Indonesian Journal of Applied and Industrial Sciences (ESA)
Vol. 4, No. 6, 2025 : 733 - 744

The Influence of Character and Skill Competency on Students' Practical Work Productivity in Construction and Housing Engineering Expertise Competency at SMK Surabaya

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A R T I CLEINFO

Keywords: Characteristics, Work Competence, Practicum Work Productivity, Structural Equation Modeling

Received: 02 October 2025
Revised: 23 October 2025
Accepted: 26 November 2025

A B STR A CT

This study aims to analyze the influence of Characteristics and Work Competencies on Practical Work Productivity for students in Construction and Housing Engineering Expertise at SMK Surabaya. The research model uses Structural Equation Modeling (SEM) with the Partial Least Squares (PLS) approach to test the relationship between variables. The results show that Characteristics have a significant influence on Practical Work Productivity with a p-value = 0.033, which indicates a negative relationship between the two variables. On the other hand, Work Competencies do not have a significant influence on Practical Work Productivity, with a p-value = 0.217. The Characteristics construct has a Cronbach's Alpha = 0.809, while Work Competencies has a Cronbach's Alpha = 0.823, both indicating good reliability.

INTRODUCTION

The era of globalization and rapid industrial development has created a growing need for skilled and professional workers, particularly in the construction and housing engineering sectors. Vocational High Schools (SMK) play a key role in preparing students for the workforce. However, the challenge is how to optimize student work productivity during practicums to meet industry standards. One factor influencing student work productivity is character. Good character traits, such as discipline, responsibility, and the ability to work together, can improve student work effectiveness. (Zurqoni et al., 2018) . Previous research has shown that students with positive character tend to be more capable of completing assignments well and have a proactive attitude in learning. The character of students in Vocational High Schools (SMK) plays an important role in determining their success in practical competencies, especially in the field of construction and housing engineering. Good character not only influences students' attitudes and behavior during the learning process but also influences the results of their practicums (Hidayati & Ningsih, 2018) . Discipline is a very important aspect of character. Disciplined students tend to be more organized in carrying out practicum tasks, following work procedures properly, and adhering to time (Kaur & Kaur, 2020) . Responsibility also plays a role in ensuring that they complete tasks well and do not neglect work safety (Singh & Singh, 2019) . Lack of discipline and responsibility can lead to poor practicum results and an increased risk of accidents.

In the context of practicums, students often work in groups. The ability to collaborate and communicate well with classmates is crucial (Verma & Gupta, 2022) . Students with strong cooperative character traits are more likely to complete joint projects effectively. Conversely, students who lack collaborative skills can hinder group progress and affect the final outcome of the practicum (Patel & Shah, 2021) . Positive character traits, such as optimism and high motivation, can encourage students to strive harder in practicums. Motivated students tend to be more active in finding solutions to problems encountered during practicums, resulting in a better learning experience. Conversely, students with negative or unmotivated attitudes can reduce group productivity and the quality of practicum results. Thus, student character in vocational schools plays a key role in influencing their practicum competency.

LITERATURE REVIEW

It is important for educators and educational institutions to pay attention to student character development through various activities and programs that can improve discipline, responsibility, teamwork skills, and motivation. Thus, it is hoped that students can achieve optimal results in practical work and be ready to face challenges in the industrial world. Adequate technical skills competency is crucial in the construction world. Students who have strong practical skills will be more confident and efficient in carrying out practical work tasks. Therefore, it is important to evaluate the extent to which these skills competencies impact student work productivity (Miller & Johnson, 2018) . Skill competency is one of the important factors that influence the productivity of student practical work in Vocational High Schools (SMK), especially in the fields of construction and

housing engineering. Students who have good technical skills will be more able to carry out practical work tasks efficiently. They can use tools and materials correctly, understand work procedures, and complete tasks in a shorter time. This increases work output and reduces the possibility of errors that can slow down the practical process. High skill competency increases student confidence when carrying out tasks. Confident students tend to be more active in participating and innovating, thereby increasing productivity. Conversely, less skilled students may feel hesitant and tend to avoid more complex tasks, which can hinder the group's progress. Good practical skills enable students to more easily identify and solve problems that arise during lab work. With adequate skills, students can quickly find solutions and make adjustments, which has a positive impact on work efficiency and overall productivity. Students with good skills competency will be more familiar with the work processes and procedures to be followed. This mastery reduces the time required to understand new instructions and procedures, allowing students to focus more on task execution and the final results of the lab work. In the context of lab work, which is often conducted in groups, students with varying skills can complement each other. Skilled students can provide guidance to their peers, creating a collaborative learning environment. This not only improves lab results but also builds interpersonal skills that are important for the workplace. Good skills competency directly influences the quality of student work (8). High-quality lab work not only reflects students' technical skills but also provides valuable learning experiences. Satisfying results can increase students' motivation to continue learning and innovating. Skill competency has a significant impact on the productivity of vocational high school students' lab work. (Soeparno et al., 2024) . Therefore, it is important for educational institutions to focus on developing practical skills through effective learning methods, structured training, and hands-on experience in the field. This study aims to analyze the influence of character and skill competencies on students' practical work productivity in the Construction and Housing Engineering expertise competency at Surabaya Vocational High Schools (SMK). The urgency of this research is very high, both from the educational aspect, character development, and relevance to industry needs. The results of the study can provide useful recommendations for curriculum development and improving the quality of education in vocational high schools.

METHODOLOGY

The research design used was a factorial analysis design to examine the role of character and skill competency in vocational high school students' practicum productivity. A factorial analysis design is an experimental research method used to test the influence of several independent variables (factors) on one or more dependent variables, as well as the interactions between these factors. This design allows researchers to test several factors simultaneously with various levels specified for each factor. Each factor has a level that is tested to see how the combination of these levels affects the research results. Furthermore, a factorial analysis design also allows for analysis of interactions between the

tested factors, which can provide deeper insight into how these factors work together. This method is more efficient than testing one factor at a time and produces a more accurate understanding of the influence of these factors on the dependent variable (Godolphin, 2019; Rahim & Cavenagh, 2021; Shi et al., 2023) .

The population in this study was all 500 students of the Construction and Housing Engineering Expertise Competency. The sampling method in this study used purposive sampling and random sampling, resulting in a sample of 90 vocational high school students spread across three vocational high schools in Surabaya. Data collection was carried out by administering questionnaires to students and analyzing them using structural equation models for individuals and groups. To anticipate data bias in the study, the researcher used Harman Single Factor.

Table 1. Research instrument items

No	Variables	Indicator	Sub-indicators
1	Character	Discipline (KR1)	Punctuality of work
			Compliance with rules and procedures
		Collaborative (KR2)	Have a contribution to the group
			Flexibility of roles in groups
		Communicative (KR3)	Hearing or receiving constructive criticism
			Discuss with group members when there are problems
		Responsibility (KR4)	Have a high awareness of the work assigned
			Responsible for every action
2	Skill Competence	Practical Preparation (KK1)	Prepare work equipment and tools
			Operating practical equipment
		Group Cooperation (KK2)	Student involvement in completing assignments
			Carry out the division of tasks for each group member
		Group Creativity (KK3)	Have an idea/concept
			Creating innovations in the products produced
		Performance Process (KK4)	Implementing K3 during practice
			Final product result
3	Practical Work Productivity	Resource usage (PP1)	Use of tools and materials used
			Number of participants in one group
		Job Skills Improvement (PP2)	Soft Skills and Work Ethics
			Practical and Technical Skills
		Work/time efficiency (PP3)	Practical time management
			Work innovations implemented
		Quantity of Work Results (Output) (PP4)	Frequency of Participation in Practical Activities
			Volume of practical work results

In Table 1, one of the main variables is character, which consists of indicators of discipline, collaboration, communication, and responsibility. Discipline relates to students' ability to comply with rules and complete assignments on time, while collaboration includes the ability to work together in groups, help each other, and communicate effectively (Tentama et al., 2019) .

Communication indicates students' ability to convey ideas clearly and accept feedback constructively. Responsibility assesses students' awareness of the task and their commitment to completing the work well (Haerudin et al., 2023; Villacís et al., 2023) .

Furthermore, skill competency also plays a crucial role in the success of practicums, involving practicum preparation, group collaboration, group creativity, and the performance process. Practical preparation includes students' readiness to prepare the necessary tools and materials before the practicum begins. Group collaboration demonstrates how students work together in teams to complete tasks, while group creativity reflects the ability to develop new ideas in problem-solving. The performance process refers to the quality of work produced during the practicum, which is influenced by students' skills and dedication (S. Kim & Lee, 2021; Zhang & Liu, 2020) .

Finally, the productivity of practicum work is measured through several indicators, such as resource utilization, work skill improvement, work/time efficiency, and quantity of work output. Resource utilization relates to how students utilize available tools, materials, and time to complete assignments. Improvement in work skills reflects students' ability to learn and develop through practicum experiences. Work/time efficiency indicates how well students can manage their time during the practicum, while quantity of work output measures the number and quality of results achieved within a certain time. All of these factors are interrelated and contribute to students' success in practicum, which in turn influences their readiness to enter the workforce (T. Kim & Lee, 2022; Liu & Xu, 2021) .

RESEARCH RESULT AND DISCUSSION

System testing was conducted using SmartPLS3 to obtain the relationship between several interrelated latent variables, namely Characteristics, Work Competence, and Practicum Productivity. Characteristics are measured by four indicators, namely KR1, KR2, KR3, and KR4, which describe various aspects that influence the characteristics of individuals or entities in the context of this study. Meanwhile, Work Competence also has four indicators, namely KK1, KK2, KK3, and KK4, which describe the abilities or skills possessed in working. These two latent variables function as predictors of Practicum Productivity, which is measured by four indicators: PP1, PP2, PP3, and PP4. The relationship between latent variables is illustrated in Figure 1 with the direction of the arrows indicating the direct influence of Characteristics and Work Competence on Practicum Productivity. This indicates that changes in individual characteristics and levels of work competency can affect the level of productivity in practice, which is the main focus of this study.

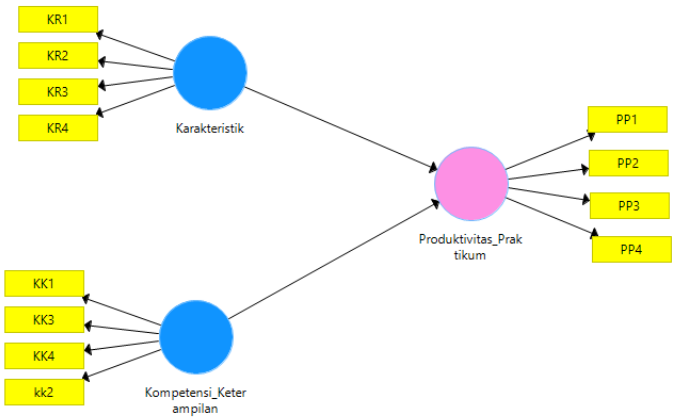

Figure 1. SmartPLS's path model

SmartPLS3 generates various indicators to evaluate measurement models, one of which is outer loading. Outer loading indicates the strength of the relationship between an indicator and the latent construct measured in the model. The outer loading value illustrates the extent to which the indicator can explain the variance of the latent construct in question. An outer loading value above 0.70 indicates a stronger indicator in measuring the intended latent construct. A low outer loading value indicates that the indicator is less relevant or less effective in describing the latent construct. Therefore, it can be considered for removal or replacement with a more appropriate indicator.

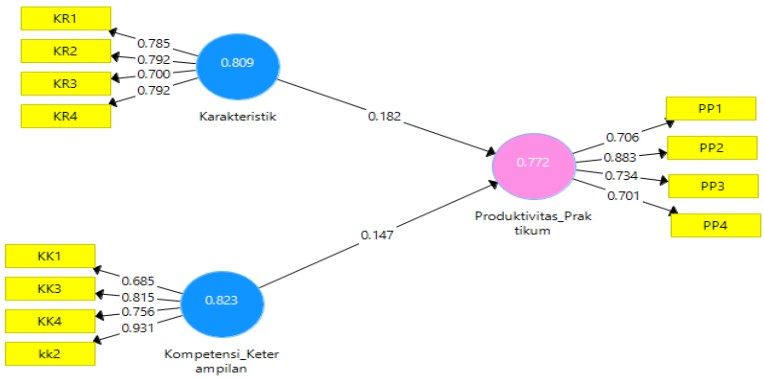

Figure 2. Outer Loading, f ^{2}, and Cronbach's alpha

Based on the outer loading results obtained in Figure 2, an analysis can be conducted on the measurement quality of each construct in the model. For the Characteristics construct, the indicators used, such as KR1, KR2, KR3, and KR4, mostly show good outer loading values, above 0.70, indicating a significant contribution to the construct. However, indicator KR3 has an outer loading value of 0.700, which is slightly lower than the ideal value of 0.70, although still acceptable. For the Work Competence construct, indicator KK1 has an outer loading value of 0.685, which is slightly below the expected threshold, so it can be considered for further evaluation. In contrast, other indicators, such as KK3 (0.815), KK4 (0.756), and kk2 (0.931), show very good contributions to this construct, with kk2 even having a very high value. As for the Practicum

Productivity construct, all indicators (PP1, PP2, PP3, and PP4) show very good outer loading values, with PP2 reaching 0.883, which indicates a very strong relationship between the indicators and this latent construct.

Overall, this model still shows quite good convergent validity because the latent constructs can still be measured accurately and consistently, with most indicators contributing significantly to the measured constructs. Although indicators such as KK1 (0.685) and KR3 (0.700) have slightly lower values, both are still within acceptable limits in the context of the broader measurement model. In addition, other indicators show very high outer loading values, such as kk2 (0.931) and PP2 (0.883), which indicates that most indicators contribute significantly to the measured latent constructs.

Table 2. Construct Reliability and Validity

	Cronbach's Alpha	**rho_A**	**Composite Reliability**	**(AVE)**
Characteristics	0.809	0.875	0.852	0.590
Work Competence	0.823	0.969	0.877	0.643
Productivity_Practical_	0.772	0.896	0.844	0.577

Based on the results presented in Table 2, it can be concluded that this model demonstrates fairly good reliability and validity, although there are several areas for improvement. For the Characteristics construct, the Cronbach's Alpha value of 0.809 and rho_A of 0.875 indicate good internal reliability, indicating high consistency in the measurement of this construct. In addition, the Composite Reliability of 0.852 also supports this consistency. However, the Average Variance Extracted (AVE) value of 0.590 is slightly below the ideal value of 0.7, which means that the convergent validity of this construct can still be improved. For the Work Competence construct, the results obtained are very good with a Cronbach's Alpha of 0.823 and rho_A of 0.969, indicating very high reliability. The Composite Reliability of 0.877 also indicates very good consistency, while the AVE value of 0.643 is still slightly below 0.7, but still indicates quite good convergent validity. As for the Practicum Productivity construct, the Cronbach's Alpha value of 0.772 and rho_A of 0.896 indicate good reliability, and the Composite Reliability of 0.844 supports adequate internal consistency. However, the AVE value of 0.577 indicates lower convergent validity compared to other constructs, although it is still acceptable. Overall, although there are some AVE values slightly lower than 0.7, this model generally shows adequate reliability and validity, with most constructs having good measurement quality.

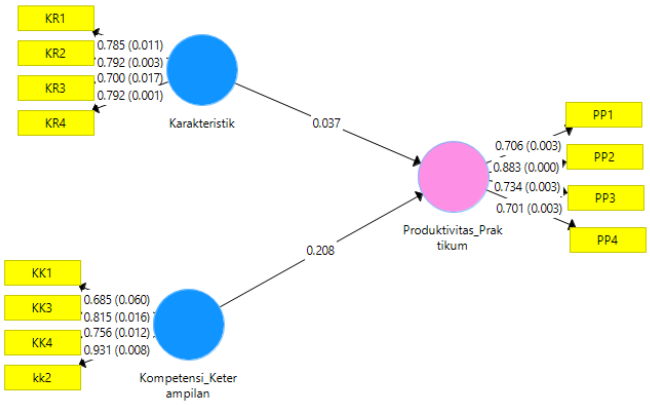

Figure 3. Outer Loading, P-value

In Figure 3, the results of the Outer Loading analysis and p-value show the relationship between indicators and constructs in a structural model. Outer loading describes the extent to which each indicator (such as KR1, KR2, KR3, KR4) represents a larger construct (such as Characteristics and Competence_Skills). The higher the outer loading value, the stronger the relationship between the indicator and the construct, indicating that the indicator has a significant contribution in describing the intended construct. The p-value listed next to each outer loading indicates the statistical significance of the relationship. P-values smaller than 0.05 (such as 0.003 and 0.001) indicate that the relationship between the indicator and the construct is highly statistically significant, meaning the relationship can be considered valid and does not occur by chance. For example, indicators KR1, KR2, KR3, and KR4 have quite high outer loading values with very small p-values, which indicates that the relationship between these indicators and the "Characteristics" construct is significant and reliable.

However, the p-value on "Skill_Competency" is greater than 0.05 and indicates that the relationship between the indicators related to the construct is not statistically significant, although the outer loading value shows a relationship between indicators such as KK1, KK3, and KK4 with the "Skill_Competency" construct. The relationship found between the "Skill_Competency" indicator and the construct needs to be examined further, and it may be necessary to improve or select other indicators to strengthen the relationship to make it more statistically significant.

Table 3. Path coefficients direct relationship

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Characteristics -> Productivity_Practical_	-0.371	-0.407	0.174	2,131	0.033
Work Competence -> Practical Productivity	0.333	0.317	0.270	1,236	0.217

Based on the results shown in Table 3, the relationship between the variables tested in the model can be analyzed. For the relationship between

Characteristics and Practicum Productivity, the Original Sample value of -0.371 indicates a negative influence, meaning that the higher the characteristics, the lower the practicum productivity. This result is supported by the T Statistics value of 2.131, which is greater than the threshold value of 1.96, indicating that this relationship is statistically significant. In addition, the P Value of 0.033 indicates that this relationship is significant at the 5% level, meaning the hypothesis that Characteristics influence Practicum Productivity can be accepted. On the other hand, for the relationship between Work Competence and Practicum Productivity, the Original Sample value of 0.333 indicates a positive influence, meaning that the higher the work competency, the higher the practicum productivity. However, the T Statistics value of 1.236 is lower than the threshold value of 1.96, indicating that this relationship is not statistically significant. The P-value of 0.217, which is greater than 0.05, confirms that this relationship is not significant, so the hypothesis that Job Competence influences Practicum Productivity cannot be accepted. Thus, although Characteristics have a significant influence on Practicum Productivity, Job Competence does not show a significant influence in this model.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the analysis conducted, it can be concluded that Characteristics and Skill Competencies have an influence on Student Practical Work Productivity in Construction and Housing Engineering Expertise Competencies at Surabaya Vocational High Schools, but with different levels of significance. Student characteristics are proven to have a significant influence on practical work productivity, with a very small p-value of 0.03, which indicates that this relationship is statistically significant. The T Statistics value of 2.131, which is greater than 1.96, also confirms the statistical significance of this relationship. Although the Original Sample (O) value = -0.371, students with certain characteristics, such as high motivation and strong determination, tend to be more productive in carrying out practical activities. In contrast, Skill Competence shows a weaker relationship with Practical Work Productivity, with a p-value of 0.208, which is greater than the threshold of 0.05. This can be explained by the results of the analysis on KK1 with the sub-indicator Preparing work equipment and tools, which has an outer loading value of 0.685. This relatively low outer loading value indicates that this sub-indicator does not have a strong contribution in describing the overall Skill Competence construct. As a result, the relationship between this indicator and Practical Work Productivity becomes less statistically significant, as reflected in the p-value greater than 0.05.

Therefore, it is important to improve the process of preparing work equipment and tools, for example by providing more intensive training to students regarding the importance of optimal equipment preparation, as well as increasing their understanding of how to select and manage laboratory equipment efficiently. Improving the quality of this preparation will strengthen its contribution to student skill competency and improve the relationship between Skill Competency and Laboratory Work Productivity. Thus, it is expected that the KK1 sub-indicator can have a higher outer loading and a lower p-value, which will increase statistical significance in this analysis model.

ADVANCED RESEARCH

Further research can continue by adding the variable of Occupational Safety and Health (K3) knowledge in the analysis model of practicum work productivity. Knowledge of K3 plays an important role in increasing student awareness of the importance of safety during practicum activities, which in turn can positively influence Practicum Work Productivity. By including this variable, the relationship between occupational safety, practicum skills, and the results achieved by students in carrying out practicum tasks can be identified more clearly. The addition of this K3 knowledge variable will also provide a new perspective in understanding the factors that influence student work productivity, as well as provide a more comprehensive picture of the elements that need to be considered in improving the quality of practicums in vocational schools. In addition, this research can be expanded by examining the effect of K3 knowledge on student work productivity in various disciplines or in a broader context.

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