

The Effects of Education, Skills, And Technology on the Productivity of Hospital Medical Staff in Central Lombok Regency

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ABSTRACT: This study aims to determine the influence of education, skills, and technology variables on the productivity of hospital medical personnel in Central Lombok Regency. The sample for this study consisted of 84 hospital medical personnel in Central Lombok Regency. This is a causal study utilizing data collection techniques such as observation, interviews, and questionnaires. Data analysis techniques employed included measurement scaling, instrument testing, classical assumption testing, multiple linear regression analysis, hypothesis testing, and the coefficient of determination (R^2) using SPSS version 13. The results indicate that the education and technology variables do not influence the productivity of medical personnel, whereas work skills do have an impact. However, when considered simultaneously, all independent variables (education, work skills, and technology) collectively exert a significant influence on the productivity of medical personnel.

KEYWORDS: Education, Work Skills, and Technology

I. INTRODUCTION

Employment encompasses all matters related to the workforce before, during, and after the work period. Similarly, according to law no. 13 of 2003, the workforce is defined as any person capable of performing work that produces goods and/or services beneficial to themselves or society at large; therefore, the workforce is a crucial component. The primary contribution of the workforce lies not in quantity but in quality. If the quality of the workforce is high, output will increase (Rumainur, R., & Jaya, I. 2023).

Healthcare workers play a crucial role in maximizing the quality of healthcare services provided to the public so that the public can enhance their awareness, willingness, and ability to live a healthy life, thereby achieving the highest possible level of health as an investment in the development of human resources that are socially and economically productive, as well as one of the elements of general welfare as referred to in the Preamble to the 1945 Constitution of the Republic of Indonesia (Ministry of Health of the Republic of Indonesia, 2014). Factors that can influence work productivity include work motivation, communication, work discipline, work ethics, education, skills, management, income level, technology, production facilities, and the work environment and climate (Rohim and Irayanti, 2022).

A hospital is a healthcare institution that provides comprehensive individual healthcare services, including inpatient care, outpatient care, and emergency care (Ministry of Health of the Republic of Indonesia, 2020). Central Lombok is a regency on the island of Lombok, West Nusa Tenggara, Indonesia. Central Lombok Regency has a total area of 1,095.03 km² and a population of 1,129,778. Central Lombok Regency consists of 12 subdistricts, 12 urban villages, and 127 villages. There are 6 hospitals in Central Lombok Regency, as shown in the table below:

Table 1.1. List of Hospital Names and Number of Hospital Staff in Central Lombok Regency

No	Name of Hospital in Central Lombok Regency	Number of Employees
1	Praya Regional General Hospital	900
2	Yatofa Islamic Hospital	312
3	Bhumi Bunda Womens and Childrens Hospital	30
4	Cahaya Medika Hospital	186
5	Mandalika Hospital, West Nusa Tenggara Province	274
6	Adikarsa General Hospital	86

Source: Central Lombok Regency Health Office

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Based on Table 1.1, it can be seen that Praya Regional General Hospital has the largest number of employees, totaling 900. Meanwhile, Bhumi Bunda Maternity and Childrens Hospital has the fewest employees, totaling 30, in Central Lombok Regency.

Table 1.2. Data on Medical Health Workers in Central Lombok Regency

Medical Health Workers	Total
Medical Personnel	194
Nurses	509
Midwives	221
Total	924

Source: Central Lombok Regency Health Office

Table 1.2 shows that the total number of health workers in hospitals in Central Lombok Regency is 924. Of this total, 194 are medical personnel, 509 are nurses, and 221 are midwives.

Among the workforce at each of these hospitals, several common patterns have emerged: because hospitals must provide services and operate continuously 24 hours a day, a rotating work schedule is implemented, such as *a morning shift* from 8:00 a.m. to 2:00 p.m., afternoon shift from 2:00 PM to 8:00 PM, and night shift from 8:00 PM to 8:00 AM. This shift system often creates problems for staff, as they must manage their time effectively, and many fail to *provide adequate care* to patients. Furthermore, there are still many errors in entering patient data, the registration process is complicated, many staff members arrive late and lack discipline, and some medical staff (doctors/nurses) are so exhausted that they are unfriendly, fail to provide clear information, or overlook allergy histories. This causes the performance of healthcare workers to decline further, which in turn affects work productivity.

II. LITERATUR REVIEW

A. Education

According to Law No. 20 of 2003 on the National Education System, the functions of education are as follows: National education serves to develop abilities and shape the character and civilization of a dignified nation in order to enlighten the nations life; its purpose is to foster the potential of students so that they may become individuals who have faith and piety toward God the Almighty, possess noble character, are healthy, knowledgeable, skilled, creative, independent, and to become democratic and responsible citizens.

According to Hasbullah (2013), the factors influencing education are as follows: 1) Ideology: All human beings are born into the world with equal rights, particularly the right to education and the acquisition of knowledge. 2) Socioeconomic Status: A higher socioeconomic status enables an individual to attain a higher level of education. 3) Sociocultural Factors: Some parents lack an understanding of the importance of formal education for their children. 4) Science and Technology Development: the need to continually seek new knowledge and skills to remain competitive with developed nations. 5) Psychology: a tool for developing an individual's personality to enhance their value.

B. Work skills

Work skills refer to an individual's ability to overcome obstacles by applying greater attention, precision, enthusiasm, and creativity while performing their duties, which drives the production of greater output within a specific timeframe, thereby delivering the best possible results for the company (Ulm, Suyadi & Hartanto, 2018).

Dimensions and indicators of skills, according to Wahyudi, B. (2013), are categorized into the following dimensions and indicators: 1) Competence dimension, with the following indicators: a) Competence in mastering the job. b) Ability to complete tasks. c) Attention to detail in completing tasks. d) Experience in completing tasks. 2) Personality dimension, with the following indicators: - Self-control: a) Self-confidence in completing tasks. b) Commitment to work.

C. Technology

Information technology encompasses all technological tools that can be used to manage, store, present, and communicate information quickly and effectively (Kessi, 2019).

According to (Legesang et al., 2021), there are several indicators of information technology use, namely: 1) Social factors—individual behavior influenced by social factors that lead a person to consciously take actions considered correct; such

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social factors include support or encouragement from coworkers and institutions regarding the use of information technology. 2) Information technology enhances the role of humans; with the advent of information technology, human activities—particularly in terms of handling, processing, and presenting data and information—have become more effective, efficient, and of higher quality. 3) Information technology is reshaping the role of humans. Before the advent of information technology, all work and activities were performed manually by humans, which was inefficient because it took longer. With the advent of information technology, human work and activities have been streamlined and have become more effective and efficient; as a result, humans can now focus on other tasks that cannot be performed by information technology.

D. Productivity

According to the National Productivity Council (as cited in Husein, 2011), productivity is defined as the ratio of the results achieved (output) to the total resources used (input). In other words, productivity has two dimensions. The first dimension is effectiveness, which refers to the achievement of targets related to quality, quantity, and time. The second is efficiency, which relates to comparing inputs with their actual utilization—that is, how the work is carried out. This perspective indicates that productivity encompasses a range of issues related to management activities and technical operations.

III. METHODOLOGY

This study is a causal research study. It was conducted in Central Lombok Regency. The population for this study consisted of 509 healthcare workers (nurses), so the researcher selected a sample of 10% of that population. Thus, the sample for this study comprised 84 healthcare workers (nurses) in Central Lombok Regency. The data collection methods used were observation, interviews, and questionnaires. This study employed multiple linear regression as the analytical tool. The multiple regression analysis model is as follows:

$$Y = \alpha - \beta_1 \cdot X_1 - \beta_2 \cdot X_2 - \beta_3 \cdot X_3 - \epsilon$$

Explanation:

Y = Work Performance

α = Constant

β_1 -3 = Regression Coefficients

X1 = Education

X2 = Work Attitude

X3 = Work Skills

ϵ = Error

A. Classic Assumption Testing

The classical assumption tests include the normality test, the multicollinearity test, and the heteroscedasticity test.

Normality Test

According to Ghozali (2016), the basis for decision-making in the normality test using the One-Sample Kolmogorov-Smirnov Test is as follows:

- If the significance value is > 0.05 , then the data are normally distributed.
- If the significance value is < 0.05 , then the data are not normally distributed.

Multicollinearity Test

According to Ghozali (2016) Multicollinearity can be tested by examining the tolerance and VIF (Variance Inflation Factor) values of each independent variable relative to the dependent variable using SPSS.

- If the tolerance value is ≥ 0.10 and the VIF value is ≤ 10.00 , this indicates that there is no multicollinearity; conversely,
- If the tolerance value is ≤ 0.10 and the VIF value is ≥ 10.00 , this indicates the presence of multicollinearity.

Heteroscedasticity Test

According to Ghozali (2016), the heteroscedasticity test aims to determine whether there is unequal variance in the residuals across different observations within the regression model. If the variance of the residuals remains constant across observations, it is called homoscedasticity; if it varies, it is called heteroscedasticity.

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B. Statistical Test

Partial Effect Significance Test (t-Test)

The t-test is conducted to determine the effect of each independent variable on the dependent variable (Ghozali, 2016). This test is performed using the following criteria:

- If the significance level (sig) is less than 0.05 and the calculated t-value is greater than the critical t-value, then H_0 is rejected and H_1 is accepted. This means the independent variable has a significant effect on the dependent variable.
- If the significance level (sig) is greater than 0.05 and the calculated t-value is less than the critical t-value, then H_0 is accepted and H_1 is rejected. This means the independent variable does not have a significant effect on the dependent variable.

F-Test

The F-test is conducted to determine whether all independent variables included in the model have a combined effect on the dependent variable (Ghozali, 2016). Test criteria:

- If the sig value is < 0.05 and the calculated F value is $>$ the table F value, then H_0 is rejected and H_1 is accepted.
- If the sig value is > 0.05 and the calculated F value is $<$ the table F value, then H_0 is accepted and H_1 is rejected.

Coefficient of Determination (R^2)

According to Ghozali (2016), the coefficient of determination (R^2) measures the extent to which the model explains the variation in the dependent variable. The coefficient of determination ranges from zero to one. A small value of R^2 indicates that the independent variables have a very limited ability to explain the variation in the dependent variable. A value close to one means that the independent variables provide almost all the information needed to predict the variation in the dependent variable.

C. Validity and Reliability Test

According to Ghozali (2016), validity testing is used to assess whether a questionnaire we administer is valid. A questionnaire is considered valid if its questions can reveal what the questionnaire itself is intended to measure. To determine whether an item is valid or not, a minimum correlation coefficient of 0.30 is used as the threshold. All items that achieve a correlation coefficient of 0.30 are considered to have satisfactory discriminative power. Therefore, items with a correlation coefficient below 0.30 are considered invalid.

Reliability testing is a method that assesses the degree of consistency and stability of the data. According to Ghozali (2016), a questionnaire is considered reliable if a persons responses to the statements are consistent over time. This test is conducted by calculating the Cronbachs alpha coefficient for each item within a variable. An item is considered reliable if it has a Cronbachs alpha coefficient greater than 0.6.

IV. RESULTS AND DISCUSSION

A. Classic Assumption Test

Normality Test

Table 1. Normality Test Result

One-Sample Kolmogorov-Smirnov Test		
		Unstandardiz ed Residual
N		84
Normal Parameters a,b	Mean	,0000000
	Std. Deviation	,93845636
Most Extreme Differences	Absolute	,132
	Positive	,088
	Negative	-,132
Kolmogorov-Smirnov Z		1,206
Asymp. Sig. (2-tailed)		,109

a. Test distribution is Normal.

b. Calculated from data.

Based on the results of the regression analysis of the normality test using the Kolmogorov-Smirnov method, an *Asymp. Sig. (2-tailed)* value of 0.109 was obtained. Since this value is greater than 0.05 ($0.109 > 0.05$), it can be concluded that the data are normally distributed.

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Multicollinearity Test

Table 2. Multicollinearity Test Result

Coefficients ^a								
Model	Unstandardized Coefficients			Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error					Tolerance	VIF
1 (Constant)	7,967	1,726			4,617	,000		
X1	-,018	,074	-,021	-,245	,807		,662	1,510
X2	,713	,065	,797	10,998	,000		,941	1,062
X3	-,103	,080	-,111	-1,282	,203		,658	1,520

a. Dependent Variable: Y

The results of the regression analysis for the multicollinearity test can be determined through the *Tolerance* and *Variance Inflation Factor* (VIF) values. The Tolerance values for the three independent variables in this study— education (X₁), work skills (X₂), and technology (X₃)—are 0.662, 0.941, and 0.658, respectively, and all are greater than 0.100 (> 0.100). Furthermore, the *Variance Inflation Factor* (VIF) calculations show that the VIF values for each independent variable are 1.510, 1.062, and 1.520, all of which are less than 10.00 (<10.00). Thus, it can be concluded that in this regression model, there is no evidence of multicollinearity among the independent variables.

Heteroscedasticity Test

Table 3. Heteroscedasticity Test Result

Coefficients ^a						
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error				
1 (Constant)	-7,295	3,877		-1,882	,064	
X1	,150	,166	,122	,902	,370	
X2	,017	,146	,013	,114	,909	
X3	,121	,181	,091	,671	,504	

a. Dependent Variable: LN_RES

Based on the results of the heteroscedasticity test using Parks test in the *Coefficients* table, the significance values for the variables Education (X₁) were 0.370, Work Skills (X₂) were 0.909, and Technology (X₃) were 0.504. All of these significance values are greater than 0.05 (Sig. > 0.05). Thus, it can be concluded that the regression model does not exhibit heteroscedasticity.

B. Statistical Test

Partial Effect Significance Test (t-Test)

Table 4. t-Test Result

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
1 (Constant)	7,967	1,726		4,617	,000
X1	-,018	,074	-,021	-,245	,807
X2	,713	,065	,797	10,998	,000
X3	-,103	,080	-,111	-1,282	,203

a. Dependent Variable: Y

The calculated t-value for the education variable (X₁) is -0.245 with a significance level of 0.807 (>0.05). When compared to the critical t-value of 1.990, the calculated t-value is smaller than the critical t-value, i.e., (-0.245 < 1.990), which means H₀ is accepted and H₁ is rejected. Therefore, it is concluded that the Education variable does not have a significant partial effect on the Work Productivity variable (Y).

The calculated t-value for the Work Skills variable (X₂) is 10.998 with a significance level of 0.000 (<0.05). When compared to the t-table value of 1.990, the calculated t-value is greater than the t-table value (10.998 > 1.990), which means H₀ is accepted and H₁ is rejected. Therefore, it is concluded that the Work Skills variable has a significant partial effect on the Work Productivity variable (Y).

The calculated t-value for the Technology variable (X₃) is -1.282 with a significance level of 0.203 (>0.05). When compared to the t-table value of 1.990, the calculated t-value is smaller than the t-table value, namely (-1.282 < 1.990), which means that H₀ is

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accepted and H_1 is rejected. Therefore, it can be concluded that the Technology variable does not have a significant partial effect on the Work Productivity (Y) variable.

F-Test

Table 5. F-Test Result

ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	111,711	3	37,237	40,753	,000 ^a
	Residual	73,098	80	,914		
	Total	184,810	83			

a. Predictors: (Constant), X3, X2, X1

b. Dependent Variable: Y

From the statistical calculations using SPSS 13, an F-statistic value of 40.753 was obtained with a significance level of 0.000 (<0.05). Based on this F-significance value, the F-table value with $df = 84 - 3 - 1 = 80$ is 2.72. Thus, the calculated F-value is greater than the table F-value, which means H_0 is rejected and H_1 is accepted. This indicates that the variables Education (X_1), Work Skills (X_2), and Technology (X_3) have an effect on the labor productivity of medical health workers in Central Lombok Regency (Y).

Coefficient of Determination (R^2)

Table 6. Coefficient of Determination (R^2)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,777 ^a	,604	,590	,95589

a. Predictors: (Constant), X3, X2, X1

Based on the results of the coefficient of determination test, the adjusted R-squared value is 0.590. This indicates that the variables of education, work skills, and technology collectively account for 59% of the variation in labor productivity, while the remaining 41% is influenced by other variables outside the scope of this study.

C. Validity and Reliability Test

Table 7. Validity Test

Education

		Correlations					
		X1.1	X1.2	X1.3	X1.4	X1.5	TX1
X1.1	Pearson Correlation	1	,389**	,195	,469**	,457**	,737**
	Sig. (2-tailed)		,000	,076	,000	,000	,000
	N	84	84	84	84	84	84
X1.2	Pearson Correlation	,389**	1	,099	,342**	,531**	,731**
	Sig. (2-tailed)	,000		,368	,001	,000	,000
	N	84	84	84	84	84	84
X1.3	Pearson Correlation	,195	,099	1	,111	,187	,391**
	Sig. (2-tailed)	,076	,368		,316	,089	,000
	N	84	84	84	84	84	84
X1.4	Pearson Correlation	,469**	,342**	,111	1	,329**	,727**
	Sig. (2-tailed)	,000	,001	,316		,002	,000
	N	84	84	84	84	84	84
X1.5	Pearson Correlation	,457**	,531**	,187	,329**	1	,743**
	Sig. (2-tailed)	,000	,000	,089	,002		,000
	N	84	84	84	84	84	84
TX1	Pearson Correlation	,737**	,731**	,391**	,727**	,743**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	
	N	84	84	84	84	84	84

** . Correlation is significant at the 0.01 level (2-tailed).

Based on the results of the validity test above, it can be seen that the values of all items regarding education (1—5) are greater than 0.215. In other words, the calculated r is > than the table value of r (0.215), which means they are valid. Thus, all items in the education questionnaire are valid.

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Work Skills

Correlations							
		X2.1	X2.2	X2.3	X2.4	X2.5	TX2
X2.1	Pearson Correlation	1	,542**	,123	,239*	,480**	,795*
	Sig. (2-tailed)		,000	,264	,028	,000	,000
	N	84	84	84	84	84	84
X2.2	Pearson Correlation	,542**	1	,083	,165	,424**	,737*
	Sig. (2-tailed)	,000		,451	,133	,000	,000
	N	84	84	84	84	84	84
X2.3	Pearson Correlation	,123	,083	1	,046	,184	,410*
	Sig. (2-tailed)	,264	,451		,679	,093	,000
	N	84	84	84	84	84	84
X2.4	Pearson Correlation	,239*	,165	,046	1	,138	,465*
	Sig. (2-tailed)	,028	,133	,679		,210	,000
	N	84	84	84	84	84	84
X2.5	Pearson Correlation	,480**	,424**	,184	,138	1	,720*
	Sig. (2-tailed)	,000	,000	,093	,210		,000
	N	84	84	84	84	84	84
TX2	Pearson Correlation	,795**	,737**	,410**	,465**	,720**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	
	N	84	84	84	84	84	84

** . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Based on the results of the validity test above, it can be seen that the values for all items regarding work skills (1—5) are greater than 0.215. In other words, the calculated r is > than the table r (0.215), which means they are valid. Thus, all items in the work skills questionnaire are valid.

Technology

Correlations							
		X3.1	X3.2	X3.3	X3.4	X3.5	TX3
X3.1	Pearson Correlation	1	,167	,286**	,243*	,104	,483*
	Sig. (2-tailed)		,128	,008	,026	,347	,000
	N	84	84	84	84	84	84
X3.2	Pearson Correlation	,167	1	,411**	,374**	,346**	,714**
	Sig. (2-tailed)	,128		,000	,000	,001	,000
	N	84	84	84	84	84	84
X3.3	Pearson Correlation	,286**	,411**	1	,437**	,380**	,766**
	Sig. (2-tailed)	,008	,000		,000	,000	,000
	N	84	84	84	84	84	84
X3.4	Pearson Correlation	,243*	,374**	,437**	1	,207	,704**
	Sig. (2-tailed)	,026	,000	,000		,058	,000
	N	84	84	84	84	84	84
X3.5	Pearson Correlation	,104	,346**	,380**	,207	1	,627**
	Sig. (2-tailed)	,347	,001	,000	,058		,000
	N	84	84	84	84	84	84
TX3	Pearson Correlation	,483**	,714**	,766**	,704**	,627**	1
	Sig. (2-tailed)	,000	,000	,000	,000	,000	
	N	84	84	84	84	84	84

** . Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Based on the validity test results in Table 4.8, it can be seen that the values for all items regarding technology (1—5) are greater than 0.215. In other words, the calculated r is > than the table r (0.215), which means they are valid. Thus, all items in the technology questionnaire are valid.

Table 8. Reliability Test Education

Reliability Statistics	
Cronbach's Alpha	N of Items
,696	5

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Work Skills

Reliability Statistics

Cronbach's Alpha	N of Items
,639	5

Technology

Reliability Statistics

Cronbach's Alpha	N of Items
,684	5

The results of the reliability test for all variables using *Cronbachs Alpha*, as shown in Table, indicate an Alpha value greater than 0.600. Therefore, it can be concluded that this study is *reliable*.

D. DISCUSSION

The Effect of Education on the Productivity of Medical Workers

The results of this study indicate that education does not affect the productivity of medical personnel, with a calculated t-value of -0.254, which is less than the critical t-value of 1.990, and a significance value of 0.807. This indicates that the significance level (sig) is greater than 0.05 and the calculated t-value is less than the critical t-value; therefore, H_0 is accepted and H_1 is rejected—in other words, the education variable does not affect the productivity of medical personnel. This finding is inconsistent with existing human capital theory, which posits that as an individual advances through each level of education, their abilities and quality as a worker also improve. The lack of a significant effect of education may occur when medical workers possess a high level of education but lack the necessary skills or soft skills to support their performance on the job.

The Effect of Work Skills on the Productivity of Medical Workers

The results of this study indicate that work skills influence the productivity of medical personnel, with a calculated t-value of 10.998 > the critical t-value of 1.990 and a significance level of 0.000. This indicates that the significance value is < 0.05 and the calculated t-value is greater than the critical t-value; therefore, H_0 is accepted and H_1 is rejected—meaning that the work skills variable influences the productivity of medical personnel.

The Effect of Technology on the Productivity of Medical Personnel

The results of this study indicate that technology does not affect the productivity of medical personnel, with a calculated t-value of -1.282, which is less than the critical t-value of 1.990, and a significance level of 0.203. This indicates that the significance value is greater than 0.05 and the calculated t-value is less than the critical t-value; therefore, H_0 is accepted and H_1 is rejected, indicating that the technology variable does not affect the productivity of medical personnel.

The Effects of Education, Job Skills, and Technology on the Productivity of Medical Personnel

For the variables of education, job skills, and technology, the calculated F-value is 40.753 with a significance level of 0.000. Meanwhile, the df value in column 3, row 80, is 2.72. Based on this, it can be seen that $40.753 > 2.72$. Since the significance value is < 0.05 and the calculated F-value is > the table F-value, H_0 is rejected and H_1 is accepted; in other words, the variables of education, job skills, and technology have a significant simultaneous effect on the productivity of medical personnel.

V. CONCLUSION

Based on the data analysis and discussion of the research results, the following conclusions can be drawn:

1. Partially, education and technology do not have a significant effect on the productivity of medical workers in Central Lombok Regency. Meanwhile, work skills have a significant effect on the productivity of medical workers in Central Lombok Regency.
2. Simultaneously, education, job skills, and technology have a significant effect on the productivity of medical personnel in Central Lombok Regency.

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