (2017), this paper found that the hypothesis of Communication affecting Safety Culture directly was rejected.

Finally, the formation of a good safety culture, especially those related to leadership, competence, and the work environment must be continuously improved, so that job satisfaction is better and the construction industry is growing.

5. Limitation

Although our research makes new contributions to improving safety culture, there are also some limitations. On the one hand, due to limited time and funds, this paper only surveys construction employees in Indonesia, through an online questionnaire. Although a very strong representative, some important information may have been missed. Furthermore,
The article does not differentiate between gender and age, but limits work experience to at least 1 year. This limitation needs to be supplemented by a larger sample of data.

6. Conclution

This paper aims to analyze the influence of leadership, communication competence, and work environment in building a safety culture in Indonesia's construction industry. The last model verifies The direct, indirect, and total effects of the six variables, including leadership, competence, and work environment have positive effects on safety culture. That mediating effect on job satisfaction.

These papers can help managers, inspectors and employees better understand their responsibility to promote a safety culture. Specific actions, such as promoting effective leadership, increasing competence through training, maintaining a more comfortable work environment, are proposed for organizations whose safety culture is established at an early stage. We hope that this study provides a new perspective for the construction industry and other high-risk processes industry in Indonesia so that job satisfaction increases, productivity will also increase.

Reference

Aburumman, MN, et al, (2019). Evaluating the effectiveness of workplace interventions in improving safety culture: A systematic review. Safety science, 115, 376-392.

Bavafa, AM, et al, (2018). Identifying and assessing the critical factors for effective implementation of safety programs in construction projects. Safety science, 106, 47-56.

Boamah, SA, et al, (2018). Effect of transformational leadership on job satisfaction and patient safety outcomes. Nursing outlook, 66 (2), 180-189.

Choudhry, RM, et al, (2007). Developing a model of construction safety culture. Journal of management in engineering, 23 (4), 207-212.

Choudhry, RM (2017). Achieving safety and productivity in construction projects. Journal of Civil Engineering and Management, 23 (2), 311-318.

Cooper, MD, et al, (2019). Criterion-related validity of the cultural web when assessing safety culture. Safety science, 111, 49-66.

Bandalos, Deborah L. "The effects of item parceling on goodness-of-fit and parameter estimate bias in structural equation modeling." Structural Equation Modeling 9.1 (2002): 78-102.

Feng, Y., et al, (2019). Developing Resilient Safety Culture for Construction Projects. Journal of Construction Engineering and Management, 145 (11), 04019069.

Grill, MP, et al, (2017). Safety leadership at construction sites: the importance of rule-oriented and participative leadership. Scandinavian journal of work, environment & health, 375-384.

Gruden, N., et al, (2018). The influence of behavioral competencies on project performance. Project Management Journal, 49 (3), 98-109.

Guo, BH, et al, (2018). A system dynamics view of a behavior-based safety program in the construction industry. Safety science, 104, 202-215.

Gurcanli, GE, et al, (2015). Activity based risk assessment and safety cost estimation for residential building construction projects. Safety Science, 80, 1-12.

Hair, JF, Black, WC, Babin, BJ, Anderson, RE, & Tatham, RL (2006). Multivariate data analysis (Vol. 6): Pearson Prentice Hall Upper Saddle River.

Hsu, IY, Su, TS, Kao, CS, Shu, YL, Lin, PR, & Tseng, JM (2012). Analysis of business safety performance by structural equation models. Safety Science, 50 (1), 1-11.

Jaafar, MH, et al, (2018). Occupational safety and health management in the construction industry: a review. International Journal of Occupational Safety and Ergonomics, 24 (4), 493-506.

Loosemore, M., et al, (2019). Safety training and positive safety attitude formation in the Australian construction industry. Safety science, 113, 233-243.

Lyu, SH, et al, (2018). Relationships among safety climate, safety behavior, and safety outcomes for ethnic minority construction workers. International journal of environmental research and public health, 15 (3), 484.

Machfudiyanto, RA, et al, (2017). A conceptual framework for the development of construction safety culture in Indonesia. In IOP Conference Series: Earth and Environmental Science (Vol. 109, No.1, p. 012025)., 012025.

Machfudiyanto, RA, et al, (2018). Improvement of policies and institutions in developing safety culture in the construction industry to improve the maturity level, safety performance and project performance in Indonesia. International Journal of Civil Engineering and Technology, 9 (10), 1022-1032.

Machfudiyanto, RA, et al, (2019). Critical Success Factors to Improve Safety Culture on Construction Projects in Indonesia. In IOP Conference Series: Earth and Environmental Science (Vol. 258), 012016.

Mohammadfam, IK, et al, (2017). Evaluation of the quality of occupational health and safety management systems based on key performance indicators in certified organizations. Safety and health at work, 8 (2), 156-161.

Newaz, MT, et al, (2018). Developing a safety climate factor model in construction research and practice. Engineering, construction and architectural management, 738-757.

Pancasila, IH, et al, (2020). Effects of work motivation and leadership toward work satisfaction and employee performance: Evidence from Indonesia. The Journal of Asian Finance, Economics, and Business, 7 (6), 387-397.

Prayitno, D., et al, (2010). Understanding of Statistical Data Analysis with SPSS. In Y. MediaKom.

Qing, MA, et al, (2019). Exploring the impact of ethical leadership on job satisfaction and organizational commitment in public sector organizations: The mediating role of psychological empowerment. Review of Managerial Science, 1-28.

Su, YF, & Yang, C. (2010). A structural equation model for analyzing the impact of ERP on SCM. Expert Systems with Applications, 37 (1), 456-469.

Swuste, PT, et al, (2016). Process safety indicators, a review of literature. Journal of Loss Prevention in the Process Industries, 40, 162-173.

Tengilimoglu, DC, et al, (2016). The effect of safety culture on safety performance: Intermediary role of job satisfaction. Journal of Economics, Management and Trade, 1-12.

Trinh, MT, et al, (2018). Conceptual model for developing resilient safety culture in the construction environment. Journal of Construction Engineering and Management, 144 (7), 06018003.

Usukhbayar, R., et al, (2020). Critical safety factors influencing on the safety performance of construction projects in Mongolia. Journal of Asian Architecture and Building Engineering, 1-13.

Wen Lim, H. L, et al, (2018). Impact of safety climate on types of safety motivation and performance: multigroup invariance analysis. Journal of Management in Engineering, 34 (3), 04018002.

Wen, X., Gu, L., et al, (2019). Job satisfaction and job engagement: Empirical evidence from food safety regulators in Guangdong, China. Journal of Cleaner Production, 208, 999-1008.

Wu, GL, et al, (2017). Investigating the relationship between communication-conflict interaction and project success among construction project teams. International Journal of Project Management, 35 (8), 1466-1482.

Wu, XL, et al, (2018). Development of construction workers job stress scale to study and the relationship between job stress and safety behavior: An empirical study in Beijing. International journal of environmental research and public health, 15 (11), 2049.

Yiu, NS, et al, (2018). Implementation of safety management systems in Hong Kong construction industry – A safety practitioner's perspective. Journal of safety research, 64, 1-9.