ISSN : 2962-9195 E-ISSN : 2963-8992

Journal of Educational Management Research
Vol. 05 No. 02 (2026) : 1083-1105
Available online at https://serambi.org/index.php/jemr

The Effects of Work Efficiency, Progress Monitoring, and Digital Collaboration on Human Resource Performance in a Digital-Based Certification Institution

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DOI: https://doi.org/10.61987/jemr.v5i2.1835

Keywords:
Digital Transformation, Work Efficiency, Employee Performance

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ABSTRACT

This study examines the effects of work efficiency, progress monitoring, and digital collaboration on employee performance within the context of digital transformation in a certification institution. The research aims to analyze both the partial and simultaneous influence of these three factors on employee performance during the transition to a digital-based work system. A quantitative approach was employed using a survey method involving 40 respondents selected through purposive sampling. Data were collected through a Likert-scale questionnaire and analyzed using multiple linear regression, t-tests, F-tests, and the coefficient of determination. The findings reveal that, partially, work efficiency has a positive and significant effect on employee performance, while progress monitoring and digital collaboration do not show a significant individual effect. However, simultaneously, all three variables significantly influence employee performance, indicating a strong explanatory power of the regression model. These results suggest that the success of digital transformation in certification institutions is primarily supported by improved work efficiency and the integrated implementation of digital management practices. The study implies that education and training institutions undergoing digital transformation should prioritize efficiency-oriented digital strategies while strengthening the synergy between monitoring systems and digital collaboration to enhance overall employee performance.

Article History:
Received: November 2025; Revised: December 2025; Accepted: January 2026

Please cite this article in APA style as:
Prastyo, H., Rachmawati, I. K., & Handoko, Y. (2026). The Effects of Work Efficiency, Progress Monitoring, and Digital Collaboration on Human Resource Performance in a Digital-Based Certification Institution. *Journal of Educational Management Research, 5*(2), 1083-1105.

INTRODUCTION

In the context of the Industrial Revolution 4.0 and Society 5.0, information technology such as artificial intelligence (AI), big data, and the Internet of Things (IoT) has become a fundamental driver of transformation that integrates the physical and digital worlds (Yulianti & Maharani, 2024). Digital transformation

is no longer limited to the automation of manual processes but represents a comprehensive shift that reshapes work culture, service models, and organizational strategies (Segara & Nasution, 2024). For society at large, this transformation is crucial as it determines the efficiency, transparency, and responsiveness of public and corporate services (Dewi & Manshur, 2026; Hefniy & Alwahedi, 2025; Holidi, 2025; Khofsah & Rozi, 2025). Organizations that fail to adapt risk declining productivity and reduced competitiveness, which may ultimately affect economic sustainability and service quality. Empirical evidence across sectors shows that digital adoption can significantly enhance operational performance when supported by effective management practices. Therefore, understanding how digital transformation influences employee performance is essential, as human resources remain the primary actors who translate digital systems into tangible outcomes. This study is important for society because it provides empirical insights into how digital management practices contribute to workforce performance during digital transitions.

Despite the rapid advancement of digital technologies, many organizations encounter persistent challenges in ensuring that digital transformation initiatives effectively improve employee performance (Hikmah & Mudarris, 2026; Kusumawati, 2025; Syafiih, 2025). The general problem lies in the uneven readiness of human resources to adapt to new digital systems, which often leads to inefficiencies, resistance to change, and suboptimal utilization of technology. While digital tools are designed to streamline workflows, their implementation frequently creates new complexities related to work coordination, progress monitoring, and inter-employee collaboration. These challenges are not only technical but also managerial, as they require organizations to redesign work processes and performance management systems (Fatmasari & Windiyani, 2025; Putri et al., 2024; Rodliyah & Khusnuridlo, 2024). In the broader societal context, ineffective digital transformation can hinder service delivery and limit the potential benefits of technological investments (Faisal, 2023; Masrum et al., 2023; Rozi et al., 2023). Previous studies suggest that without proper integration of efficiency-oriented practices, monitoring mechanisms, and digital collaboration, digital systems may fail to generate expected performance improvements. Consequently, there is a pressing need for empirical studies that examine how specific aspects of digital work systems influence employee performance in organizational settings undergoing digital transition.

The phenomenon of digital transformation is clearly observable within PT PLN (Persero), where digitalization has become a strategic pillar to accelerate electrification, expand clean energy, and develop modern, efficient, and real-time customer services. This transformation has contributed to PLN's achievement of

being listed in the Fortune Global 500 in 2025, reflecting the effectiveness of its digital strategy and the implementation of the Beyond kWh business model. At the operational level, PT PLN (Persero) Pusat Sertifikasi is undergoing a digital transition through the implementation of the Pusertif Inspection Certification and Testing Services (PICTS) application. This system digitizes job requests, work monitoring, and reporting processes that were previously manual and fragmented. Although PICTS has been strategically targeted as a key organizational initiative, its implementation remains ongoing and is currently focused on the Power Generation Systems Division. This transition presents a critical opportunity to assess how digital systems affect employee performance, particularly in core tasks such as real-time reporting and certification processes.

Previous studies have extensively examined the relationship between digital transformation and employee performance across various organizational contexts. Research on work efficiency consistently indicates that digital tools can enhance productivity by reducing process redundancy and accelerating task completion. Studies on progress monitoring emphasize the role of digital tracking systems in improving accountability and performance evaluation, while research on digital collaboration highlights the importance of communication platforms in supporting teamwork and knowledge sharing. However, most existing studies analyze these variables separately, often within different organizational settings and levels of digital maturity. As a result, the findings remain fragmented and context-specific. Furthermore, empirical results regarding progress monitoring are inconsistent, with some studies reporting positive effects on performance and others indicating insignificant or even negative outcomes due to increased work pressure. This fragmented approach limits the ability to understand how these variables interact within an integrated digital work environment, particularly in certification and training institutions undergoing structured digital transitions.

The limitations of prior research reveal a significant gap in the literature. First, there is a lack of studies that simultaneously examine work efficiency, progress monitoring, and digital collaboration within a single analytical framework. Second, few studies focus on certification institutions, which combine elements of education, training, and operational service delivery. Third, the transitional phase of digitalization remains underexplored, even though this stage is critical for determining the long-term success of digital initiatives. Existing research tends to assess digital transformation either before full implementation or after stabilization, thereby overlooking the dynamic challenges faced during the transition period. Consequently, there is insufficient empirical evidence explaining how the synergy among efficiency, monitoring, and collaboration affects employee performance in real-world digital transitions.

Addressing this gap is essential to develop a more holistic understanding of digital management practices and to provide practical guidance for organizations implementing digital systems in complex operational environments.

This study offers novelty by integrating work efficiency, progress monitoring, and digital collaboration into a single empirical model within the context of digital transition in a certification institution. Unlike previous studies that adopt a partial or fragmented approach, this research examines both the individual and simultaneous effects of these variables on employee performance. The study further contributes to the state of the art by focusing on an institution that operates at the intersection of digital services, certification, and professional training, an area that remains underrepresented in the literature. Additionally, the use of real operational performance indicators during an ongoing digital transition provides timely and contextually rich insights. By analyzing the interaction among key digital management practices, this research advances understanding of how digital transformation can be strategically managed to enhance employee performance, thereby offering both theoretical enrichment and practical relevance.

Based on the identified gaps and observed field phenomena, this study addresses the following research problem: how do work efficiency, progress monitoring, and digital collaboration influence employee performance during the digital transition process? The study argues that while work efficiency directly enhances task completion and output quality, progress monitoring and digital collaboration contribute more effectively when integrated within a coherent digital management system. This research hypothesizes that the simultaneous implementation of these variables produces a synergistic effect that strengthens employee performance. The contribution of this study lies in providing empirical evidence on the interaction of key digital management practices within a certification institution context. The findings are expected to inform organizational leaders, policymakers, and education and training institutions on how to design effective digital transformation strategies that prioritize human resource performance as a critical success factor.

Hypothesis

Work Efficiency

This variable measures the impact of digitalization on the optimization of work processes, particularly in reducing time wastage, minimizing operational costs, and maximizing resource utilization through digitalized systems. Previous studies have consistently reported a positive relationship between work efficiency and employee performance, indicating that higher levels of efficiency

contribute to improved productivity and work outcomes (Syam, 2020; Herawati, 2022; Tessalonika et al., 2021; Rohma, 2023; Ernawati et al., 2025). In the context of digital transformation, efficiency-oriented systems enable employees to perform tasks more effectively and accurately, thereby enhancing overall performance. Based on this theoretical and empirical foundation, the following hypothesis is proposed:

H1: Work efficiency has a positive and significant effect on employee performance.

Progress Monitoring

This variable assesses the role of digital systems in enhancing work transparency and accountability through real-time tracking features, intermediate target achievement, and centralized reporting mechanisms. Several empirical studies have found that monitoring systems positively and significantly influence employee performance by improving supervision and performance control (Najriyana & Rahman, 2021; Pramina et al., 2024; Harefa et al., 2023). However, contrasting findings have also been reported, indicating no statistically significant effect of work monitoring on employee performance, particularly when monitoring is perceived as excessive or rigid (Abdillah & Sari, 2023). These inconsistent results suggest that the effectiveness of progress monitoring may depend on how it is integrated within digital work systems. Therefore, further empirical examination is required, leading to the formulation of the following hypothesis:

H2: Progress monitoring has a positive and significant effect on employee performance.

Digital Collaboration

This variable evaluates changes in interaction and work coordination patterns facilitated by digital technology, including information accessibility, structured task coordination, and cross-functional synergy. Prior research has demonstrated that digital collaboration positively and significantly affects employee performance by fostering teamwork, communication efficiency, and knowledge sharing (Diputra et al., 2025; Nuriza et al., 2024; Lusiana et al., 2025). Nevertheless, other studies have reported insignificant effects, suggesting that collaboration alone may not automatically improve performance without effective management support (Farica & Renwarin, 2022). These mixed findings highlight the importance of contextual analysis, particularly within organizations undergoing digital transition. Accordingly, the following hypothesis is proposed:

H3: Digital collaboration has a positive and significant effect on employee

performance.

Simultaneous Hypothesis and Research Gap

Previous literature demonstrates a tendency to examine work efficiency, progress monitoring, and digital collaboration separately across different organizational contexts, resulting in fragmented empirical evidence. The lack of studies employing a simultaneous analytical approach limits understanding of the interaction dynamics and potential synergistic effects among these variables. Moreover, contradictory findings, particularly regarding progress monitoring, emphasize the need for a more integrated research framework. Within the context of digital transformation in certification institutions, these variables are inherently interconnected and collectively shape employee performance outcomes. To address this research gap, the following simultaneous hypothesis is formulated:

H4: Work efficiency, progress monitoring, and digital collaboration simultaneously have a positive and significant effect on employee performance.

RESEACH METHOD

This study adopts a quantitative research design using a survey method, which is appropriate for examining causal relationships between variables and testing empirically formulated hypotheses. The quantitative approach was selected because it enables objective measurement and statistical analysis of the influence of work efficiency, progress monitoring, and digital collaboration on employee performance (Gul, 2023; Sardana et al., 2023). The research design is causal–associative, aiming to identify both partial and simultaneous effects among variables. This design is widely used in organizational and management studies to explain relationships between independent and dependent variables through numerical data and inferential statistics. According to Sugiyono (2018), a sample represents part of the population that reflects its characteristics, while Arikunto (2010) emphasizes that a sample must adequately represent the population being studied to ensure valid conclusions.

The research was conducted at a certification institution undergoing a digital transformation process, specifically within the unit responsible for inspection and commissioning of power plant systems. This location was chosen because it is actively implementing a digital work system through the PICTS application, which directly affects work efficiency, progress monitoring, and digital collaboration. The selected unit represents a critical operational function where digitalization is expected to significantly influence employee performance. The population of this study consisted of employees involved in inspection and commissioning activities who directly use the digital system in

their daily tasks, making them relevant and information-rich respondents for the research objectives.

Data collection was carried out using primary data obtained through a structured questionnaire. The questionnaire was designed based on the research variables and measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Considering the need for respondents with specific characteristics, the sampling technique employed was non-probability sampling with a purposive sampling method. This technique was selected to ensure that only employees who were directly involved in the implementation of the digital system participated in the study. A total of 40 respondents were selected as the research sample, which was deemed sufficient for regression analysis in exploratory quantitative research.

Data analysis was conducted using SPSS version 26. The analytical procedures included multiple stages. First, descriptive statistics were used to provide an overview of respondent characteristics and variable distributions. Second, inferential statistical analysis was performed using multiple linear regression to examine the effect of work efficiency (X_1), progress monitoring (X_2), and digital collaboration (X_3) on employee performance (Y). The regression model applied in this study is expressed as:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e,$$

where Y represents employee performance, α is the constant, β_1, β_2, β_3 are regression coefficients, X_1 is work efficiency, X_2 is progress monitoring, X_3 is digital collaboration, and e is the error term. Hypothesis testing was conducted using partial t-tests, a simultaneous F-test, and the coefficient of determination (R^2).

To ensure the validity and reliability of the data, several data quality and assumption tests were conducted. Instrument validity was examined using correlation analysis, while reliability was tested using Cronbach's Alpha to ensure internal consistency of the measurement items. Furthermore, classical assumption tests including normality, heteroscedasticity, and multicollinearity tests were performed to confirm that the data met the requirements for multiple linear regression analysis. These procedures were implemented to enhance the robustness, credibility, and trustworthiness of the research findings.

RESULT AND DISCUSSION

Result

Description of Respondent Characteristics

Based on the data obtained, the characteristics of respondents based on gender can be seen as follows:

Table 1Respondent characteristics based on gender

	Gender	Amount	Percentage (%)
1.	Man	35	87.5
2.	Woman	5	12.5
Amount		40	100

(Source: Processed data, 2025)

Based on Table 1, the characteristics of respondents based on gender show that male respondents numbered 35 people (87.5%) of the total participants, while female respondents numbered 5 people (12.5%). The dominance of male respondents in this study reflects the technical operational characteristics of the inspection and commissioning field, while all female respondents who participated had an engineering educational background so that they remained representative of the research object.

Based on the data obtained, the characteristics of respondents according to age can be explained as follows:

Table 2Respondent characteristics based on age

No	Age	Amount	Percentage (%)
1.	< 25 years	1	2.5
2.	25-35 years	11	27.5
3.	36-45 years old	27	67.5
4.	46-55 years	1	12.5
Amount		40	100

(Source: Processed data, 2025)

Based on Table 2, the characteristics of respondents by age show that most are in the productive age range. The 36–45 age group is the most dominant category with 27 respondents (67.5%), followed by the 25–35 age group with 11 respondents (27.5%). The <25 age group and 46–55 age groups are each represented by only 1 respondent (2.5%). These characteristics indicate that respondents have optimal work capacity potential, both in terms of physical and work experience, making it relevant to assess the variables studied in the context of employee performance and the digitalization transition process.

Based on the collected data, the characteristics of respondents based on education level are explained as follows:

Table 3Respondent characteristics based on education

No	Education	Amount	Percentage (%)
1.	D3	8	20
2.	S1	24	60
3.	S2	8	20
Amount		40	100

(Source: Processed data, 2025)

Based on Table 3, the respondents' educational levels show a diverse distribution. The majority of respondents had a Bachelor's degree (S1) with a total of 24 respondents (60%). Respondents with a Diploma 3 (D3) education numbered 8 people (20%), while respondents with a Master's degree (S2) also numbered 8 people (20%). The relatively high educational background supports respondents' ability to understand work procedures, master technology, and adapt to the digitalization process, so the collected data is relevant for analysis related to employee performance and the research variables examined.

Based on the data collected, the characteristics of respondents according to tenure are explained as follows:

Table 4Respondent characteristics based on length of service

No	Years of service	Amount	Percentage (%)
1.	< 1 year	1	2.5
2.	1-5 years	4	10
3.	6- 10 years	5	12.5
4.	11-15 years	16	40
5.	>15 years	14	35
Amount		40	100

(Source: Processed data, 2025)

Based on Table 4, the characteristics of respondents based on length of service show quite a wide variety of work experience. Respondents with 11–15 years of service are the most dominant group, with 16 people (40%). Respondents with more than 15 years of service are in second place with 14 people (35%). The group of respondents with 6–10 years of service consists of 5 people (12.5%), while respondents with 1–5 years of service consists of 4 people (10%). Respondents with less than 1 year of service consist of only 1 person (2.5%). These characteristics support the relevance of respondents in assessing employee performance and the impact of the digitalization transition, as respondents have directly experienced changes in work systems.

The study respondents were predominantly male (87.5%), within the productive age range of 36-45 years (67.5%), with a bachelor's degree (60%), and 11-15 years of work experience (40%). These characteristics indicate that the respondents possess sufficient experience and capacity to assess the study variables.

Validity Test Results

Table 5. Results of the Validity Test of the Work Efficiency Variable (X1)

Item	r count	r table	Sig. (2-*tailed*)	Conclusion
X1.1.1	0.753	0.2573	0,000	*Valid*
X1.2.1	0.698	0.2573	0,000	*Valid*
X1.3.1	0.828	0.2573	0,000	*Valid*
X1.4.1	0.765	0.2573	0,000	*Valid*

(Source: Processed data, 2025)

Table 5 shows that all items in the Work Efficiency variable (X1) are declared valid. This is based on the correlation value (calculated r) for each item, which is greater than the table r (0.2573) and a p-value of 0.000 (<0.05). Thus, all items are suitable for use in measuring this variable in the study.

Table 6. Results of the Validity Test of *the Progress Monitoring Variable* (X2)

Item	r count	r table	Sig. (2-tailed)	Conclusion
X2.1.1	0.763	0.2573	0,000	*Valid*
X2.2.1	0.702	0.2573	0,000	*Valid*
X2.3.1	0.829	0.2573	0,000	*Valid*
X2.4.1	0.739	0.2573	0,000	*Valid*

(Source: Processed data, 2025)

Table 6 shows that all statement items in the Progress Monitoring variable (X2) are declared valid because they have a significant correlation with the total score of the variable. This is indicated by a Pearson Correlation value greater than the table's r (0.2573) and a p-value of 0.000 (<0.05). Thus, all items are suitable for use in measuring this variable in the study.

Table 7. Results of the Validity Test of the Digital Collaboration Variable (X3)

Item	r count	r table	Sig. (2-tailed)	Conclusion
X3.1.1	0.899	0.2573	0,000	*Valid*
X3.2.1	0.894	0.2573	0,000	*Valid*
X3.3.1	0.947	0.2573	0,000	*Valid*
X3.4.1	0.733	0.2573	0,000	*Valid*

(Source: Processed data, 2025)

Table 7 shows that all items in the three variables: Work Efficiency (X1), Progress Monitoring (X2), and Digital Collaboration (X3) are declared valid. Each item has a correlation value (r count) greater than the critical value of r table (0.2573) and a p-value of 0.000 (<0.05). Thus, all statements in these three variables are suitable for use as measurements in this study.

Table 8. Results of the Validity Test of the Employee Performance Variable (Y)

Item	r count	r table	Sig. (2-tailed)	Conclusion
Y.1.1	0.926	0.2573	0,000	*Valid*
Y.2.1	0.917	0.2573	0,000	*Valid*
Y.3.1	0.940	0.2573	0,000	*Valid*
Y.4.1	0.922	0.2573	0,000	*Valid*
Y.4.2	0.890	0.2573	0,000	*Valid*

(Source: Processed data, 2025)

Based on table 8, it shows that all statement items in the Employee Performance variable (Y) are declared valid. This is evidenced by the correlation value (r count) of each item which is higher than r table (0.2573) and p-value 0.000 (<0.05). Thus, all items are suitable for use to measure the Employee Performance variable in the study. for all research variables, namely Work Efficiency (X1), Progress Monitoring (X2), Digital Collaboration (X3), and Employee Performance (Y) are declared valid. Each item in all variables has a correlation value (r count) greater than the critical value of r table (0.2573) with a p-value of 0.000 (<0.05). Thus, all statements used are declared *valid* and suitable for measuring these variables in this study.

Reliability Test Results

Table 9. Reliability Test Results

Variables	*Cronbach's Alpha*	Provision	Conclusion
Work efficiency (X1)	0.708	> 0.6	Reliable
Monitoring Progress (X2)	0.751	> 0.6	Reliable
Digital Collaboration (X3)	0.893	> 0.6	Reliable
Employee Performance (Y)	0.952	> 0.6	Reliable

(Source: Processed data, 2025)

Based on the reliability test results table above, it can be seen that all research variables have *Cronbach's Alpha values* exceeding the minimum limit of 0.6. This indicates that the research instrument used to measure each variable has high internal consistency and is reliable.

Classical Assumption Test Results

Normality Test Results

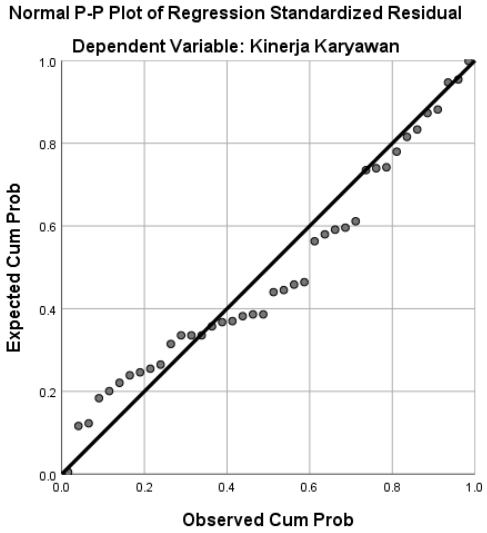

Figure 2. Visualization of normal *probability plot*
(Source: Processed data, 2025)

In Figure 2, a visualization of the normal *probability plot* shows a diagonal line, with the data distribution following and approaching the diagonal line. From this explanation, it can be concluded that the requirements for proving that the data obtained using the visualization approach are met.

Table 10. Normality Test Results
One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		40
Normal Parameters [a,b]	*Mean*	.0000000
	Standard Deviation	2.06940448
Most Extreme Differences	*Absolute*	.137
	Positive	.137
	Negative	-.099
Test Statistics		.137
Asymp. Sig. (2-tailed)		.055 [c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

(Source: Processed data, 2025)

Based on Table 10 Normality Test Results, the * *Asymp. Sig.* (2- *tailed*)* value was obtained at 0.055. This value is higher than the significance level of α = 0.05, so the residual results of the regression model are normally distributed. From the test results carried out through two visualization approaches using the normal *probability plot and the Kolmogorov-Smirnov (KS)* statistical test , the assumption of normality of the residual values in this study is met.

Results of the Heteroscedasticity Test

Table 11. Statistical Test Results of the Glesjer Method

Model		*Unstandardized Coefficients*		
		B	*Std. Error*	Sig.
1	*(Constant)*	6,997	1,413	.000
	Work Efficiency	-.004	.131	.974
	Monitoring Progress	-.193	.141	.180
	Digital Collaboration	-.123	.078	.125

(Source: Processed data, 2025)

Based on Table 11, the results of the heteroscedasticity test using the *Glesjer method* , it can be concluded that all independent variables do not significantly affect the absolute value of the residual. This is evidenced by the significance value of the Work Efficiency variable of 0.974, *Progress Monitoring* of 0.180, and Digital Collaboration of 0.125. All of these values are greater than the significance limit of α = 0.05.

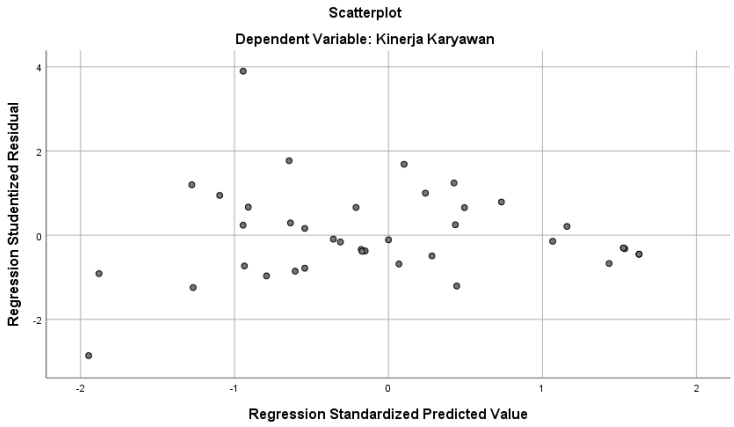

Figure 3. Visual Scatterplot

(Source: Processed data, 2025)

Based on the visual analysis results in Figure 3, the residual distribution pattern relative to the predicted values is randomly distributed around the zero line. The distribution of these points does not form a specific pattern and is not concentrated in a specific area. Therefore, it can be concluded that there are no symptoms of heteroscedasticity in the regression model used. The results from

both methods indicate no symptoms of heteroscedasticity, thus meeting the assumption of homoscedasticity.

Multicollinearity Test Results

Table 12. Multicollinearity Test Results

Model		*Collinearity Statistics*	
		Tolerance	VIF
1	(Constant)		
	Work Efficiency	.355	2,816
	Monitoring Progress	.311	3,221
	Digital Collaboration	.586	1,707

(Source: Processed data, 2025)

Table 12 Multicollinearity Test Results displays the *Tolerance* and VIF values for each independent variable . The *Tolerance values* for the Work Efficiency, *Progress Monitoring* , and Digital Collaboration variables are respectively 0.355, 0.311, and 0.586, all exceeding the critical limit of 0.10. The VIF values for the three variables are 2.816, 3.221, and 1.707, respectively, all below the threshold of 10.00. These results confirm that there is no violation of the multicollinearity assumption in the regression model.

Multiple Linear Regression Test Results

The test results can be seen in table 13 below.

Table 13. Multiple Linear Regression Test (*Coefficients*)

Model		*Unstandardized Coefficients*	
		B	Std. Error
1	(Constant)	1,085	2,612
	Work Efficiency	1,057	.242
	Monitoring Progress	.268	.261
	Digital Collaboration	-.097	.144

(Source: Processed data, 2025)

Coefficients (B) value , the regression equation formed is:

$Y = 1.085 + 1.057\ X_1 + 0.268\ X_2 - 0.097\ X_3 + e$

Information:

Y = Employee Performance; α = Constant; β_1, β_2, β_3 = Regression Coefficient; X_1 = Work Efficiency; X_2 = Progress Monitoring; X_3 = Digital Collaboration; e = error term.

Based on the regression equation above, we can describe it as follows :

a. Constant (α = 1.085)

If all independent variables (Work Efficiency, *Progress Monitoring* , and Digital Collaboration) have a value of 0, then the predicted Employee Performance value is 1.085.

b. Work Efficiency (X1)

Regression Coefficient (β_1): 1.057, a positive value indicates a unidirectional relationship. This means that every one unit increase in Work Efficiency will increase Employee Performance by 1.057 units, assuming other variables remain constant.

c. *Monitoring Progress* (X2)

Coefficient (β_2): 0.268, a positive value indicates a unidirectional relationship. This means that every one unit increase in *Progress Monitoring* will increase Employee Performance by 0.268 units, assuming other variables remain constant.

d. Digital Collaboration (X3)

Regression Coefficient (β_3): -0.097, a negative value indicates a negative relationship. This means that every one-unit increase in Digital Collaboration will actually decrease Employee Performance by 0.097 units, assuming other variables remain constant.

Hypothesis Test Results

Coefficient of Determination Test (R2)

In multiple regression models, the Adjusted R^2 is a more appropriate measure because it is adjusted for degrees of freedom, thus more accurately reflecting the model's explanatory power. The results of the R^2 test [in] this study can be seen in Table 5.18 below:

Table 14. Determination Coefficient Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.812[a]	.660	.631	2.15390

a. Predictors: (Constant), Kolaborasi Digital, Efisiensi Kerja, Monitoring Progress

b. Dependent Variable: Kinerja Karyawan

(Source: Processed data, 2025)

Based on the results of the determination analysis, the *Adjusted R Square value* of 0.631 indicates that the independent variables of work efficiency, *progress monitoring* , and digital collaboration simultaneously explain 63.1% of the

variation in employee performance. The remaining 36.9% is explained by factors outside this study. Thus, the regression model used has strong explanatory power and is reliable in identifying the determinants of employee performance in the context of digital transformation at the PLN (Persero) Certification Center.

t-test (partial effect)

Table 15. T-Test (*Coefficients)*

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.085	2.612		.415	.680
	Efisiensi Kerja	1.057	.242	.711	4.360	.000
	Monitoring Progress	.268	.261	.179	1.025	.312
	Kolaborasi Digital	-.097	.144	-.086	-.675	.504

a. Dependent Variable: Kinerja Karyawan

(Source: Processed data, 2025)

Based on the t-distribution table with 36 degrees of freedom (df) and a two-way significance level ($\alpha/2$) of 0.025, the critical value (t-table) is 2.028. This value is determined based on the statistical standards applicable in partial hypothesis testing. This value is then used as a critical reference to evaluate the statistical significance of the regression coefficients of each independent variable.

The following is the hypothesis decision for each independent variable based on Table 15 T-Test (*Coefficients)* for the calculated t-value of each independent variable:

a. The Work Efficiency variable (X1) has a t-count of 4.360 and a significance of 0.000. Because the t-count (4.360) > t-table (2.028) and the significance value (0.000) < 0.05 with a positive coefficient, Hypothesis 1 (H1) is accepted. Thus, Work Efficiency is proven to have a positive and significant effect on Employee Performance.
b. *Progress Monitoring* variable (X2) has a t-count of 1.025 and a significance value of 0.312. Since the t-count (1.025) < t-table (2.028) and the significance value (0.312) > 0.05, Hypothesis 2 (H2) is rejected. This indicates that *Progress Monitoring* does not have a significant positive influence on Employee Performance.
c. The Digital Collaboration variable (X3) has a t-value of -0.675 and a significance value of 0.504. Since the t-value is negative (-0.675) and the significance value (0.504) is > 0.05, Hypothesis 3 (H3) is rejected. In other words, Digital Collaboration does not have a positive and significant effect on Employee Performance.

F Test (Simultaneous Effect)

Table 16. F Test Results (ANOVA)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	323.960	3	107.987	23.276	.000[b]
	Residual	167.015	36	4.639		
	Total	490.975	39			

a. Dependent Variable: Kinerja Karyawan

b. Predictors: (Constant), Kolaborasi Digital, Efisiensi Kerja, Monitoring Progress

(Source: Processed data, 2025)

F Test Results (ANOVA) in table 16 shows the calculated F value of 23.276 with a significance level of 0.000. The F table value at a significance level of α = 0.05, degrees of freedom of the numerator (df_1) = 3, and degrees of freedom of the denominator (df_2) = 36 is 2.866. The condition of calculated F > F table (23.276 > 2.866) and the significance value < α (0.000 < 0.05) proves that the null hypothesis (H_0) is rejected. This confirms that the independent variables Work Efficiency, *Progress Monitoring* , and Digital Collaboration simultaneously has a significant effect on the dependent variable Employee Performance.

Discussion

The findings demonstrate that work efficiency has a positive and significant effect on employee performance during the digitalization transition process. The partial test results confirm that improvements in work efficiency directly contribute to higher levels of individual performance. This result reinforces the argument that efficiency-oriented digitalization represents the most immediate and tangible benefit of digital transformation (Liu et al., 2025; Steig et al., 2025). In the context of the Certification Center, efficiency gains are primarily driven by automation of approval workflows, document digitization, and integrated reporting systems. These mechanisms shorten task completion cycles, reduce administrative redundancies, and minimize human error. Critically, this finding suggests that employees are able to quickly internalize and utilize digital tools when such tools clearly simplify work processes. Therefore, during transitional phases of digitalization, process-centric digital investments appear to be more effective in enhancing performance than more abstract managerial controls or collaborative features.

Contrary to theoretical expectations, progress monitoring does not show a significant effect on employee performance. This finding highlights an important paradox in digital performance management: increased transparency does not automatically translate into improved outcomes. Although digital

monitoring systems provide real-time tracking and centralized reporting, their effectiveness depends heavily on how the information is interpreted and used by management. In this case, monitoring appears to function primarily as a control mechanism rather than as a developmental tool. Excessive or poorly contextualized monitoring may even generate psychological pressure, compliance-oriented behavior, or monitoring fatigue among employees. This result aligns with previous empirical contradictions in the literature, indicating that progress monitoring can lose its motivational value when it is detached from meaningful feedback, learning, and performance development processes (Ateş Akdeniz, 2023; Tzimas & Demetriadis, 2024).

From a managerial perspective, the insignificance of progress monitoring signals the need to shift from system-based surveillance to performance-oriented management. Monitoring systems should not merely collect data but should be embedded within a structured performance management cycle. This includes aligning monitoring indicators with core technical Key Performance Indicators (KPIs), integrating monitoring outcomes with feedback and coaching mechanisms, and involving employees in the design of performance metrics. Without these elements, digital monitoring risks becoming a symbolic implementation rather than a value-generating instrument. Thus, the finding suggests that digital transformation initiatives must be accompanied by managerial capability development to interpret data, communicate expectations, and support employee growth.

The analysis reveals that digital collaboration has no significant effect on employee performance and even exhibits a negative regression coefficient. Importantly, this result should not be interpreted as evidence that digital collaboration is ineffective (Fauzi et al., 2025; Rohmatillah & Jannah, 2024; Safitri & Lateh, 2024). Instead, it reflects a condition of misalignment within the digital ecosystem. Respondents perceive digital collaboration tools such as communication platforms, document sharing systems, and coordination mechanisms as functioning well. However, these tools do not translate into measurable performance gains. A plausible explanation lies in the fragmentation of digital platforms, including the simultaneous use of corporate email, PICTS, messaging applications, enterprise systems, and independent cloud storage. This fragmentation increases cognitive load, disrupts workflow continuity, and dilutes accountability, ultimately offsetting the potential benefits of collaboration.

The insignificant and negative effect of digital collaboration underscores a broader issue in digital transformation: technology adoption without cultural and strategic alignment. While digital collaboration tools enhance connectivity, they require shared norms, standardized workflows, and integrated strategies to

produce performance outcomes. In the absence of a cohesive digital culture, collaboration may increase coordination costs rather than reduce them. This finding indicates that the organization has prioritized digital capability deployment but has not yet fully synchronized it with cultural readiness and integration strategy. Consequently, digital collaboration remains underutilized as a performance driver, reinforcing the argument that digital transformation is not solely a technological challenge but an organizational one.

Despite the insignificant partial effects of progress monitoring and digital collaboration, the simultaneous analysis demonstrates that work efficiency, progress monitoring, and digital collaboration collectively have a significant influence on employee performance. The substantial explanatory power of the model indicates that these variables operate as an interconnected system rather than as isolated factors. Work efficiency emerges as the dominant driver, while monitoring and collaboration function as supporting mechanisms whose effectiveness depends on integration quality. This finding supports digital transformation theory, which emphasizes the alignment of digital capabilities, digital culture, and digital strategy in enhancing organizational performance. Practically, the results suggest that organizations undergoing digital transition should prioritize efficiency gains while systematically improving monitoring quality and platform integration. The synergy among these elements is critical for achieving sustainable improvements in employee performance in the digital era.

CONCLUSION

The findings of this study provide important insights into the dynamics of digital transformation and employee performance. The most significant lesson derived from this research is that work efficiency emerges as the primary and most consistent driver of employee performance during the digitalization transition. In contrast, progress monitoring and digital collaboration do not automatically enhance performance and may even produce counterproductive effects when they are poorly integrated or perceived as burdensome. These results highlight that digital transformation is not a linear or uniform process; rather, its effectiveness is strongly influenced by contextual factors such as task characteristics, system integration, clarity of performance standards, and employees' digital readiness. The study contributes to the scientific literature by offering empirical evidence that the relationship between digitalization variables and employee performance is contingent and interactional, thereby enriching digital transformation and performance management theories with a more nuanced, context-sensitive perspective.

Despite its contributions, this study has several limitations that should be acknowledged. The research model was limited to three digitalization variables and did not incorporate other potentially influential factors such as digital leadership, organizational culture, employee motivation, or digital competencies. In addition, the digital systems examined were still in a transitional implementation phase, which may have affected the stability of employee perceptions and responses. Future research is therefore encouraged to adopt a more comprehensive model by integrating leadership and cultural variables, employing longitudinal designs to capture post-transition effects, and exploring qualitative approaches to better understand employee experiences during digital transformation. Such extensions would provide a deeper and more holistic understanding of how digital initiatives can sustainably enhance employee performance.

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