

The Effect of Technical Skills on Employee Productivity of PT Sumber Bara Abadi Through Work Environment As a Mediator Variable

Reny Ramahdani ^{1*}, Vera Anitra ², Achmad Efendi ³

¹ Program Studi Manajemen, Fakultas Ekonomi, Bisnis dan Politik, Universitas Muhammadiyah Kalimantan Timur; email : 2111102431159@umkt.ac.id

² Program Studi Manajemen, Fakultas Ekonomi, Bisnis dan Politik, Universitas Muhammadiyah Kalimantan Timur; email : va674@umkt.ac.id

³ Program Studi Manajemen, Fakultas Ekonomi, Bisnis dan Politik, Universitas Muhammadiyah Kalimantan Timur; email : ae614@umkt.ac.id

* Corresponding Author : **Reny Ramahdani**

Abstract: Employee productivity is a crucial element in determining the operational success of a company, which is influenced by internal factors such as technical skills and working conditions. The purpose of this study is to examine the extent to which technical skills contribute to increasing employee productivity at PT Sumber Bara Abadi, considering the role of the work environment as a mediating variable. The research approach is quantitative, using the Structural Equation Modeling (SEM) method with the Partial Least Squares (PLS) technique. The population in this study includes all 70 permanent employees of the company, where the entire population was used as the sample through a census technique due to its limited size. Data collection was conducted using a questionnaire designed to assess aspects of technical skills, work environment, and productivity levels. The analysis results indicate that technical skills have a positive and significant influence on productivity, as well as on the work environment. Additionally, the work environment was also found to have a significant impact on employee productivity. Other findings confirm that technical skills indirectly influence productivity through the mediation of the work environment. Based on these results, it is recommended that the company develop a technical skills training program integrated with a strategy for creating a conducive work environment to promote optimal and sustainable productivity.

Keywords: Technical Skills, Work Environment, Employee Productivity

Diterima: :March 20 2025

Direvisi: April 24 2025

Diterima: May 02 2025

Diterbitkan: June 10 2025

Versi sekarang: June 10 2025



Hak cipta: © 2025 oleh penulis.
Diserahkan untuk kemungkinan
publikasi akses terbuka
berdasarkan syarat dan ketentuan
lisensi Creative Commons
Attribution (CC BY SA) (
<https://creativecommons.org/licenses/by-sa/4.0/>)

1. Introduction

The coal industry plays an important role in the Indonesian economy as a foreign exchange earner and a provider of jobs. However, entering 2025, the industry is facing significant external pressures, including a 12% decline in coal exports due to reduced demand from major markets such as China and India. Amid these challenges, PT Sumber Bara Abadi, as a national entity in the mining sector, is committed to improving operational efficiency in order to maintain its competitiveness. One important strategic step is strengthening human

resources (HR), especially in terms of technical skills and creating a conducive work environment. Strengthening HR is very important because employee productivity in this industry is highly dependent on their ability to complete technical tasks and supportive working conditions.

Employee productivity reflects how much work results are compared to what is used to achieve them. Productivity shows the efficiency of an organization in managing resources to achieve optimal output [1]. Employee productivity can be measured by the amount of work results, quality of output, target achievement, and timeliness of task completion. High employee productivity has a positive impact on operational efficiency, target achievement, and competitiveness. Therefore, good mastery of technical skills is one of the keys to reducing work obstacles and encouraging increased employee productivity.

Technical skills refer to the specific abilities needed to complete a job well, such as operating tools or using software. Explains that these skills include understanding work tools and technology [1], while according to *human capital theory*, technical skills are part of human capital that can be improved through education and training [2]. Research shows that technical skills training can increase employee confidence and productivity [3]. These skills are important because they help make work more efficient and encourage innovation. To achieve maximum results, technical skills must be accompanied by a supportive work environment.

The work environment includes social, psychological, and physical factors that affect how well employees perform their jobs. An ideal workplace should include physical comfort, a friendly environment, and a network of support among coworkers [1]. Meanwhile, according to *Teori Job Demands-Resources* (JD-R) views the workplace as a combination of job demands and job resources that affect worker performance and well-being [4]. The work environment plays an important role in determining the overall level of employee productivity [5]. When needs and resources are well balanced, an ideal workplace can increase motivation, reduce stress levels, and encourage employee engagement and productivity within the company.

Based on internal company data, 79% of the total 70 permanent employees at PT Sumber Bara Abadi are high school/vocational high school graduates. This condition shows that the majority of the workforce comes from vocational high school education which generally has basic work skills. However, the level of technical mastery that is deeper and in accordance with operational demands in the field is not evenly distributed. This poses a challenge for the company, especially in maintaining consistency in work quality, speed of task completion, and accuracy of work results between individuals.

In an ideal world, technical skills are essential because they help employees work faster, more accurately, and produce better work. Employees who master the tools and work procedures can usually complete tasks more efficiently. But in reality, not all employees have the same technical skills, so their work results can vary. In addition, an uncomfortable work environment, such as a lack of facilities or high work pressure, can make it difficult for employees to utilize the skills they have. This inconsistency needs to be studied further by using *Job Demands-Resources* (JD-R) Model, which explains that technical skills as *job resources*

will only be effective in increasing productivity if supported by a conducive work environment. Showed that technical skills have a major influence on productivity, meaning that the higher a person's skills, the higher their work results [6]. Where a good work environment can strengthen the relationship between technical skills and productivity [7].

There are differences in previous research findings on how technical skills affect employee productivity. Technical skills have a significant impact on productivity [8]. However, this finding contradicts which is not proven to have a real effect. Likewise [9], [10] and [7] had different results in terms of work environment variables as mediators. This difference indicates a research gap that requires more research.

The focus of this study is to analyze the influence of technical skills on employee productivity, with the work environment as a moderator variable. This study seeks to understand the direct impact of technical skills on productivity, as well as how the work environment strengthens or weakens the influence of technical skills in increasing employee productivity, especially in the work environment of PT Sumber Bara Abadi.

2. Method

The quantitative approach was chosen because it is able to assess the relationship between variables systematically and measurably [11]. The main focus of this study is to analyze the extent to which technical skills impact employee productivity. In addition, this study also explores the role of the work environment in strengthening or weakening the relationship. With this approach, it is expected that the results of the study can reflect the conditions and realities that occur in the field objectively.

The research was conducted at PT Sumber Bara Abadi located on JL Mulawarman, Sumber Sar Village, Sebulu District, Kutai Kartanegara Regency, East Kalimantan. This location was chosen because the company is engaged in coal mining which is very relevant to the variables of technical skills and work environment as important factors in supporting employee productivity.

The population in this study were all permanent employees of PT Sumber Bara Abadi, totaling 70 people. Because the population is relatively small and homogeneous, this study used a saturated sampling technique, in which all members of the population were sampled. This approach allows researchers to obtain representative and comprehensive data on the phenomenon being studied.

Data collection was conducted through the distribution of closed questionnaires compiled based on the indicators of each research variable. The questionnaire instrument used a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). The technical skills variable (X) was measured through indicators of mastery of work tools, ability to complete technical tasks, knowledge of work procedures, and speed and accuracy. The work environment variable (M) was measured through aspects of cleanliness and comfort of the work space, relationships between colleagues, job security, and work atmosphere. Employee productivity (Y) included the amount of work output, quality of work results, target achievement, and punctuality.

The data analysis technique used is Structural Equation Modeling based on Partial Least Squares (SEM-PLS) with the help of SmartPLS software version 3.0. The SEM-PLS method was chosen because it is suitable for causal relationship analysis with complex models and relatively small sample sizes. The analysis process includes testing the measurement model (outer model) through convergent validity, discriminant validity, and construct reliability tests, as well as testing the structural model (inner model) which includes evaluation of the coefficient of determination (R^2), *effect size* (f^2), *predictive relevance* (Q^2) [12].

Hypothesis

1. The influence of technical skills on employee productivity

Technical skills include skills in using work tools, completing technical tasks, and following work procedures correctly. Workers who have these skills can usually complete their work faster, neater, and more efficiently. Their work results are also more and better. Therefore, technical skills are very important to help increase employee productivity.

H1: Technical skills have a positive and significant effect on employee productivity.

2. The influence of technical skills on the work environment

Workers with a good level of technical mastery generally show more optimal work productivity. This helps reduce errors, speed up work processes, and create a more organized work environment. If everyone can work well, the team's workload becomes lighter and cooperation between colleagues also increases. Therefore, mastery of technical skills contributes to creating a conducive and supportive work environment.

H2: Technical skills have a positive and significant effect on the work environment.

3. The influence of the work environment on employee productivity.

The work motivation of employees can increase if they work in a friendly, comfortable, and safe place. Employee work motivation tends to grow stronger when they are in a positive and supportive environment. This allows them to complete tasks well and efficiently. Therefore, comfortable workplace conditions play an important role in increasing the productive performance of employees.

H3: The work environment has a positive and significant effect on employee productivity.

4. The influence of technical skills on employee productivity through the work environment as a moderator

Workers with technical skills usually provide regular and professional work experience. Such regular workplace conditions can increase work enthusiasm and productivity. Therefore, the work environment can be a bridge between technical skills and productivity. This means that the work environment not only has a direct effect on productivity, but also strengthens the influence of technical skills on work results.

H4: Technical skills have a positive and significant effect on employee productivity through the work environment as a mediator.

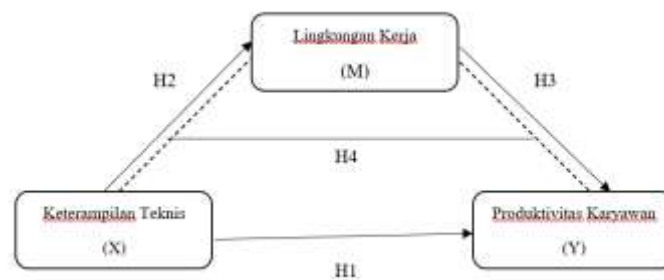


Figure 1. Conceptual Framework

3. Results and Discussion

Results

Research Objects and Respondent Characteristics

This study was conducted at PT Sumber Bara Abadi located on JL Mulawarman, Sumber Sari Village, Sebulu District, Kutai Kartanegara Regency, involving 70 permanent employees as respondents. Most of the respondents were male (92.86%) and dominated by the productive age group, namely 20-30 years (34.29%) and 41-50 years (28.57%). As many as 78.57% of respondents had a high school/vocational high school education background, reflecting the need for advanced technical skills training which is very important in the work environment.

Evaluation Results of Measurement Model or Measurement (Outer) Model

The outer model functions to measure the extent to which the indicators used are able to represent the latent variables they represent. Outer model analysis is carried out by testing validity and reliability. The validity of an indicator can be tested through the value *outer loading*, where the indicator is said to be valid if its value is more than 0.70. In addition, validity testing also involves the value *Average Variance Extracted* (AVE), which is considered to meet the criteria when its value exceeds 0.50.

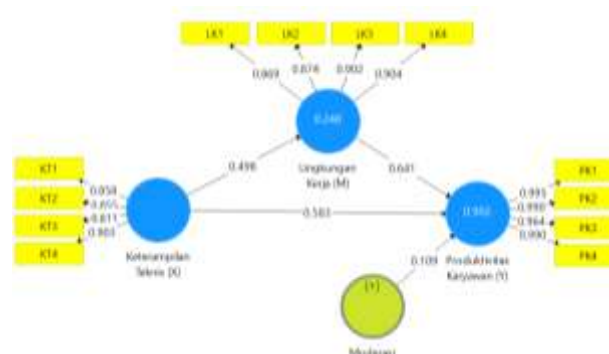


Figure 2. Measurement Model

Based on Figure 2, all indicators in the model have a value *outer loading* above 0.70, so it is declared valid for further testing. Validity is also reviewed through the value *Average Variance Extracted* (AVE). The indicator is said to be valid when the AVE value exceeds 0.50. The AVE results are presented in table 1.

Table 1. Results *Average Variance Extracted* (AVE)

Variables	<i>Average Variance Extracted</i> (AVE)
Technical Skills (X)	0.735
Work Environment (M)	0.788
Moderation	1.000
Employee Productivity (Y)	0.970

Source: Results of data processing with Smartpls (2025)

Based on the measurement results, all variables have values *Average Variance Extracted* (AVE) above 0.50. Thus, it can be concluded that the AVE value has met the criteria and shows adequate validity.

Reliability testing is used to ensure that research instruments can produce consistent, accurate, and stable data. Value *Composite Reliability* (CR) and *Cronbach's alpha* as a reference, where both are considered reliable if their values exceed 0.70. If both values are met, then the instrument can be said to be reliable in measuring the variables studied. Results *Composite Reliability* And *Cronbach's alpha* presented in table 2.

Table 2. Results *Composite Reliability* And *Cronbach's alpha*

	<i>Composite Reliability</i>	<i>Cronbach's Alpha</i>	Information
Technical skills (X)	0.917	0.880	Reliable
Work environment (M)	0.937	0.910	Reliable
Moderation	1.000	1.000	Reliable
Employee productivity (Y)	0.992	0.990	Reliable

Source: Results of data processing with Smartpls (2025)

Based on the analysis results, all constructs in this study have a composite reliability value above 0.70. This shows that each indicator is able to provide consistent responses from respondents. Thus, the instruments used are classified as reliable and appropriate for measuring variables in the study.

Structural Model or Inner Model Results

The inner model functions to analyze the causal relationship between latent variables (variables that cannot be measured directly). Inner model analysis is carried out by testing the Determination Coefficient (R^2), *Effect Size* (f^2), *Predictive Relevance* (Q -Square). The R^2 value ranges from 0 to 1, where a value close to 1 indicates that the independent variable has a strong influence in explaining the dependent variable. In addition, this value also describes the model's ability to predict the dependent variable well. R^2 Results² presented in table 3.

Table 3. Results of the Determination Coefficient (R^2)

	R Square
Work Environment (M)	0.248
Employee Productivity (Y)	0.902

Source: Results of data processing with Smartpls (2025)

Based on table 3, the R^2 value of 0.248 in the work environment shows that technical skills explain 24.8% of the variation. The remaining 75.2% is influenced by other factors. Meanwhile, the R^2 value of 0.902 in productivity shows that technical skills and work environment explain 90.2% of the variation in productivity, and the remaining 9.8% by factors outside the model.

To assess the magnitude of the influence between variables, the value is used *effect size* (f^2). The effect is categorized as small if <0.02 , medium between 0.02–0.15, and large if in the range of 0.15–0.35. The results of f^2 presented in table 4.

Tabel 4. Results Effect Size (F^2)

	Technical Skills (X)	Work Environment (M)	Moderation	Employee Productivity (Y)
Technical Skills (X)		0.330		2.227
Work Environment (M)				2.824
Moderation				0.270
Employee Productivity (Y)				

Source: Results of data processing with Smartpls (2025)

Based on table 4, technical skills have a very large effect on productivity ($f^2 = 2.227$) and quite large on the work environment ($f^2 = 0.330$). The work environment also has a very large effect on productivity ($f^2 = 2.824$). Meanwhile, the moderating effect of the work environment is included in the moderate category ($f^2 = 0.270$). This shows that all variables in the model contribute significantly to employee productivity.

Predictive Relevance (Q^2) is used to assess the ability of the PLS-SEM model to predict out-of-sample data. A Q^2 value greater than 0 indicates that the model has good predictive relevance and practical validity. The Q Square results are presented in Table 5.

Table 5. Results *Predictive Relevance* (Q-Square)

	$Q^2 (=1-SSE/SSO)$
Technical Skills (X)	
Work Environment (M)	0.174
Moderating	
Employee Productivity (Y)	0.844

Source: Results of data processing with Smartpls (2025)

Based on table 5, the q^2 value for the work environment is 0.174 and for employee productivity is 0.844 indicating that the model is able to predict the variables well. technical skills contribute to the work environment, while the combination of technical skills and work environment contributes greatly to productivity. because the value is above 0, the model has good predictive relevance.

Hypothesis Test Results

Hypothesis testing aims to decide whether to accept or reject the proposed hypothesis. The test results are considered significant if the t-statistic value is more than 1.95 and the p-value is less than 0.050. The results of the hypothesis test are presented in table 6.

Table 6. Hypothesis Test Results

	Original Sample (O)	<i>T' - Statistics</i>	<i>P - Value</i>	Results
Technical Skills (X) -> Employee Productivity (Y)	0.583	8.540	0.000	Hypothesis Accepted
Technical Skills (X) -> Work Environment (M)	0.498	3.702	0.000	Hypothesis Accepted
Work Environment (M) -> Employee Productivity (Y)	0.641	11.585	0.000	Hypothesis Accepted
Moderation -> Employee Productivity (Y)	0.109	2.624	0.009	Hypothesis Accepted

Source: Results of data processing with Smartpls (2025)

The results of the hypothesis test show that all relationships between variables in the model are significant, indicated by the value $P\text{-}Value < 0.05$ and $T\text{-}Statistics > 1.95$, so all hypotheses are accepted. This means that employee productivity is influenced by technical skills and is also supported by a conducive work environment.

Discussion

The Influence of Technical Skills on Employee Productivity

Based on the results of data analysis and hypothesis testing conducted, it is known that technical skills have a positive and significant effect on employee productivity at PT Sumber Bara Abadi. This is indicated by the path coefficient value of 0.583, with a value of $p\text{-}value$ of 0.000 and $t\text{-}statistic$ of 8.540 which is greater than the t-table of 1.96, then the first hypothesis is accepted. This finding indicates that the higher the technical skills possessed by employees, the higher the level of work productivity. Employees with good technical skills can complete tasks more efficiently, minimize errors, and produce quality output.

This finding is in line with *Human Capital Theory* which states that skills are the main human capital that directly contributes to increasing productivity. As explained by Becker (1964), investment in employee skills significantly increases work ability and performance. Also reinforces that improving technical skills contributes significantly to employee

productivity in the manufacturing sector [6]. Therefore, companies need to make technical training a strategic priority to increase competitiveness.

The Influence of Technical Skills on the Work Environment

Based on the results of data analysis and hypothesis testing conducted, it is known that technical skills have a positive and significant influence on the work environment, with a path coefficient value of 0.498, p -value of 0,000 and t -statistic of 3.702 > t -table 1.96 supports the acceptance of the second hypothesis. This shows that employees who have adequate technical skills tend to create a more conducive, independent, and productive work atmosphere.

This finding is in line with the perspective *Human Capital Theory*, where employee skill mastery not only improves individual performance, but also shapes the quality of interactions and work processes that support the creation of a healthy work environment. In addition, *Job Demands-Resources (JD-R) Theory* places the work environment as an important resource that employees can utilize to optimize their technical abilities [14]. Confirms that good technical skills increase adaptation and self-confidence in working, thus having a positive impact on the quality of the work environment. Therefore, companies need to strengthen the development of employee technical skills as part of a strategy to create a more conducive work environment.

The Influence of the Work Environment on Employee Productivity

Based on the results of data analysis and hypothesis testing conducted, it is known that the work environment has also been proven to have a positive and significant effect on employee productivity. The path coefficient is 0.641, the value p -value 0,000, and t -statistic 11.585 > t -table 1.96 shows that the third hypothesis is accepted. A clean, safe, and comfortable work environment increases employee motivation, focus, and commitment in carrying out their duties, which directly increases work output.

This result is in line with *Job Demands-Resources (JD-R) Theory* which explains that the work environment is a key resource that supports performance and reduces work pressure (*burnout*). Also stated that the work environment affects employee productivity, emphasizing the importance of investing in work environment management as a strategy to increase productivity [13]. Therefore, the Company needs to continuously create and maintain a safe, comfortable, and supportive work environment both physically and socially in order to increase employee motivation, focus, and commitment which has a direct impact on work productivity.

The Influence of Technical Skills on Employee Productivity Through the Work Environment as a Mediator Variable

Based on the results of data analysis and hypothesis testing conducted, it is known that the work environment is able to mediate the influence of technical skills on employee productivity. The path coefficient is 0.109, the value p -value of 0.009, and t -statistic of 2.624 indicates that the fourth hypothesis is accepted. This means that technical skills not only have a direct impact on productivity, but also indirectly through improving the work environment. Employees with good technical skills are able to create more organized, stable, and efficient work conditions.

This result is in line with *Human Capital Theory* and *JD-RT theory*, where the integration between human capital in the form of technical skills and work environment resources contributes optimally to work performance. Research also emphasized the role of the work environment as a mediator that strengthens the positive relationship between training (technical skills) and productivity [7]. Thus, employee productivity improvement strategies must focus on developing technical skills while strengthening the quality of the work environment.

Based on the research results, companies need to prioritize the development of employee technical skills through continuous training to improve work efficiency and quality [15]. In addition, a comfortable and conducive work environment must be maintained so that employees can utilize their technical skills optimally. The synergy between skill improvement and work environment management will significantly increase productivity. Thus, performance improvement strategies must integrate both aspects simultaneously.

4. Conclusion

The results of this study indicate that technical skills have a positive and significant effect on employee productivity at PT Sumber Bara Abadi, with a path coefficient value of 0.583, $p\text{-value}$ 0,000, and $t\text{-statistic}$ 8.540 (> 1.96). Technical skills also have a significant influence on the work environment, with a path coefficient value of 0.498, $p\text{-value}$ of 0,000 and $t\text{-statistic}$ of 3.702. The work environment is also proven to have a significant influence on employee productivity, indicated by a path coefficient of 0.641, $p\text{-value}$ 0,000, and $t\text{-statistic}$ 11,585. In addition to direct influence, technical skills also have an indirect impact on productivity through the work environment as a mediator variable, with a path coefficient of 0.109, $p\text{-value}$ 0.009, and $t\text{-statistic}$ 2,624. These results reinforce that employees with high technical skills tend to be more productive, especially if supported by a comfortable, safe, and collaborative work environment. Skills and a positive work atmosphere together create optimal performance.

Thus, all hypotheses in this study are proven and mutually supportive. Technical skills honed through continuous training can increase productivity while creating a positive work environment. A conducive work environment also strengthens the influence of technical skills on productivity. Therefore, HR management needs to implement an integrated strategy that includes skills development and improving working conditions. This approach is believed to be able to drive employee efficiency and performance sustainably.

Referensi

- [1]. Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources Model: State of the art. *Journal of Managerial Psychology*, 22(3), 309–328.
- [2]. Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis*. New York: National Bureau of Economic Research.
- [3]. Faenia, D. P., Riskitaa, A., Sugianto, B. A. G. A. R., Husnaya, A., & Wibowo, T. A. (2025). The influence of technical skills and work motivation on employee productivity in MSMEs in the manufacturing sector in Indonesia. *Journal of Social and Cultural Research and Scientific Studies*, 2.
- [4]. Hair, J. F., Hult, G. T., Ringle, C., & Sarstedt, M. (2022). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (Edisi ke-3). SAGE.

-
- [5]. Hidayatullah, M. R. (2025, Maret 10). Indonesia's coal exports plunge in early 2025, lowest in 3 years. *Bisnis.com*. <https://ekonomi.bisnis.com/read/20250511/44/1876138/ekspor-batu-bara-ri-anjlok-awal-2025-terendah-selama-3-tahun-terakhir>
- [6]. Kusuma, A. P. (2025). The influence of environment and employee performance on employee work productivity at PT. Indonesia Trc Industry. *Journal of Economics and Business (JEBS)*, 4(6), 2025–2030.
- [7]. Maliah, M., Damayanti, R., Heryati, H., & Saputra, E. (2023). The influence of work attitude and work skills on employee work productivity at PT. Indonesian Trading Company (PPI). *Journal of Economics Media*, 20(1), 104–119. <https://doi.org/10.31851/jmwe.v20i1.11513>
- [8]. Paila, F. E., Lengkong, V. P. K., & Sendow, G. M. (2023). The influence of occupational safety and health and work environment on employee work productivity at PT. Manado Korin Paradise during the Covid 19 pandemic. *EMBA Journal: Journal of Economics, Management, Business and Accounting Research*, 11(1), 973–982. <https://doi.org/10.35794/emba.v11i1.46898>
- [9]. Pendayani, N. K., & Heryanda, K. K. (2020). The effect of work environment moderation on the relationship between training and work productivity at CV. Mente Bali Sejahtera. *Bisma: Journal of Management*, 6(2), 3–9.
- [10]. Robbins, S. P., & Judge, T. A. (2023). Organizational behavior I. *Choice Reviews Online*, 43(01). <https://doi.org/10.5860/choice.43-0421>
- [11]. Sugiyono. (2023). *Qualitative Quantitative Research Methods and R&D (Edisi ke-5)*. Bandung: Alfabet.
- [12]. Sumantika, E., Mukminin, A., & Badar, M. (2021). The influence of skills and work experience on work productivity (study on employees of Nurmantika Woven Fabric Company, Bima City). *EduSociata: Journal of Sociology Education*, 4(1), 10–26.
- [13]. Vento, S. (2025). Opinion: Medical education in many low-and middle-income countries needs urgent attention and serious improvement. *Frontiers in Medicine*, 12, 1548112.
- [14]. Wijaya, A., Khairullah, K., Syahril, M. F. I. R. M., & Lingga, R. P. (2025). Strengthening the skills of Saprasin UMB human resources through PC assembly, installation, and repair training. *Journal of Education and Community Service*, 8(2).
- [15]. Zaufariyanto, A. M. (2023). The moderation effect of work environment on the influence of work discipline and training on employee work productivity at PT Wija Kusuma Nadi Denpasar Bali. *Journal of Business Research*, 2(11), 2517–2534.