

THE EFFECT OF DIGITAL LITERACY, ORGANIZATIONAL SUPPORT, AND DIGITAL READINESS ON THE PERFORMANCE OF HEALTH WORKERS AT COMMUNITY HEALTH CENTERS IN BATAM CITY

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Abstract

Digital transformation has significantly reshaped primary healthcare services, requiring healthcare professionals to enhance their digital competencies and adaptability. This study aims to analyze the effect of digital literacy, organizational support, and digital readiness on the performance of healthcare workers at community health centers in Batam City, Indonesia. A quantitative approach was employed using a sample of 285 respondents selected from a population of 962 healthcare workers through proportional random sampling. Data were collected through a structured questionnaire and analyzed using multiple linear regression with SPSS. The findings indicate that digital literacy, organizational support, and digital readiness each have a positive and significant effect on healthcare worker performance, both partially and simultaneously ($F = 100.770$; $p < 0.001$). Among the three variables, digital literacy demonstrates the most dominant influence ($B = 0.357$; $p < 0.001$), followed by organizational support ($B = 0.355$; $p < 0.001$) and digital readiness ($B = 0.295$; $p < 0.001$). These results confirm that performance improvement in primary healthcare settings requires not only individual digital competence but also supportive organizational systems and readiness for change. The study contributes empirically to digital-based human resource management in primary healthcare and emphasizes that digital transformation depends fundamentally on comprehensive human and organizational readiness.

Keywords: *Digital Literacy, Organizational Support, Digital Readiness, Healthcare Worker Performance, Primary Healthcare Services.*

INTRODUCTION

The advancement of digital technology has become one of the primary factors driving transformation across various sectors, including healthcare services. The digital era requires healthcare professionals to be capable of leveraging information technology in carrying out their duties to enhance efficiency, effectiveness, and service quality for the community. One crucial aspect supporting the success of digital transformation in healthcare is digital literacy, which encompasses the ability to understand, evaluate, and apply digital technology in daily professional activities (Febrianty et al., 2024). Digital literacy has been shown to positively influence workforce performance in various sectors, including education professionals (Ginoga & Suhairi, 2024), and healthcare (Fahyudi & Hapsari, 2025). Community Health Centers (Puskesmas), as the frontline of primary healthcare services, play a strategic role in achieving Universal Health Coverage (UHC) and improving public health outcomes (Wiranata, 2026). In Batam City, various initiatives have been implemented to strengthen primary healthcare, including the Strengthening of Primary Healthcare in Indonesia (SOPHI) program aimed at enhancing Puskesmas services (Dinkes Batam, 2025). The Batam local government's commitment to expanding healthcare access is further evidenced by the city's achievement of the 2026 UHC Awards in the Pratama Category, reflecting high National Health Insurance (JKN) coverage and effective collaboration among all health stakeholders (Wiranata, 2026). The establishment of new facilities, such as the Puskesmas in Sei Pelunggut, along with the provision of 24-hour emergency services in 21 Puskesmas during the Lebaran holidays, further improves healthcare access for the Batam community (Yuliandra, 2025)(Sultan, 2024). These developments illustrate the complex dynamics of primary healthcare services, highlighting the need for healthcare professionals who are both adaptive and high-performing to provide optimal services in accordance with community needs.

In this context, the digital readiness of healthcare professionals has become increasingly crucial, as it not only influences technology adoption but also plays a significant role in enhancing professional performance (Siahaan et al., 2025)(Bober et al., 2024). Systematic studies indicate that digital readiness is a key factor that can enhance healthcare professionals' capabilities in addressing the challenges of digital transformation in healthcare services, including both barriers and facilitators (Alotaibi et al., 2025)(Steenkamp et al., 2025). Moreover, empirical literature in the healthcare sector confirms that digital competence, including digital literacy, is significantly associated with technology acceptance and utilization, thereby impacting individual performance in service delivery contexts (Hariri et al., 2025)(Qvarfordt & Lagrosen, 2024). Another equally important factor is organizational support, which encompasses policies, resources, and a work environment that fosters digital innovation and learning (Dewi et al., 2025). Organizational support often shapes a conducive work culture and motivates healthcare professionals to enhance their digital competencies, ultimately influencing overall organizational performance (Hidayah & Andjarwati, 2025). Research in other sectors has also demonstrated that strong organizational support positively correlates with digital work readiness and individual performance outcomes.

However, despite the growing relevance of the relationships between digital literacy, organizational support, digital readiness, and healthcare performance in the Society 5.0 era, research focusing specifically on primary healthcare services in Indonesia particularly in urban areas like Batam City remains limited. Most previous studies have centered on the education sector or hospitals, leaving generalizations to Puskesmas contexts insufficient. This study seeks to address this gap by examining the influence of three independent variables digital literacy, organizational support, and digital readiness on the performance of healthcare professionals in Puskesmas in Batam City. Accordingly, the findings of this study are expected to provide empirical contributions for developing strategies to enhance primary healthcare performance through the strengthening of digital literacy and digital readiness within healthcare organizations.

LITERATURE REVIEW

Digital transformation has become a major driving force in reshaping healthcare service systems worldwide, including in the context of primary healthcare services such as community health centers. The digitalization of healthcare services encompasses the adoption of electronic medical records, telemedicine, mobile health applications, health management information systems, and other digital technologies that support improvements in service quality, operational efficiency, and the reduction of healthcare workers' workload. The existing literature indicates that the implementation of digital transformation positively contributes to innovation, service efficiency, and clinical decision-making. However, it also faces significant challenges, particularly related to human resource readiness and insufficient organizational support, which may hinder the optimal utilization of digital technologies in healthcare settings.(Santoso et al., 2025).

Digital Literacy and Healthcare Worker Performance

Digital literacy, which encompasses an individual's ability to understand, evaluate, and effectively apply digital technologies, constitutes a fundamental foundation for successful digital transformation. Several empirical studies have demonstrated that an adequate level of digital literacy significantly contributes to employee performance across various organizational settings, including the healthcare sector. For instance, empirical evidence in hospital contexts indicates that digital literacy has a significant influence on managerial staff performance and enhances their readiness to adapt to technological innovations. These findings suggest that digital competence not only improves operational effectiveness but also strengthens individuals' capacity to respond to ongoing digital advancements within healthcare organizations. (Gustin, 2025). More specifically, studies conducted among community health center personnel reveal that low levels of digital literacy constitute a significant challenge to the effectiveness of primary healthcare services, particularly in the adoption of digital health information systems such as electronic medical records. These findings emphasize that digital literacy not only affects individuals' technical capabilities but is also directly associated with the quality and effectiveness of healthcare services delivered to the community.(Fahyudi & Hapsari, 2025).

Organizational Support as a Determinant of Digital Performance

Organizational support encompasses various forms of resources, policies, training, and a work environment that facilitate the implementation of digital technologies. Studies in the field of human resource management suggest that strong organizational support enhances workforce readiness for digital adaptation and improves staff retention, which in turn positively affects service performance (Nangsih & Mokodompit, 2026).

Conceptual explorations of healthcare workers' readiness for the implementation of integrated digital patient record systems also position organizational support as a key dimension of readiness, alongside digital literacy and a collaborative work culture. This indicates that organizational factors cannot be separated from efforts to promote the effective adoption of digital technologies within healthcare service environments (Delima & Anggreiniboti, 2026).

Digital Readiness of Healthcare Workers

Digital readiness reflects the preparedness of individuals or organizations to adopt and effectively utilize digital technologies in their operations. Recent systematic reviews have identified various interventions, barriers, and facilitating factors in enhancing the digital readiness of healthcare professionals, including structured training programs, intrinsic and extrinsic motivation, managerial support, and the development of an adaptive organizational culture (Alotaibi et al., 2025). Other studies focusing on digital health readiness among healthcare service leaders indicate that the capacity for change, motivation toward change, and digital leadership capabilities are critical factors influencing overall readiness. Although these studies primarily concentrate on the managerial level, their findings underscore the relevance of digital readiness as an essential prerequisite for the successful implementation of digital technologies, including within community health centers (Steenkamp et al., 2025).

Other studies on digital health readiness emphasize the need for assessment approaches that consider healthcare workers' experience, technical preparedness, and personal competencies. Such an approach strengthens the argument that digital readiness has a direct impact on both clinical and administrative performance in the context of digital healthcare services (Bober et al., 2024). 4. The Relationship between Digital Readiness and Healthcare Professional Performance The literature on healthcare worker performance in the context of digital technology adoption has gained increasing importance due to the acceleration of digital transformation driven by the COVID-19 pandemic and the growing demand for remote healthcare services. A study conducted in Mogadishu, Somalia, found that the adoption of digital technologies was positively associated with healthcare worker performance, including improvements in service efficiency and productivity (Jeilani & Hussein, 2025). In addition, research on healthcare workers' readiness for artificial intelligence (AI) indicates that positive perceptions of organizational openness to change are significantly associated with their readiness to adopt AI technologies. This finding highlights the crucial role of organizational support in shaping healthcare workers' attitudes and preparedness toward digital innovation (Boyacı & Söyük, 2025).

METHOD

This study employed a quantitative approach to analyze the effect of digital literacy, organizational support, and digital readiness on the performance of primary healthcare workers at community health centers in Batam City. This approach was selected as it enables objective testing of relationships among variables through inferential statistical analysis. The research was conducted across all community health centers within the administrative area of Batam City, which share relatively homogeneous characteristics in delivering primary healthcare services. The study population consisted of 962 healthcare workers, from which 285 respondents were selected as the sample using the Slovin formula with a 5% margin of error. A proportional random sampling technique was applied to ensure proportional representation across service units and to provide equal opportunities for all healthcare workers to be included as respondents.

The research instrument was a structured questionnaire developed based on established theories and previous studies. Digital literacy was measured through technical competence and the utilization of digital technology; organizational support was assessed through perceptions of facilities, policies, leadership support, and training; digital readiness was measured through readiness to accept change and adopt technology; and healthcare worker performance was evaluated based on quality, quantity, timeliness, and job responsibility. The instrument's validity and reliability were tested using item-total correlation and Cronbach's Alpha. Data were collected directly through Google Forms and subsequently analyzed using SPSS software. Classical assumption tests and multiple linear regression analysis were conducted to examine both partial and simultaneous effects of the independent variables on healthcare worker performance.

RESULTS AND DISCUSSION

1. Instrument Testing

Validity Test

The results of the validity test indicate that all items measuring Digital Literacy (X1), Organizational Support (X2), Digital Readiness (X3), and Healthcare Worker Performance (Y) have calculated correlation coefficients (r -

count) greater than the critical r-table value at the 5% significance level. Therefore, all indicators are considered valid and adequately represent the constructs being measured. These findings confirm that the research instrument satisfies construct validity requirements and is appropriate for use in subsequent multiple regression analysis.

Reliability Test

The results of the reliability test indicate that one of the research variables has a Cronbach’s Alpha value below the recommended threshold, suggesting suboptimal internal consistency. Although the variable was retained due to its theoretical relevance, the findings related to this construct should be interpreted with caution. This limitation constitutes one of the constraints of the study, and future research is recommended to refine the measurement instrument in order to improve its reliability.

2. Classical Assumption Test

Normality Test

The normality test was conducted using the Kolmogorov–Smirnov method, which produced an Asymp. Sig. (2-tailed) value of 0.036, lower than the 0.05 significance threshold. The results of the normality test are presented in Figure 1.

One-Sample Kolmogorov-Smirnov Test

		Standardized Residual	
N		285	
Normal Parameters ^{a,b}	Mean	.0000000	
	Std. Deviation	.99470429	
Most Extreme Differences	Absolute	.055	
	Positive	.046	
	Negative	-.055	
Test Statistic		.055	
Asymp. Sig. (2-tailed) ^c		.036	
Monte Carlo Sig. (2-tailed) ^d	Sig.	.036	
	99% Confidence Interval	Lower Bound	.031
		Upper Bound	.041

a. Test distribution is Normal.
 b. Calculated from data.
 c. Lilliefors Significance Correction.
 d. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000.

Figure 1. SPSS Results of Normality Test

Statistically, this indicates that the model residuals are not normally distributed at the 5% significance level. However, considering the relatively large sample size in this study (N = 285), the Central Limit Theorem suggests that the distribution of residuals can be assumed to approximate normality. Therefore, the slight deviation from normality is not expected to substantially affect the robustness of the regression estimates.

Multicollinearity Test

Based on Table 2, the results of the multicollinearity test indicate that all independent variables have Tolerance values greater than 0.10 and Variance Inflation Factor (VIF) values below 10.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-.024	1.223		-.020	.984					
	Literasi Digital	.357	.032	.463	11.167	<.001	.451	.554	.462	.997	1.003
	Dukungan Organisasi	.355	.033	.450	10.784	<.001	.384	.541	.447	.986	1.014
	Digital Readiness	.295	.032	.388	9.304	<.001	.354	.485	.385	.988	1.012

a. Dependent Variable: Kinerja Tenaga Kesehatan

Figure 2. SPSS Result of Multicollinearity Test

Specifically, Digital Literacy shows a Tolerance value of 0.997 and a VIF of 1.003; Organizational Support has a Tolerance value of 0.986 and a VIF of 1.014; while Digital Readiness demonstrates a Tolerance value of 0.988 and a VIF of 1.012. The VIF values, which are very close to 1, indicate the absence of high correlations among the independent variables in the regression model.

Therefore, it can be concluded that the research model is free from multicollinearity issues, ensuring that the estimated regression coefficients are stable and can be interpreted accurately. These findings also suggest that Digital

Literacy, Organizational Support, and Digital Readiness are empirically distinct constructs and can be analyzed simultaneously in explaining Healthcare Worker Performance.

Heteroscedasticity Test

The heteroscedasticity test was conducted using the Glejser method by regressing the absolute residual values (ABRESID) on the independent variables. The results of the heteroscedasticity test are presented in Figure 3.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	1.346	.728		1.848	.066					
	Literasi Digital	-.030	.019	-.093	-1.567	.118	-.095	-.093	-.093	.997	1.003
	Dukungan Organisasi	.003	.020	.009	.158	.875	.018	.009	.009	.986	1.014
	Digital Readiness	-.009	.019	-.029	-.489	.625	-.033	-.029	-.029	.988	1.012

a. Dependent Variable: ABRESID

Figure 3. SPSS Result of Heteroscedasticity Test

Based on the Coefficients table, the significance values for each variable are as follows: Digital Literacy has a Sig. value of 0.118, Organizational Support 0.875, and Digital Readiness 0.625. All significance values exceed the 0.05 threshold. Therefore, it can be concluded that there is no indication of heteroscedasticity in the regression model. This means that the residual variance is constant (homoscedasticity), and the regression model satisfies one of the classical assumptions required for multiple linear regression analysis. Consequently, the estimated regression coefficients are considered unbiased and appropriate for subsequent hypothesis testing.

3. Hypothesis Testing

Partial Test (t-Test)

The partial test (t-test) was conducted to examine the effect of each independent variable on Healthcare Worker Performance. Based on the Coefficients table, the results are presented in Figure 4.

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.024	1.223		-.020	.984
	Literasi Digital	.357	.032	.463	11.167	<.001
	Dukungan Organisasi	.355	.033	.450	10.784	<.001
	Digital Readiness	.295	.032	.388	9.304	<.001

a. Dependent Variable: Kinerja Tenaga Kesehatan

Figure 4. SPSS Result of Partial Test (t-Test)

a. Digital Literacy (X1)

The Digital Literacy variable has a regression coefficient (B) of 0.357, with a t-value of 11.167 and a significance level of < 0.001. Since the significance value is lower than 0.05, it can be concluded that Digital Literacy has a positive and significant effect on Healthcare Worker Performance. This finding indicates that improvements in healthcare workers' ability to understand and utilize digital technology substantially enhance their job performance.

b. Organizational Support (X2)

The Organizational Support variable shows a regression coefficient (B) of 0.355, with a t-value of 10.784 and a significance level of < 0.001. These results demonstrate that Organizational Support has a positive and significant effect on Healthcare Worker Performance. In other words, higher levels of organizational support in the form of facilities, policies, leadership support, and training are associated with improved performance among healthcare workers.

c. Digital Readiness (X3)

The Digital Readiness variable has a regression coefficient (B) of 0.295, with a t-value of 9.304 and a significance level of < 0.001. Therefore, Digital Readiness also has a positive and significant effect on Healthcare Worker Performance. This suggests that individuals’ readiness to adapt to change and digital transformation plays an important role in determining their level of job performance.

Simultaneous Test (F-Test)

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	166.457	3	55.486	100.770	<.001 ^b
	Residual	154.722	281	.551		
	Total	321.179	284			

a. Dependent Variable: Kinerja Tenaga Kesehatan

b. Predictors: (Constant), Digital Readiness, Literasi Digital, Dukungan Organisasi

Figure 5. SPSS Result of Simultaneous Test (F-Test)

Based on Table 5, the F-value obtained is 100.770 with a significance level of < 0.001. Since the significance value is lower than 0.05, it can be concluded that the three independent variables simultaneously have a positive and significant effect on Healthcare Worker Performance. The Sum of Squares for the regression is 166.457, while the residual Sum of Squares is 154.722, resulting in a total variation of 321.179. These results indicate that the regression model is able to explain a substantial proportion of the variation in healthcare worker performance through the combined influence of the three independent variables. The high F-value (100.770) further suggests that the proposed model has strong predictive power and is appropriate for explaining the relationships among the variables.

4. Discussion

The findings indicate that the proposed regression model satisfies all methodological requirements and classical assumptions, confirming its suitability for explaining the relationships among variables. The research instrument was proven valid, as all items demonstrated correlation coefficients exceeding the critical r-table value at the 5% significance level, and reliable, with Cronbach’s Alpha values greater than 0.70. These results confirm that the constructs of Digital Literacy, Organizational Support, Digital Readiness, and Healthcare Worker Performance were measured consistently and accurately. Therefore, the causal relationships analyzed in this study can be interpreted scientifically. Although the normality test yielded an Asymp. Sig. value of 0.036 (< 0.05), indicating that residuals were not perfectly normally distributed, the relatively large sample size (N = 285) allows the assumption of normality to be maintained based on the Central Limit Theorem. Furthermore, no multicollinearity was detected (VIF values ranged from 1.003 to 1.014), and no heteroscedasticity was found (all Glejser significance values > 0.05), indicating that the regression model is stable and unbiased.

The Effect of Digital Literacy on Performance

Digital Literacy demonstrates the most dominant influence, with a regression coefficient of 0.357 and a t-value of 11.167 (p < 0.001). The high t-value reflects a strong and statistically significant relationship. This finding suggests that healthcare workers’ ability to understand, operate, and utilize digital technologies is a primary determinant of improved job performance. In the context of increasingly digitalized primary healthcare services, digital competence is no longer supplementary but essential for enhancing service efficiency, medical documentation accuracy, and clinical decision-making speed.

The Effect of Organizational Support on Performance

Organizational Support shows a nearly equivalent effect, with a regression coefficient of 0.355 and a t-value of 10.784 (p < 0.001). This result emphasizes that successful digital transformation depends not only on individual competence but also on organizational policies, facilities, and managerial support. A supportive work environment that encourages digital innovation enhances healthcare workers’ motivation and commitment, thereby directly

improving performance. This finding supports the theory of perceived organizational support, which posits that institutional support strengthens individual contributions to organizational outcomes.

The Effect of Digital Readiness on Performance

Digital Readiness has a regression coefficient of 0.295 and a t-value of 9.304 ($p < 0.001$), indicating a positive and significant effect on performance. Although its contribution is relatively smaller than the other variables, digital readiness remains a crucial factor in bridging competence and actual implementation. Psychological, mental, and technical readiness to embrace digital change determines how effectively healthcare workers can utilize their digital literacy. Without readiness for change, high digital competence may not necessarily translate into optimal performance.

Integrative Discussion

Simultaneously, the F-test result ($F = 100.770$; $p < 0.001$) indicates that the model possesses strong predictive power. The regression Sum of Squares (166.457 out of a total 321.179) suggests that a substantial proportion of performance variation is explained by the three independent variables. This confirms that healthcare worker performance in Batam City community health centers is influenced by a multidimensional interaction between individual competence, organizational support, and readiness for digital transformation. Theoretically, these findings extend digital-based human resource management studies within Indonesia's primary healthcare context by demonstrating that performance improvement in the digital transformation era requires a systemic rather than partial approach. Practically, the results imply that performance enhancement strategies should integrate continuous digital literacy training, technology-oriented organizational policies, and structured digital readiness development programs. Ultimately, digital transformation in the healthcare sector is not merely a technological issue but a comprehensive matter of human and organizational readiness. From a practical perspective, the findings imply that improving healthcare worker performance requires an integrated strategy consisting of: (1) continuous digital literacy training, (2) the strengthening of technology-based organizational policies, and (3) structured programs to enhance digital change readiness. Without the integration of these three components, digital transformation in primary healthcare services is unlikely to produce optimal performance outcomes. Therefore, this study emphasizes that digital transformation in the healthcare sector is not merely a matter of technological advancement, but fundamentally a matter of comprehensive human and organizational readiness.

CONCLUSION

This study aimed to analyze the effect of digital literacy, organizational support, and digital readiness on the performance of primary healthcare workers in Batam City. Based on the analysis of 285 respondents, the findings reveal that all three independent variables have a positive and significant effect on performance, both partially and simultaneously. Partially, digital literacy emerges as the most dominant factor in improving healthcare worker performance. This indicates that the ability to understand and utilize digital technology plays a crucial role in enhancing the effectiveness, efficiency, and quality of healthcare services. Organizational support is also found to have a significant effect, suggesting that policies, facilities, and a work environment that support digital transformation can strengthen healthcare workers' performance. Meanwhile, digital readiness demonstrates that individual preparedness to face technological change contributes to the optimization of performance.

Simultaneously, the three variables significantly contribute to the variation in healthcare worker performance, confirming that performance improvement in the era of digital transformation requires an integrated approach that combines individual competence and organizational system support. The practical implications of this study highlight the importance of strengthening digital literacy, providing consistent organizational support, and continuously enhancing healthcare workers' digital readiness. Therefore, digital transformation in primary healthcare services depends not only on technological availability but also on the readiness and competence of human resources to optimize its utilization.

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