Enhancing Safety Culture in Vocational Education: Insights from Industrial Workshops

Muhammad Sayuti[1], Harry Agus Susanto[2,3], Noviatun Hasanah[4], Muhammad Kunta Biddinika[1], Wadiyo[5], Ariati Dina Puspitasari[6], Meshack Opwora[7], Arasinah Kamis[8], Na'ilir Rokhmah[1,9]

[1]Faculty of Teacher Training and Education, Universitas Ahmad Dahlan, Indonesia
[2]Vocational High School Muhammadiyah Imogiri, Yogyakarta, Indonesia
[3]Technological and Vocational Education, Universitas Negeri Yogyakarta, Indonesia
[4]Vocational High School Muhammadiyah Bangunjiwo Kasihan, Bantul, Indonesia
[5]Vocational High School Muhammadiyah 1 Playen, Gunungkidul, Indonesia
[6]Department of Physics Education, Universitas of Ahmad Dahlan, Yogyakarta, Indonesia
[7]State Department of Technical and Vocational Education and Training, Ministry of Education, Kenya
[8]Faculty of Technical & Vocational, Universiti Pendidikan Sultan Idris, Malaysia
[9]Vocational High School (SMK) Muhammadiyah Lumajang, Lumajang, Indonesia

Abstract

This study analyzes the condition of industrial workshops related to Occupational Safety and Health (K3) equipment and workshop regulations according to supervisors' and industrial instructors' views. The availability of K3 equipment and workshop rule standards are considered important due to the development of students' industrial cultural character toward fostering job readiness. The results show the K3 culture in the *Prakerin* industry tends to be positive. It is found the necessity to focus on commitment and management style as the key to improving safety culture. Although K3 document is considered sufficient, workers' and students' response vary in K3 culture of *Prakerin*. This indicates the need for improving understanding of safety in *Prakerin*. Based on the F-test, the availability of documents and worker culture simultaneously affect the student's K3 culture. Although the t-test shows that work safety documents have no significant effect, worker safety culture has a very significant influence on student work safety culture. It concludes that the adoption of K3 culture by workers in industry influenced the K3 culture of *Prakerin* students. This study recommends to exploring influence of industrial environment on student character by evaluating various industry, for understanding student' character building and job readiness of vocational graduates.

Keywords: field practice, industrial practice, occupational health and safety, partner workshop, vocational high school

✉*Corresponding Authors:*
Muhammad Sayuti, Faculty of Teacher Training and Education, Universitas Ahmad Dahlan, Indonesia
Email: muhammad.sayuti@mpgv.uad.ac.id

1. Introduction

The majority of industrial workers in Indonesia are middle-level workers. Vocational High School (SMK) is an educational institution that produces workers/technicians at the secondary level (Basori, 2019). The gap between employment and education is still huge, as

highlighted in research on the importance of link and match between education and industry (Ali, Mardapi, & Koehler, 2020). SMK as an educational institution that aims to produce job-ready graduates, is faced with the reality of a large unemployment rate (Mukhlason, Winanti, & Yundra, 2020). Until 2022, there are 10,573 vocational schools with private status and 3,693 schools with state status, this number is certainly also in line with the very large number of vocational students, namely 1,741,955 students (Pusdatin-Kemdikbudristek, 2023; Evidiasari et al., 2019).

Many aspects need to be improved by the school, one of which is the application of industrial work practices (*Prakerin*) (Iktiari & Purnami, 2019). *Prakerin* seeks to overcome the gap that occurs between the world of education and the world of work. *Prakerin* can improve hard skills and soft skills (Amalia, 2022; Savi, 2019), as well as providing real work experience to enhance students' competence and potential (Lestari & Hayati, 2019; Zulatama, Ambiyar, Sukardi, & Devega, 2022) and provide opportunities for students to actively engage in learning activities with a personalized approach (Dewey, 2004; Hamalik, 2011; Arung et al., 2023) . *Prakerin* as a form of cooperation between SMK and industry that has been carried out by the school by giving confidence in industry to guide students to achieve competence in accordance with the curriculum (Rahmawati & Patrikha, 2022). This *Prakerin* has many benefits that can be felt by students, such as increasing student job readiness (Husnita & Suparno, 2020), and improving professional attitude (Septiana, 2023). *Prakerin*'s activities can also provide insight to students about the importance of Occupational Safety and Health (K3) in reducing accidents and improving work efficiency (Cahyawati et al.,

2023). Education is seen as a cross-sectoral strategy in realizing a culture of safety for the next generation, through strengthening skills and expanding knowledge (Kavouras, Vardopoulos, Mitoula, Zorpas, & Kaldis, 2022). Mastery of skills and knowledge about K3 is a crucial factor in supporting the smooth production process in the industrial sector (Basori, 2019; Latif, Situngkir, Nugraha, & Yusuf, 2022) and the importance of K3 education is increasingly urgent along with the rapid growth of society, technological developments, and changes in demographic structure (Reinhold, Siirak, & Tint, 2014) so that the K3 aspect becomes the main focus in the 21st-century era (Abdullah, Abd Aziz, Abdullah, Isa, & Othman, 2021).

K3 is an element that cannot be separated from the company in work activities (Vranješ & Todić, 2019). Duryan, Smyth, Roberts, Rowlinson, and Sherratt (2020) Fostering a positive safety culture encourages the transfer of good practice learning. More and more companies are prioritizing safety, considering it a fundamental aspect (Bisbey et al., 2021; Chavez, Yu, Jajja, Song, & Nakara, 2022; Shad, Lai, Fatt, Klemeš, & Bokhari, 2019). While according to Gultom, Baharuddin, Fibriasari, and Sembiring (2022) K3 awareness begins before entering the workforce. The development of safety culture and professional competence is a key factor in the development of an industry/business to improve the quality of life of its employees (Abikenova, Oshakbayeva, Bekmagambetov, & Sarybayeva, 2023).

This proves that habituation of work safety culture is important for *Prakerin* students. The results of the study stated that SMK in the Yogyakarta region has not implemented all aspects of K3

implementation in accordance with industry standards, so that the application of occupational safety aspects is still lacking, the application of occupational health is still lacking, and management aspects have not been implemented optimally (Wijanarka, Sukardi, Rahdiyanta, & Ngadiyono, 2019). This reality demands safety policies, safety training and safety committees to improve the safety culture in the education sector (Makhtar, Parasuraman, Zakaria, & Ismail, 2018). Many studies examine *Prakerin*, however, this study provides a detailed view of the condition of the workshop in terms of the feasibility of industrial workshops according to the perception of *Prakerin*'s supervisor, more specifically on work safety equipment and workshop rules. The objectives of this study: (1) Identify variability in safety culture in *Prakerin*'s premises, (2), Analyze K3 culture responses among *Prakerin* workers and students. (3) Assess compliance with K3 standards at *Prakerin* sites, and (4) Identify and evaluate the simultaneous influence of worker K3 culture on student K3 culture.

2.   Method

This study uses a quantitative approach with survey methods because numerical data is the main focus in analyzing results using statistical tests. Quantitative research is based on positivistic philosophy which believes that something is considered to exist if it can be measured and tested empirically (Mulyadi, 2011; Sugiyono, 2008) Using numerical processing as a method for analyzing statistical data (Balaka, 2022; Kasiram, 2010; Sugiyono, 2008). A survey method is a procedure in quantitative research used to examine trends in attitudes, opinions, behaviors, or specific characteristics of the population of a particular sample (Creswell, 2015) while

according to Sukardi (2010) and Wingard et al., (2020) The survey method is used to obtain original data from a sample to describe the state of the population.

The population of this study is 54 *Prakerin* type B industries (Repair service industries or workshops that are able to carry out periodic maintenance work, small and large repairs or small types of repairs and vehicle chassis & body repairs) according to Indonesian Industrial Standards (SII) located in Gunungkidul Regency. The sampling technique used was purposive sampling, which was a total of 36 respondents consisting of instructors and supervisors. The data collection instrument used is a questionnaire that must be read and filled out by respondents. Data was collected using Likert scale questionnaire with four alternative choices, namely 5 = always; 4 = frequent; 3 = sometimes; 2 = rare; and 1 = never, then analyzed through descriptive tests to evaluate respondents' views on each variable, and classical assumption tests were carried out, including tests of normality, linearity, multicollinearity, and heteroscedasticity. Test the hypothesis through multiple linear regression which includes simultaneous tests (F-test) and t-test (individual).

3.   Results and Discussion

Test Construct Validity This study uses exploratory factor analysis by correlating between the scores of instrument items in a factor, and correlating factor scores with total scores and indicator (factor) variables developed from questionnaire questions or statements (Artaya et al, 2018; Kuncoro, 2009; Sugiyono, 2008; Utama, 2016; Supriyanto et al., 2022). The loading factor is the magnitude of the correlation between the indicator and its latent construction. Indicators with a high Loading Factor have a

higher contribution to explaining their latent construction. Conversely, indicators with a low loading factor have a weak contribution to explain their latent construct. In most references, factor weights of 0.50 or more are considered to have strong enough validation to explain latent constructs (Ghozali, 2008; Hair, 2009). In this study, rotation used the Varimax method (part of Orthogonal). Use confirmation factor analysis to measure the strength of the dimensional structures that make up the factor (Utama, 2016). The data factors analyzed are the Occupational Health and Safety (K3) Document, Worker K3 Culture, and *Prakerin* Student K3 Culture based on the perception of the *Prakerin* Supervisor is the result of a questionnaire consisting of 16 statement points consisting of 6 points about K3 documents, 5 points about K3 culture applied by workers, and 5 points of K3 culture applied by *Prakerin* students.

Table 1. Confirmatory Factor Analysis Results

Variable	Items	Load	KMO Test (MSA)	Bartlett Test (p)	Combach Alpha
K3 Document	Code of conduct board	0,586	0,603	<0.001	0,684
	Household documents (before)	0,566			
	Household documents (after)	0,700			
	Fire extinguisher and how to use it	0,618			
	K3 Mark	0,515			
	Establishment license	0,804			
K3 Worker Culture	Execute commands	0,386	0,624	<0,001	0,814
	Carry out K3 procedures	0,577			
	Using K3 equipment	0,729			
	Use workwear/wearpack	0,639			
	Using safety shoes	0,605			
K3 Culture of *Prakerin* Students	Execute commands	0,546	0,582	<0,001	0,720
	Carry out K3 procedures	0,574			
	Using K3 equipment	0,551			
	Use workwear/wearpack	0,549			
	Using safety shoes	0,856			

The results of the Confirmatory Factor Analysis in Table 1, the variable value of Document K3 shows the KMO test (MSA) which is 0.603, with the significance level of the Barlett Test <0.001, then aspects of existing variable indicators can be analyzed further. Item loading factor Order board (0.586), House keeping-before document (0.566), House keeping-after document (0.700), fire extinguisher and how to use it (0.618), K3 mark (0.515), and establishment permit (0.804), the value of each variable is >0.500 then all variable items of Document K3 are declared valid and the results of Cronbach analysis alpha 0.684 which means the reliability of variable instruments Document K3 68.400% or strong so that it can be concluded for further analysis.

The value of the results of the K3 Worker Culture variable analysis on the KMO test (MSA) is 0.624, with the significance level of the Barlett Test <0.001, then the aspects of the existing variable indicators can be analyzed further. Item loading factors Carrying out rules of conduct (0.386), Carrying out K3 procedures (0.577),

Using K3 equipment (0.729), Using work clothes / wearpacks (0.639), and Using safety shoes (0.605), the value of 1 variable <0.500 so that it is declared invalid and 4 variables with a magnitude of >0.500 are declared valid so that they can be tested for reliability are 4 items with Cronbach alpha analysis results of 0.891 which means the variable reliability of the K3 instrument Worker Culture 89, 100% or stronger so that it is concluded can be further analyzed. Furthermore, for the value of the results of the K3 *Prakerin* Student Culture variable analysis on the KMO (MSA) test, which is 0.582, with the significance level of the

Barlett Test <0.001, aspects of existing variable indicators can be analyzed further. Item loading factors Carrying out rules of conduct (0.546), Carrying out K3 procedures (0.574), Using K3 equipment (0.551), Using work clothes / wearpacks (0.549), and Using safety shoes (0.856), the value of each variable is >0.500 then all variable items of K3 Culture *Prakerin* Students are declared valid and the results of the Cronbach analysis alpha 0.720 which means the reliability of the K3 Worker Culture variable instrument is 72.000% or strong so that it is concluded that it can be analyzed more next.

Table 2. Statistical Descriptive Analysis of Each Variable Based on the Perception of *Prakerin* Supervisor Teacher

Variable	Minimum	Maximum	Median	Standard Deviation
K3 Document	2,167	4,667	3,625	0,492
K3 Worker Culture	1,600	4,800	3,583	0,817
K3 Culture of *Prakerin* Students	1,600	4,600	3,411	0,751

The results of the analysis in Table 2 on the K3 document variables show a relatively small variation in the value of the K3 document. The mean or middle value is about 3.625, and a low standard deviation (0.492) indicates that most values converge close to the mean. The range between minimum and maximum values is also limited, from 2.167 to 4.667. In the K3 Culture by Worker variable, the value range is greater than 1,600 to 4,800. Although the average was slightly lower than the K3 document (3.583), the standard deviation was higher (0.817), indicating greater variation in workers' responses to K3 culture. Some workers may have lower or higher than average responses. While the K3 Culture variable by *Prakerin* students, showed a slightly lower average score (3,411) than other variables. The relatively high standard deviation (0.751) indicates significant variation in *Prakerin* students'

responses to K3 culture. The range of values is also quite large, from 1,600 to 4,600.

Safety culture practiced by employees in *Prakerin* industry; The K3 culture variable by workers has a high standard deviation (0.817), indicating a large variation in workers' responses to K3 culture. Descriptively, these data paint a positive picture of workplace safety culture Agree with the results of research revealing that fostering a positive safety culture encourages the transfer of good practice learning (Duryan et al., 2020) and K3 awareness begins before entering the workforce (Gultom et al., 2022), but pointed out the need to focus efforts on specific aspects to improve overall compliance and safety. Management's commitment to safety, management style, and management visibility are key indicators of safety culture in the company (Flin, Mearns, O'Connor, & Bryden, 2000). Therefore, there must be

commitment from all levels of the organizational structure, starting with a top-down organizational approach (Antonsen, 2009; Choudhry, Fang, & Mohamed, 2007; Hopkins, 2002; Mearns, Flin, Gordon, & Fleming, 2001; Mohamed, 2003).

Table 3. Analysis of frequency distribution between variables

| Variable	Item	Frequency level				
		Never	Infrequently	Sometimes	Often	Always
K3 Document	Code of conduct board	-	-	21	8	7
	Household documents (before)	-	7	21	7	1
	Household documents (after)	-	2	12	21	1
	Fire extinguisher and how to use it	-	2	2	31	1
	K3 Mark	-	4	3	15	14
	Establishment license	2	2	10	18	4
K3 Worker Culture	Execute commands	-	-	15	11	10
	Carry out K3 procedures	3	5	15	8	5
	Using K3 equipment	2	2	7	20	5
	Use workwear/ wearpack	5	1	3	26	1
	Using safety shoes	5	-	2	20	9
K3 Culture of *Prakerin* Students	Execute commands	5	2	14	14	1
	Carry out K3 procedures	5	4	9	15	3
	Using K3 equipment	-	11	8	15	2
	Use workwear/ wearpack	-	1	6	20	9
	Using safety shoes	2	11	3	7	13

The frequency distribution data in Table 3 shows a fairly clear picture of the level of respondents' compliance with Occupational Safety and Health (K3) practices in the work environment. The majority of respondents tend to consistently select the "Often" and "Sometimes" categories on most items, signifying a high level of awareness of K3 practices. Some aspects that received high attention included the use of work clothes and safety shoes, with the majority of respondents choosing the "Often" category on both items. However, there was significant variation in certain items, such as "Using K3 Equipment" and "Fire Extinguishers and How to Use Them," with some respondents answering "Rarely" or "Always."

It was concluded that the K3 document received consistent and positive responses with limited variation. Meanwhile, the K3 culture among workers showed greater variation and the K3 culture of *Prakerin* students showed higher variation in their responses to the K3 culture. Compliance with the K3 standard in the *Prakerin* industry is assessed quite consistently by the supervisor. This is in line with the results of research that reveals that more and more companies are Be consistent and prioritize safety, because it considers it a fundamental aspect (Bisbey et al., 2021; Chavez et al., 2022; Shad et al., 2019), so that *Prakerin* activities as a basis in providing insight to students about the importance of occupational safety and health in reducing

accidents and improving work efficiency (Cahyawati et al., 2023). Academics and practitioners emphasize the importance of corporate culture in facilitating knowledge transfer (Davenport & Prusak, 1998; Szulanski, 2000).

**Table 4. Multicollinearity Test Results**

Variable	Tolerance	VIF
K3 Document	0,654	1,529
K3 Worker Culture	0,654	1,529
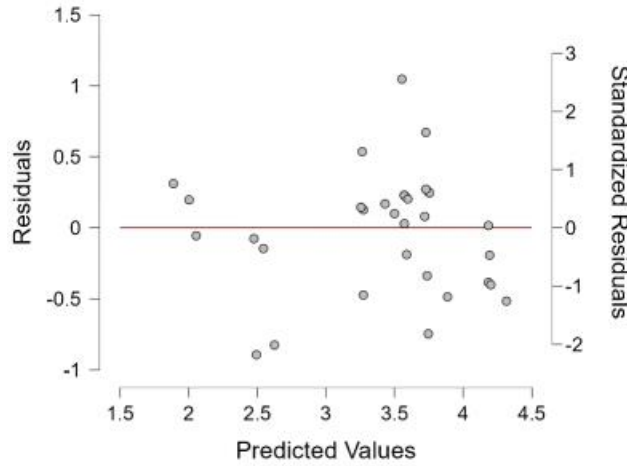
Figure 1. Heteroscedasticity Test Results

Heteroscedasticity testing is performed by creating a scatter plot between residual values and predictions of standard bound variables. The results of the heteroscedasticity test can be seen in the Scatterplot image, as in Figure 1. It can be seen that the distribution of points does not form a certain pattern / groove, so it can be concluded that heteroscedasticity does not occur or in other words homoscedasticity occurs. The classical assumption of heteroscedasticity in this model is fulfilled, that is, it is free from heteroscedasticity.
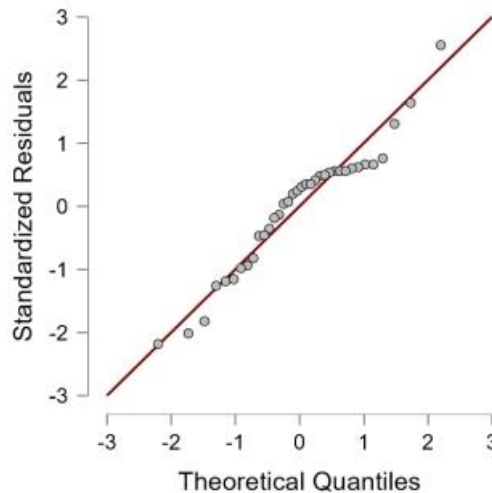
Figure 2. Q-Q Plot Normality Test Results

Residual criteria (data) that are distributed normally or not with the Normal Q-Q Plot approach can be done by looking at the distribution of points in the figure. If the distribution of these points is close or tight on a straight line (diagonal) then it is said that the residue (data) is normally distributed, but if the distribution of these points is far from the line it is not normally distributed. The results of the normality test can be seen in Figure 2. The point distribution of the Normal Q-Q Plot figure is relatively close to a straight line, so it can be concluded that the residue (data) is normally distributed. These results are in line with the classical assumption of linear regression with the ordinary least square (OLS) approach.

Table 5. Simultaneous Significance Test (F Test)

Kind	Square means	F-Table	F- Calculate	Meaning
Regression	6,939	3,285	38,952	<0.001
Residue	0,178			

The results of the F test analysis can be seen in Table 5. The value of prob. F count is <0.001, seen in column p, while F value count (38.952) > F table (3.285). This result means that there is a simultaneous and significant influence between the two independent variables on the dependent variable, so it can be concluded that the linear regression model estimation is feasible to use to explain the influence of the K3 Document variables and Worker K3 Culture on the Student K3 Culture variable. This conclusion is in line with Vranješ and Todić (2019) Occupational safety and health is an element that cannot be separated from the company in work activities. The industry's existing culture of informal knowledge transfer is essential for learning (Bartsch, Ebers, & Maurer, 2013; Mueller, 2015). *Prakerin* as one of the learning activities in the company is seen as a cross-sectoral strategy in realizing a safety culture, through strengthening skills and expanding knowledge (Kavouras et al., 2022).

Table 6. Results of the Individual Parameter Significance Test (Test t)

Variable	Koefisien Regresi (β)	t-Table	t-Calculate	Meaning
K3 Document	-0,034	2,035	-0,289	0,774
K3 Worker Culture	0,858		7,305	<0.001

The results of the t-test analysis of the Document K3 variable in Table 6 showed a probability significance value of 0.774 greater than 0.050 and a negative calculated t value smaller than table t, which is -0.289 < 2.035. It was concluded that the K3 Document did not have a significant and negative effect on the K3 Culture of *Prakerin* students. In contrast to the results of the t-test analysis of the K3 Worker Culture variable, it shows a probability significance value of <0.001 less than 0.050 and a calculated t value greater than the t table, which is 7.305 > 2.035. It was concluded that the K3 Worker Culture has a very significant influence on the K3 Culture of *Prakerin* students. This is also partially described in the diagram in Figure 3. As revealed by Vranješ and Todić (2019) Active involvement of workers in developing and improving work safety systems has implications for all parties while the role of worker and the role the company has an impact on the culture of occupational safety

and health (Altay, 2022; Tetzlaff et al., 2021). Companies need to encourage social interaction based on trust and mutual understanding for the transfer of operational knowledge through its workers (Roberts, 2000; Sherehiy & Karwowski, 2006).
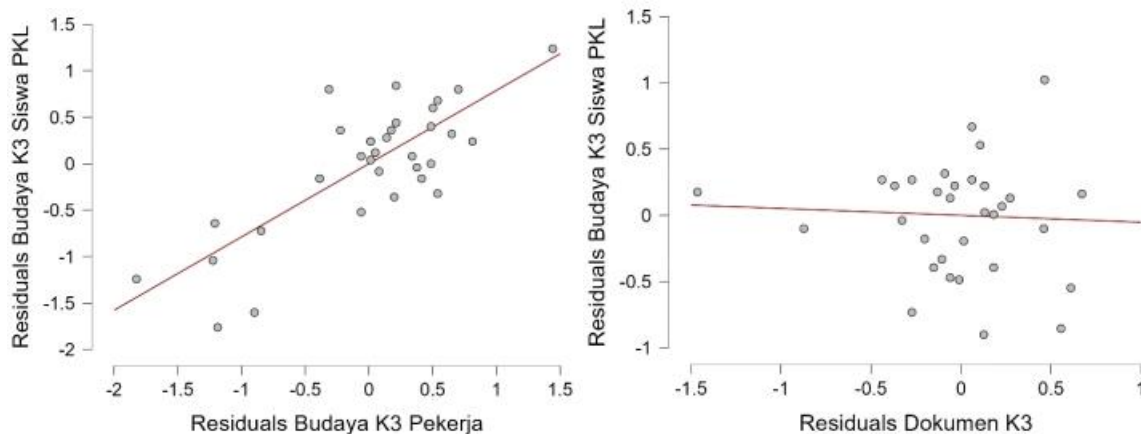

Figure 3. t-Test Results

4. Conclusion

Analysis shows that the safety culture in *Prakerin*'s industry is generally positive, although worker responses vary. Special attention is needed to certain aspects, such as management commitment and management style, as key in improving safety culture. Full commitment from the entire organizational structure, starting with upper management, is essential to driving positive change. Improvement efforts should consider variations in worker response and focus on key factors to form an effective safety culture.

The K3 document received positive and consistent responses, while the K3 culture of *Prakerin* workers and students showed variation. Although the guidance counselor assessed K3 standard compliance quite consistently, the difference in worker and student responses showed the need to continuously improve the understanding of safety in the *Prakerin* environment. In conclusion, the corporate culture and understanding of safety at *Prakerin* supports the transfer of knowledge and awareness of K3 students.

Frequency distribution data shows high levels of compliance with Occupational Safety and Health (K3) in the work environment, with the majority of respondents consistently choosing the "Often" and "Sometimes" categories. The use of work clothes and safety shoes has received high attention, but there are variations in the use of K3 and fire extinguisher equipment. The K3 document received a positive response with limited variation. Even so, the K3 culture of *Prakerin* workers and students shows significant variations. K3 standard compliance in the *Prakerin* industry is considered quite consistent by the guidance teacher, in line with previous research that emphasized the importance of safety in the company. *Prakerin* activities are considered the basis for raising students' awareness of occupational safety and health. The success of knowledge transfer is reinforced by the importance of corporate culture according to academics and practitioners.

The analysis shows a simultaneous and significant influence between the K3 Document and the Worker's K3 Culture on

the Student's K3 Culture. Occupational safety and health are considered inseparable from the company's activities, as Vranješ and Todić view. The K3 document does not significantly and negatively affect the K3 Culture of *Prakerin* students, while the culture of K3 Workers significantly affects the K3 Culture of students. Companies need to encourage trust-based social interaction and mutual understanding for the transfer of operational knowledge through its workers.

The results of this study show that SMK students tend to adopt role models from employees and the industrial environment in shaping their character. These findings have important implications regarding selectivity and criteria in selecting industry partners for the *Prakerin* program. Type B industries still dominate this study sample, providing more comprehensive variation in the analysis. Therefore, recommendations for future research can focus on exploring the impact of differences in industrial environments on the character development of vocational students, by evaluating the influence of role models from various types of industries. Expanding the sample frame, future research can provide deeper insight into how the influence of the work environment can shape the character of vocational students holistically to provide employment readiness for vocational graduates.

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