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(RESEARCH ARTICLE)

THE EFFECT OF THE QUALITY OF THE E-PUSKESMAS INFORMATION SYSTEM ON THE PERFORMANCE OF OFFICERS IN NHI SERVICES AT THE AERE HEALTH CENTER, EAST KOLAKA, SOUTHEAST SULAWESI PROVINCE, INDONESIA

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ABSTRACT

Background: e-Puskesmas is the main means of recording services and administration of the National Health Insurance (NHI), but the influence of the quality of the system on the performance of officers in semi-remote health centers is still rarely tested quantitatively. The achievement of the Aere Health Center in several indicators of the Minimum Service Standards 2025 is below the achievement of the district, for example services for toddlers (39.4% compared to 64.9%). This study aims to analyze the influence of reliability, ease of use, speed of access, and flexibility of e-Puskesmas on the performance of officers in NHI services.

Method: A quantitative *cross-sectional* study at the Aere Health Center, East Kolaka Regency, on October 13–18, 2026. The sample was 77 e-Puskesmas users (*total sampling*). Data were collected through a valid and reliable 25-item Likert questionnaire (*Google Form*) (*Cronbach's alpha* 0.774–0.911), then analyzed by *Fisher's exact test* and multiple linear regression (α = 5%), accompanied by endurance tests (*bootstrap* and *robust* standard error HC3).

Results: A total of 87.0% of officers performed well. All four dimensions were related to performance in bivariate analysis ($p \leq 0.043$). In multiple regressions, access speed (B = 0.444; 95% CI 0.207–0.682; $p < 0.001$) and system flexibility (B = 0.472; 95% CI 0.262–0.682; $p < 0.001$) had a positive and significant effect on officer performance, while reliability ($p = 0.344$) and ease of use ($p = 0.278$) did not. The model explains 76.5% variation in performance (*adjusted* $R^2 = 0.765$; $F = 62.74$; $p < 0.001$).

Conclusions: The speed of access and flexibility of the system contribute to officer performance so that P-Care *bridging* stability , feature completeness, and network quality deserve priority. Reliability and ease of use were insignificant after other dimensions were controlled, likely due to the high interdimensional correlation (r = 0.61–0.82), not because they were insignificant. Latitude-cut design and self-report-based measurements limited causal interpretation.

Keywords: E-Puskesmas; Equality of information systems; Performance of officers; NHI; DeLone and McLean

1 INTRODUCTION

The digitalization of health services is part of strengthening the global health system; the number of WHO member states with national digital health strategies increased from 85 in 2015 to 129 in 2024 (1). The quality of the system is related to the success of the health information system, both in Iran's national electronic health record system and in the performance of post-implementation clinicians in Moroccan public hospitals, which is partly through user satisfaction (2) (3).

In Indonesia, the NHI Program organized by BPJS Kesehatan has been running nationally since January 1, 2014 (4,5). As an FKTP, the Puskesmas carries out membership verification, outpatient services, tiered referrals, and claims submission that require timely, accurate, and connected data to the BPJS Kesehatan system. The Ministry of Health encourages the use of e-Puskesmas, which is a service management application connected to BPJS Kesehatan P-Care through *bridging* 6) , and strengthens it with the obligation to switch to electronic medical records no later than December 31, 2023 (7).

In Southeast Sulawesi, the evaluation of SIMRS at the medical record unit of the Buton Regency Hospital found a poor internet network and users who had not mastered the application (8). At the Jati Raya Health Center, Kendari City, the e-Puskesmas often experienced errors and slow access and depended on the internet network, with system recovery sometimes taking 20–30 minutes, although the officers were generally still satisfied (9).

The Aere Health Center is a Health UPTD in Aere District, East Kolaka Regency, Southeast Sulawesi, located about 49 km from the district center and serves around 7,000–7,500 registered participants. This health center has been using e-Puskesmas since 2023, while the internet network from the BAKTI program no longer functions so that access depends on Telkomsel's cellular network and (10) voucher-based paid wifi. The performance of the officers is reflected in the service achievements whose data is sourced from records on the information system and is the basis for assessing the performance of the Puskesmas as an FKTP (11).

Minimum Service Standards (SPM) In the health sector, there are rules about the type and quality of basic services that every citizen must obtain as a minimum right. This includes the duties that must be carried out by local governments, the source of which comes from Law Number 23 of 2014, explained in Government Regulation Number 2 of 2018, and technically regulated in the Regulation of the Minister of Health Number 6 of 2024 which repeals the Regulation of the Minister of Health Number 4 of 2019. As an FKTP, the Puskesmas plays a direct role in the fulfillment of SPM so that its achievement depends on the performance of officers in services and data recording, including in NHI services. (12) (13) (14).

In East Kolaka Regency, the cumulative achievement of pregnant women's health services in 2025 will only reach 63.8% (1,149 out of 1,801 targets), and no health center has reached the target of 100%. The achievement of maternity services is 78.5% (1,384 out of 1,764 targets) and newborns are 80.1% (1,451 out of 1,811 targets). Health services under five reached 64.9%, although quarterly achievement increased from 12.3% in the first quarter to 24.7% in the third quarter. At the age of basic education, the achievement reached 94.3%, while the productive age was only 51.5% and the elderly age was 76.6%. The achievement of hypertension patients was 68.2% and diabetes mellitus patients 54.1%, with the quarterly achievement both increasing (hypertension from 16.0% to 21.6%, diabetes mellitus from 8.7% to 19.1%). Meanwhile, the service of people suspected of tuberculosis reached 80.1% and people at risk of HIV infection 79.3%. All of these indicators have not reached the SPM target of 100% (15).

At the Aere Health Center, the cumulative achievement in 2025 is lower than the district's achievement in services for toddlers (39.4% compared to 64.9%), hypertension patients (46.6% compared to 68.2%), diabetic mellitus (38.7% compared to 54.1%), and people at risk of HIV infection (63.9% compared to 79.3%). The achievement of pregnant women (62.9%) and maternity mothers (73.9%) is also slightly below the achievement of the district (63.8% and 78.5%). On the other hand, the achievement of the Aere Health Center is higher in productive age (73.4% compared to 51.5%), newborns (89.9% compared to 80.1%), the elderly (82.7% compared to 76.6%), and suspected tuberculosis (92.7% compared to 80.1%). The achievement of toddler services at the Aere Health Center also fluctuated, namely 9.0% in the first quarter, 16.2% in the second quarter, and 9.7% in the third quarter, so that the performance of officers has not been consistent throughout the year (16).

This achievement gap shows that the performance of Aere Health Center officers is not optimal, and the accuracy and reliability of recording through e-Puskesmas has the potential to affect it, so the quality of this information system needs to be reviewed.

A preliminary study in September of 11 officers using e-Puskesmas in NHI services found obstacles in all four dimensions of system quality. Network disruptions and *bridging* failures with P-Care hampered membership verification and caused data to be reprocessed, some officers still had difficulty operating menus without assistance, and connections to BPJS slowed down during service hours. The application also did not accommodate back-referral uploads, laboratory results, and drug availability, so re-recording and manual prescriptions were still ongoing, which hampered NHI administration and increased workload. Due to the limited number of informants, these findings need to be tested quantitatively.

This research is based on the updated DeLone and McLean information system success model, which places system quality, information quality, and service quality as determinants of usage and user satisfaction, which further contributes to net benefits. This model has been used to assess the success of electronic health record systems (17) (18) . System quality is operationalized through four dimensions, namely reliability, ease of use, speed of access, and flexibility; the security dimension was not studied because preliminary studies did not indicate safety barriers. Employee performance was selected as a net benefit at the individual level and measured by five indicators according to Robbins (2019) cited in Kartikaningrum and Kurniyati, namely quantity, quality, timeliness, effectiveness, and work independence. This study examined the direct relationship between system quality and performance as a first step, before examining the mechanism through use and satisfaction (19).

A number of studies have assessed health information systems, including in primary care facilities, using the DeLone and McLean models. System quality is reported to have a significant effect on user usage and satisfaction, and the health center management information system is positively related to user intent and satisfaction (20,21) (22. However, a study on the medical features of e-Puskesmas in Sumedang Regency shows that system quality (speed of response and system updates) does not have a significant effect on user satisfaction, while ease of use, accuracy, and quality of information have an effect, so the findings between locations are not consistent. Most studies also use user satisfaction as an output (23). Evaluation of NHI services only assesses the benefits felt by officers in the framework of implementation evaluation, while evidence of the influence of system quality on performance comes more from hospitals. As a result, the influence of each dimension of system quality on the performance of officers in NHI services, especially in Southeast Sulawesi, is still rarely tested quantitatively (25) (3,26) .

This study aims to analyze the influence of the quality of the e-Puskesmas information system, which includes reliability, ease of use, speed of access, and flexibility, on the performance of officers in supporting NHI services at the Ere Health Center, East Kolaka Regency. The results are expected to show the dimensions that most determine the performance of officers so that the development of e-Puskesmas and infrastructure strengthening can be focused on these aspects, as well as enriching the study of the DeLone and McLean models in primary health services in semi-remote areas (17)

2 METHODS

This study is an observational quantitative analytical research with a *cross-sectional* study design which was carried out at the Aere Health Center, East Kolaka Regency, on October 13-18, 2026. The research sample was all e-Puskesmas users who met the criteria, as many as 77 respondents, with *a total sampling technique*. Data was obtained through a Likert 1–5 scale self-fill questionnaire (*Google Form*) of 25 items that have been tested for validity and reliability (*Cronbach's alpha* 0.774–0.911). Data were analyzed by *Chi-square*/*Fisher's exact test* and multiple linear regression at α = 5%, accompanied by model endurance test (*bootstrap* and robust standard error HC3).

3 RESULTS AND DISCUSSION

3.1 The Relationship between System Reliability and Officer Performance at the Aere Health Center, East Kolaka Regency in 2026

Table 1: The Relationship between System Reliability and Officer Performance at the Aere Health Center, East Kolaka Regency in 2026

System reliability	Performance				Total		Value p
	Good	%	Less good	%	n	%	
Good	63	90.0	7	10.0	70	100	0.043
Less good	4	57.1	3	42.9	7	100	
Total	67	87.0	10	13.0	77	100	

Source: Primary Data 2026

Based on Table 1, out of 70 respondents (100%) with good system reliability, as many as 63 respondents (90.0%) had good performance and 7 respondents (10.0%) had poor performance. Meanwhile, of the 7 respondents (100%) with poor system reliability, as many as 4 respondents (57.1%) had good performance and 3 respondents (42.9%) had poor performance.

In *the Chi-square* test, there was one cell with *an expected count* value of less than 5 (the smallest 0.91) so the *value of Fisher's exact test* (two sides), which was 0.043, was used. This value showed that there was a significant relationship between the reliability of the system and the performance of the officers at the Aere Health Center, with the strength of the weak relationship (*Cramér's V* = 0.281) and *the Spearman* correlation on the relatively strong continuous score (ρ = 0.683). The p-value is near the limit of meaning, so this result is interpreted carefully and exploratively.

System reliability is the ability of the information system to operate stably, consistently, and according to the promised function without experiencing failures, errors, or data loss, so that the system is available when needed. In NHI services, reliability is the basis for other dimensions of system quality, because a system that is fast and easy to use is useless if it cannot be used during the service (17,27).

Of the 70 respondents with good system reliability, the largest percentage, namely 63 people (90.0%), had good performance. This is associated with the system being available during service hours and stable during data input so that officers can complete NHI recording and administration without repetition.

On the other hand, in the 7 respondents with poor system reliability, the proportion of officers performing poorly (42.9%) was much larger than the group with good reliability (10.0%). This is associated with system disruptions in the input process that force officers to repeat data entry or switch to manual recording.

This bivariate relationship is in line with the theoretical foundation that places reliability as a determinant of user assessment of the quality of the system and with the evaluation of the national electronic health record system in Iran which places the quality of the system as the factor that most influences the success of the system. However, this relationship does not persist after other dimensions are controlled on multivariate analysis (Subchapter 3.5) (27) (2)

3.2 The Relationship between Ease of Use and Officer Performance at the Aere Health Center in East Kolaka Regency in 2026

Table 2: The Relationship between Ease of Use and Officer Performance at the Aere Health Center, East Kolaka Regency in 2026

Ease of use	Performance				Total		Value p
	Good	%	Less good	%	n	%	
Good	59	93.7	4	6.3	63	100	0,002
Less good	8	57.1	6	42.9	14	100	
Total	67	87.0	10	13.0	77	100	

Source: Primary data, 2026

Based on Table 2, of the 63 respondents (100%) with good ease of use, as many as 59 respondents (93.7%) had good performance and 4 respondents (6.3%) had poor performance. Meanwhile, of the 14 respondents (100%) with poor ease of use, as many as 8 respondents (57.1%) had good performance and 6 respondents (42.9%) had poor performance.

In *the Chi-square* test, there was one cell with an *expected count* alue of less than 5 (the smallest 1.82) so the *Fisher's exact test* value (two sides), which was 0.002, was used. This value showed that there was a significant relationship between the ease of use and the performance of the officers at the Aere Health Center, with the strength of the medium relationship (*Cramér's V* = 0.419) and *the Spearman* correlation on a relatively strong continuous score (ρ = 0.665).

Ease of use is an attribute of the system that makes operation feel natural, easy to learn, and not burdensome to the user, which is reflected in a clear display, logical menu flow, and simple input procedures (17) . This dimension is relevant in health centers because users come from a variety of professions, officers work under time pressure during peak visiting hours, and more than half of respondents (51.9%) have never attended e-Puskesmas training.

Of the 63 respondents with good ease of use, the largest percentage, namely 59 people (93.7%), performed well. This is attributed to a clear interface, logical menu flow, and simple data input so that the officer can operate the system without assistance and focus on patient service.

On the other hand, of the 14 respondents with poor ease of use, as many as 6 people (42.9%) performed poorly, much larger than the group with good ease (6.3%). This was associated with the difficulty operating the unassisted menu found in some attendants in the preliminary study.

This relationship is in line with the research of Azilyah et al. in the Klangenan Health Center, which found that ease of use was strongly related to the satisfaction of health workers using the e-Puskesmas, as well as the research of Nurhayati et al. in Sumedang Regency, which found that ease of use affected the satisfaction of users of the e-Puskesmas medical features. It should be noted that both studies measured user satisfaction, not performance. As in reliability, this relationship did not persist after other dimensions were controlled (Subchapter 3.5) (24) (23).

3.3 The Relationship between Access Speed and Officer Performance at the Aere Health Center in East Kolaka Regency in 2026

Table 3: Relationship between Access Speed and Officer Performance at the Aere Health Center, East Kolaka Regency in 2026

Access speed	Performance				Total		Value p
	Good	%	Less good	%	n	%	
Good	62	95.4	3	4.6	65	100	< 0.001
Less good	5	41.7	7	58.3	12	100	
Total	67	87.0	10	13.0	77	100	

Source: Primary Data 2025

Based on Table 3, out of 65 respondents (100%) with good access speeds, as many as 62 respondents (95.4%) had good performance and 3 respondents (4.6%) had poor performance. Meanwhile, of the 12 respondents (100%) with poor access speeds, as many as 5 respondents (41.7%) had good performance and 7 respondents (58.3%) had poor performance.

In *the Chi-square* test, there was one cell with an *expected count* value of less than 5 (the smallest 1.56) so the *value of Fisher's exact test* (two sides), which was < 0.001, was used. This value showed that there was a significant relationship between the speed of access and the performance of the officers at the Aere Health Center, with the strength of the medium relationship (*Cramér's V* = 0.580) and *the Spearman correlation* on the continuous score which was classified as very strong (ρ = 0.832).

Access speed is a user's assessment of the system's response time to service transactions when the system is functioning, which includes the speed of opening applications, searching and storing patient data, and verifying NHI participation (17,27) . In primary services that handle many patients in a limited time, the system's response delay in each transaction accumulates into longer queues and fewer patients served in one working day.

Of the 65 respondents with good access speeds, the largest percentage, namely 62 people (95.4%), had good performance. This is associated with the system's rapid response when opening the application, storing data, and verifying membership so that NHI service transactions can be completed on time.

On the other hand, of the 12 respondents with poor access speed, as many as 7 people (58.3%) had poor performance, while in the group with good access speed the proportion was only 4.6%. This is attributed to the semi-remote condition of the Aere Health Center, with internet access dependent on cellular networks and paid *wifi*, so that the system's response at the time of NHI membership verification and crowded visiting hours is easily slowed down.

This relationship is in line with research on e-Puskesmas users in Sumedang Regency who reported slow system response, which was noted as an initial problem in e-Puskesmas users in Sumedang Regency and complaints of a long loading process at SIMPUS Blitar City, as well as timeliness of a meaningful relationship between time density and satisfaction at Klangenan Health Center. However, the study in Sumedang did not find a significant effect of system quality, which includes response speed, on satisfaction. The three studies measured user complaints or satisfaction, while this study linked access speed to officer performance. Its effect on the multivariate model is discussed in Subchapter 3.5.(23) (22) (24)(23).

3.4 The Relationship between System Flexibility and Officer Performance at the Aere Health Center in East Kolaka Regency in 2026

Table 4: The Relationship between System Flexibility and Officer Performance at the Aere Health Center, East Kolaka Regency in 2026

System flexibility	Performance				Total		Value p
	Good	%	Less good	%	n	%	
Good	61	98.4	1	1.6	62	100	< 0.001
Less good	6	40.0	9	60.0	15	100	
Total	67	87.0	10	13.0	77	100	

Source: Primary data, 2026

Based on Table 4, of the 62 respondents (100%) with good system flexibility, as many as 61 respondents (98.4%) had good performance and 1 respondent (1.6%) had poor performance. Meanwhile, of the 15 respondents (100%) with poor system flexibility, as many as 6 respondents (40.0%) had good performance and 9 respondents (60.0%) had poor performance.

In *the Chi-square* test, there was one cell with *an expected count* value of less than 5 (the smallest 1.95) so *Fisher's exact test* value (two sides) was used, which was < 0.001. This value showed that there was a significant relationship between system flexibility and the performance of officers at the Aeree Health Center, with the strength of the strong relationship (*Cramér's V* = 0.688), which was the strongest relationship between the four dimensions, and *the Spearman* correlation on the very strong continuous score (ρ = 0.833).

System flexibility is the ability of the information system to adjust to changes in service provisions and unit needs and integrate with other systems without the need for a complete overhaul (17,27) . This dimension is important for NHI services because the technical provisions of the program are updated regularly, both regarding membership administration requirements, referral procedures, and data formats sent to the guarantor. The system that is unable to keep up with the update forces officers to double record, namely in the e-Puskesmas for internal purposes and in the guarantor application for claim purposes.

Of the 62 respondents with good system flexibility, the largest percentage, 61 people (98.4%), performed well, which was the highest proportion among all groups in all four dimensions. This is attributed to a system that is able to keep up with changes in NHI rules, connect with P-Care, and generate reports without reorganization so that double recording and rework are reduced.

On the other hand, of the 15 respondents with poor system flexibility, as many as 9 people (60.0%) had poor performance, compared to 1.6% in the group with good flexibility. This is associated with failure to integrate with P-Care and feature limitations that force officers to re-input data and hold back the completion of NHI administration.

This relationship is in line with the evaluation of the health center information system at the Tambun Health Center, Bekasi, which reported that the e-Puskesmas was integrated with P-Care and was felt to be beneficial by the officers, although bridging sometimes failed, with a study in Sumedang Regency that noted the difficulty of synchronizing with P-Care as an initial problem of the user without testing it, as well as with research on the hospital information system that attributed the system's ability to adjust to clinical needs and work benefits. Overall, the four dimensions were positively related to the performance of the officers in the bivariate analysis ($p \leq 0.043$); since the group that rated poorly consisted of only 7–15 people and the four dimensions were highly correlated ($r = 0.61–0.82$), these results were interpreted as preliminary descriptions and the influence of each dimension was tested in the multivariate analysis (Subchapter 3.5). (25) (23)(21).

3.5 The Effect of System Quality on Officer Performance at the Aere Health Center, East Kolaka Regency in 2026

Table 5: Results of Multiple Linear Regression Analysis of System Quality on Officer Performance at the Aere Health Center, East Kolaka Regency in 2026 (n = 77)

Variable	B	Default error	β	t	p	95% CI for B
Constant	2.345	1.305	–	1.80	0.077	−0.257 to 4.947
System reliability (X1)	0.094	0.099	0,088	0.95	0.344	−0.103 to 0.291
Ease of use (X2)	−0.113	0.104	−0.111	−1.09	0.278	−0.320 to 0.094
Access speed (X3)	0.444	0.119	0.448	3.73	< 0.001	0.207 to 0.682
System flexibility (X4)	0.472	0.105	0.502	4.48	< 0.001	0.262 to 0.682

Description: R^2 = 0.777; *adjusted* R^2 = 0.765; bold = mean at α = 5%. Source: Primary data, 2026

Based on Table 5, the multiple linear regression model is feasible (F = 62.74; p < 0.001) and explains 76.5% of the variation in officer performance (*adjusted* R^2 = 0.765). With other dimensions controlled, access speed (B = 0.444; β = 0.448; p < 0.001) and system flexibility (B = 0.472; β = 0.502; p < 0.001) had a positive and significant effect on officer performance, while system reliability (B = 0.094; p = 0.344) and ease of use (B = −0.113; p = 0.278) had no significant effect. Each one-point increase in access speed score was associated with a 0.44-point increase in performance score, and system flexibility by 0.47 points, with other dimensions considered fixed. Flexibility had the largest beta, followed by access speed; because the trust interval of the two overlapped, the difference was not formally tested. The ease of use coefficient was negatively marked but meaningless so it was not interpreted.

These findings persisted on *bootstrap* (BCa 95% for access speed 0.174–0.691 and flexibility 0.251–0.784), *robust* HC3 standard error, analysis without a single *outlier*, and addition of lifetime, training, and staffing status control variables (*adjusted* R^2 = 0.774; no change in significance status). Multicollinearity is still within limits (VIF 2.759–4.653). However, the assumptions of residual normality, linearity (at X1–X3), and homogeneity of variance (at X4) were not fully met, and Harman's single-factor test showed the first factor absorbing 50.5% of the variance.

Flexibility was the dimension with the greatest influence on officer performance (B = 0.472; p < 0.001). Flexibility items in this study included adjustment to changes in NHI rules, automatic connectivity with P-Care, suitability of recording formats, follow-up recording after network recovery, and reporting without restructuring; almost all of them related to reduced double recording and rework. The distribution of data supports this: 9 out of 10 underperforming officers came from the group that rated flexibility poorly. Eight of the 14 respondents' meaningful open-ended suggestions also concerned server, network, and P-Care *bridging* disruptions, or completeness of report features and formats.

Access speed also had a significant effect (B = 0.444; p < 0.001). This relationship makes sense in the context of the semi-remote Aere Health Center and relies on cellular networks and *paid wifi*: verification of NHI membership (average point 4.03) and speed during rush hour (3.97) depend directly on communication with the BPJS Kesehatan system. Slow response can prompt officers to postpone recording until the end of service hours so that the timeliness and accuracy of data decrease. This mechanism is theoretical and is not directly observed.

Reliability was related to performance in bivariate analysis (p = 0.043; ρ = 0.683), but had no significant effect after other dimensions were controlled (B = 0.094; p = 0.344). These results differ from the findings of Nelson et al. who placed reliability as the most consistent dimension shaping system quality assessments, and from the evaluation of electronic health record systems in Iran (27) (2) however, it is in line with Tjandra et al., who reported that the implementation of electronic medical records as a whole did not have a significant direct effect on the performance of health workers in hospitals (p = 0.617), although the construct, type of facility, and sample size were different so that this comparison is indicative, and Nurhayati et al., who found no significant effect of system quality (system response and updates) on e-Puskesmas user satisfaction (28) . There are three possible explanations. First, reliability is highly correlated with access speed (r = 0.80) and flexibility (r = 0.67) so that the unique contribution is only 0.3%. Second, the assessment is relatively uniform and high (average item 4.05). Third, the number of respondents is limited to detect small unique effects. These results do not mean that system disruptions are not important: a qualitative study in Banjarmasin reported that unstable Wi-Fi networks and applications that frequently error or down both hinder bridging with P-Care; in this study, the two types of interference may be difficult to separate by officers, and repeated interference is likely to be perceived as slowing down and failure of data transmission captured by two other dimensions (23) (29).

Ease of use showed a similar pattern: it was related to bivariate analysis ($p = 0.002$; $\rho = 0.665$), but had no effect on multiple models ($B = -0.113$; $p = 0.278$). Rhayha et al. found the effect of system quality, measured through ease of use and ease of learning of the system, on clinician performance in Moroccan hospitals ($\beta = 0.17$), but as a construct and with satisfaction as a stronger predictor ($\beta = 0.50$). In this study, ease of use was highly correlated with speed of access ($r = 0.76$) and flexibility ($r = 0.82$). In addition, officers had been using the system for an average of 1.9 years and the system was mandatory to use in NHI services, so the initial learning barrier may have been overcome. This explanation was not tested and needs to be proven in further research (3).

Theoretically, these results are consistent with the assumption of DeLone and McLean's models that system quality is related to the net benefit at the individual level (17) , and is in line with the findings of Rhayha et al. and Utomo et al.; however, this study did not test the intermediary pathway through user usage and satisfaction. System quality also did not work as a whole: two of the four dimensions were meaningful and the other two were not. The *adjusted* R^2 value of 0.765 needs to be read as the upper limit because system quality and performance were measured from the same respondents (Harman's first factor of 50.5%) and the four dimensions were highly correlated (3) . Conclusions about the direction and dimensions that play a role are more reliable because they stand on endurance tests. "Influence" is understood as a predictive contribution to cross-sectional data, rather than cause-effect relationships (26).

Practically, these findings direct the improvement of e-Puskesmas to flexibility, namely the stability of *P-Care bridging*, the completeness of features, and the suitability of the report format that needs to be discussed with system developers and health offices through recording cases of synchronization failures that can be traced, as well as on access speed, namely network quality during peak hours and during membership verification, accompanied by connection backups, backup power sources, and clear manual recording procedures when the system is disrupted. Structured training and *key user* officers are also worth considering as 51.9% of respondents have never been trained, although the impact of training on performance was not tested in this study.

4 CONCLUSION

Based on the results of the study on the influence of the quality of the e-Puskesmas information system (reliability, ease of use, speed of access, and flexibility) on the performance of officers in NHI services at the Aere Health Center, it can be concluded that the quality of the system has a significant effect, in the sense of predictive contribution, on the performance of the officers ($F = 62.74$; $p < 0.001$; *adjusted* $R^2 = 0.765$). The flexibility of the system and the speed of access have a significant effect, while the reliability and ease of use have no significant effect after the other dimensions are controlled. Therefore, the Puskesmas together with the health office and system developers are advised to prioritize improvements in flexibility (*stability of P-Care bridging*, completeness of features, and report format) and speed of access (network quality and backup procedures). Further research is recommended using a wider range of designs and samples as well as more objective performance measures.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

No conflict of interest needs to be disclosed.

Statement of ethical approval

Prior to data collection, all participants were informed about the purpose and procedures of the study. Their participation was voluntary, and informed consent was obtained from all respondents before their involvement in the research. The confidentiality and privacy of all participants were maintained throughout the study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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