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The Influence of System Quality and Information Quality on E-Puskesmas User Satisfaction: An Empirical Study at Kumai Community Health Center

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a b s t r a c t

The implementation of Electronic Medical Records (EMR) in primary healthcare facilities has become a critical component of Indonesia's national digital health transformation agenda. This study examines the influence of system quality and information quality on E-Puskesmas user satisfaction at Kumai Community Health Center in Central Kalimantan Province, Indonesia. Employing a quantitative research approach with cross-sectional design, data were collected from all 58 healthcare staff who directly used the E-Puskesmas system through a validated questionnaire adapted from the DeLone and McLean IS Success Model and End User Computing Satisfaction (EUCS) framework. Multiple linear regression analysis revealed that both system quality ($\beta = 0.408$, $p = 0.000$) and information quality ($\beta = 0.574$, $p = 0.000$) significantly and positively affected user satisfaction, with information quality demonstrating stronger influence. The model achieved an adjusted R^2 of 0.586, indicating that 58.6% of variance in user satisfaction was explained by these two variables. Descriptive analysis uncovered dimensional heterogeneity, with security and relevance achieving high categories while system reliability, timeliness, and overall satisfaction remained in moderate classification. These findings suggest that healthcare professionals in resource-constrained settings prioritize accurate and relevant patient data over technical system performance, yet infrastructure limitations continue to undermine holistic user experience. The study contributes empirical evidence for improving E-Puskesmas implementation and supports Indonesia's broader digital health integration through the Satusehat platform.

Kata Kunci:
Kepuasan Pengguna; Kualitas Sistem; Kualitas Informasi.

a b s t r a k

Implementasi Rekam Medis Elektronik (EMR) di fasilitas kesehatan primer telah menjadi komponen penting dari agenda transformasi kesehatan digital nasional Indonesia. Studi ini meneliti pengaruh kualitas sistem dan kualitas informasi terhadap kepuasan pengguna E-Puskesmas di Puskesmas Kumai, Provinsi Kalimantan Tengah, Indonesia. Dengan menggunakan pendekatan penelitian kuantitatif dengan desain cross-sectional, data dikumpulkan dari seluruh 58 staf kesehatan yang secara langsung menggunakan sistem E-Puskesmas melalui kuesioner tervalidasi yang diadaptasi dari Model Keberhasilan Sistem Informasi DeLone dan McLean dan kerangka kerja Kepuasan Pengguna Akhir Komputasi (EUCS). Analisis regresi linier berganda mengungkapkan bahwa baik kualitas sistem ($\beta = 0{,}408$, $p = 0{,}000$) maupun kualitas informasi ($\beta = 0{,}574$, $p = 0{,}000$) secara signifikan dan positif memengaruhi kepuasan pengguna, dengan kualitas informasi menunjukkan pengaruh yang lebih kuat. Model tersebut mencapai R^2 yang disesuaikan sebesar 0,586, menunjukkan bahwa 58,6% varians dalam kepuasan pengguna dijelaskan oleh kedua variabel ini. Analisis deskriptif mengungkap heterogenitas dimensional, dengan keamanan dan relevansi mencapai kategori tinggi sementara keandalan sistem, ketepatan waktu, dan kepuasan keseluruhan tetap berada dalam klasifikasi sedang. Temuan ini menunjukkan bahwa para profesional kesehatan di lingkungan dengan keterbatasan sumber daya memprioritaskan data pasien yang akurat dan relevan daripada kinerja sistem teknis, namun keterbatasan infrastruktur terus menghambat pengalaman pengguna secara holistik. Studi ini memberikan bukti empiris untuk meningkatkan implementasi E-Puskesmas dan mendukung integrasi kesehatan digital Indonesia yang lebih luas melalui platform Satusehat.

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1. Introduction

The global healthcare landscape is undergoing a profound transformation driven by the digitization of patient records. Electronic Medical Records (EMR) and Electronic Health Records (EHR) represent a fundamental departure from traditional paper-based documentation systems, promising improvements in care quality, efficiency, and patient safety (Ali *et al.*, 2024; Mohammed *et al.*, 2024; Widiyanto *et al.*, 2023). The World Health Organization has described electronic medical records as digital versions of all information typically found in a provider's paper chart, encompassing medical history, diagnoses, medications, immunization dates, allergies, laboratory results, and physician notes (Mohammed *et al.*, 2024). Since the initial mainstream implementation of EHR systems in the mid-to-late 2000s—catalyzed by landmark legislation such as the Health Information Technology for Economic and Clinical Health Act in the United States—the adoption of electronic records has accelerated worldwide (Huber, 2025). A WHO survey conducted in 2012 indicated that 45% of countries used electronic systems for patient data management, with 30% collecting and communicating patient information via electronic systems (Berihun *et al.*, 2020).

However, this shift has been uneven across regions, with developed nations generally achieving higher adoption rates compared to developing countries, where significant barriers persist ((Rahman & Islam, 2024; Torkman *et al.*, 2024). Government policies and legislative mandates have been among the most powerful drivers of EMR adoption globally. In the United States, the HITECH Act allocated more than $20 billion to incentivize hospital and provider systems to digitize their paper records and adopt EHR systems, with specific definitions for multiple phases of adoption and "meaningful use" requirements (Huber, 2025). The primary purpose of this legislation was to move storage and processing of medical records from paper to electronic form while strengthening protection of electronic protected health information (Ignatovski, 2023). In the United Kingdom, the National Health Service expressed a vision in 2014 for fully interoperable electronic health records, presenting digitization as a collective endeavor for patients and healthcare professionals (Wyatt *et al.*, 2020). In the Gulf Cooperation Council countries, substantial investments have been made; for example, the United Arab Emirates launched the Wareed health information system in 2011, while Saudi Arabia committed $1.1 billion between 2008 and 2011 for e-health development as part of its Vision 2030 (Alanazi *et al.*, 2020). These policy initiatives demonstrate how government leadership can accelerate digital transformation in healthcare, even as challenges remain in implementation and sustainability. In Indonesia, the digitalization of health records has been propelled by regulatory mandates at the national level. The Ministry of Health Regulation Number 24 of 2022 concerning Medical Records represents a landmark regulatory instrument that mandates the implementation of Electronic Medical Records across all healthcare facilities in Indonesia (Basani, 2023; Heryawan *et al.*, 2025; Tilaar & Sewu, 2023). This regulation was enacted as a replacement for the previous Minister of Health Regulation Number 269/MENKES/PER/2008, reflecting the government's recognition that technological development should be accompanied by the digitalization of health sector data (Basani, 2023).

The transition to electronic medical records was expected to be completed by December 31, 2023, establishing a clear timeline for compliance (Basani, 2023). The regulation serves as the implementing regulation of Article 46 of Law Number 29 of 2004 concerning Medical Practice, which establishes the foundational obligation for all doctors and dentists to maintain medical records in their practice (Tilaar & Sewu, 2023). This regulatory framework aligns with broader digital health transformation initiatives, including the development of the Satusehat platform as Indonesia's nationwide Electronic Health Record system (Heryawan *et al.*, 2025). Primary health care in Indonesia is predominantly delivered through a vast network of community health centers known as Puskesmas, which serve as the cornerstone of the nation's healthcare system (Aisyah *et al.*, 2024, 2025). As of recent counts, Indonesia operates approximately 10,260 Puskesmas spread across urban, rural, remote, and very remote areas within all provinces and districts (Aisyah *et al.*, 2025). The digitalization of health services at these facilities has

become imperative, driven by the need for efficient data management, improved service delivery, and integration with national health information ecosystems (Aisyah *et al.*, 2025; Heryawan *et al.*, 2025). Among the various digital health information systems deployed at Puskesmas, E-Puskesmas has emerged as a significant web-based application designed to fulfill the need for digital data recording and reporting at the primary care level (Utami & Wardani, 2021). This system represents a transition from manual to electronic reporting systems, serving as a recording and reporting application that has been available since 2018 in certain districts (Sari *et al.*, 2023). The implementation of E-Puskesmas and similar web-based health information systems in Indonesian primary care occurs within a complex and challenging environment. The health information system landscape in Indonesian Puskesmas is characterized by substantial fragmentation, with a national-level survey covering 2,606 Puskesmas finding that each facility reported using approximately 30 different health information system platforms on average. Most of these systems were developed by national ministries, though local governments and third-party developers also contributed significantly (Aisyah *et al.*, 2025).

This proliferation of systems has been driven by the introduction of numerous program-specific applications by the central government, creating excessive burden for healthcare workers, fragmented data, lack of data integration and interoperability, and low levels of system standardization. Infrastructure limitations represent significant barriers, with 7.18% of Puskesmas having no internet access at all, 14.33% having limited access, and only 24.85% having sufficient and fast internet access. Furthermore, 8.02% of Puskesmas did not have 24-hour electricity, and significant proportions had inadequate computing hardware specifications (Aisyah *et al.*, 2025). User satisfaction has emerged as a critical determinant of successful health information system implementation and sustainable adoption. The Technology Acceptance Model and subsequent theoretical developments emphasize that perceived usefulness and perceived ease of use significantly influence users' intentions to adopt and continue using information systems (Hizriansyah, 2023). In the context of E-Puskesmas, research has shown that while users may perceive the system as relatively easy to learn and use, concerns about increased workload and reduced productivity can undermine acceptance. The DeLone and McLean Information Systems Success Model provides a comprehensive framework for understanding the multidimensional nature of information system success, identifying system quality, information quality, and service quality as key antecedents of user satisfaction and net benefits. This model has been extensively applied and validated in healthcare information system contexts, demonstrating that technical performance of the system and the quality of information produced are fundamental to achieving user satisfaction (Rahmi, 2025; Yuniarti *et al.*, 2021). System quality encompasses dimensions such as ease of use, response time, reliability, availability, and security, while information quality includes accuracy, timeliness, completeness, relevance, and consistency. Despite the critical importance of E-Puskesmas for Indonesia's digital health transformation, research examining the factors that influence user satisfaction in this specific context remains limited.

Previous studies have demonstrated that system quality and information quality significantly affect user satisfaction with electronic medical records in various healthcare settings (Rahmi, 2025; Yuniarti *et al.*, 2021). However, these studies have predominantly focused on hospital settings or urban healthcare facilities, with less attention to primary care contexts in remote and resource-constrained environments. The unique challenges facing Puskesmas in Indonesia—including infrastructure limitations, multiple concurrent information systems, and varying levels of digital literacy among healthcare workers—necessitate context-specific investigation. Furthermore, as Indonesia continues to expand its Satusehat platform for national health data integration, understanding the determinants of user satisfaction with foundational systems such as E-Puskesmas becomes increasingly important for policy and practice. This study addresses this research gap by examining the influence of system quality and information quality on E-Puskesmas user satisfaction at Kumai Community Health Center in Central Kalimantan Province, Indonesia. By applying the DeLone and McLean model in this specific context, the study aims to generate evidence-based insights for

improving E-Puskesmas implementation and supporting Indonesia's broader digital health transformation agenda.

2. Research Methodology

This study employed a quantitative research approach with cross-sectional design to examine the influence of system quality and information quality on E-Puskesmas user satisfaction at Kumai Community Health Center, Central Kalimantan Province, Indonesia. The research was conducted in January 2026 at Puskesmas Kumai, a primary healthcare facility located in Kotawaringin Barat Regency that serves as a key implementer of Indonesia's national digital health transformation agenda. The population comprised all 58 staff members who directly used E-Puskesmas in patient service and data management processes, with saturation sampling applied to include the entire population as respondents. Data collection utilized a validated questionnaire instrument adapted from the DeLone and McLean IS Success Model (2003) and the End User Computing Satisfaction (EUCS) framework (Doll & Torkzadeh, 1988), consisting of 30 items measured on a 4-point Likert scale (1 = Strongly Disagree to 4 = Strongly Agree). System quality was operationalized through five dimensions (ease of use, response time, reliability, availability, and security) with 10 items, while information quality encompassed accuracy, timeliness, completeness, relevance, and consistency (10 items). User satisfaction was measured through five EUCS dimensions: content satisfaction, accuracy satisfaction, format satisfaction, ease of use satisfaction, and overall satisfaction (10 items). Instrument validity was established through Pearson bivariate correlation testing with 30 pilot respondents from a comparable health facility, yielding r-count values ranging from 0.613 to 0.979, all exceeding the r-table value of 0.361 ($p < 0.05$). Reliability was confirmed via Cronbach's alpha coefficients of 0.920 (system quality), 0.962 (information quality), and 0.978 (user satisfaction), all exceeding the 0.60 threshold. Data analysis proceeded through univariate analysis using the Three Box Method to categorize index scores into low, moderate, and high categories, followed by multiple linear regression analysis to test hypotheses. Classical assumption tests confirmed normality (P-P plot), absence of multicollinearity (Tolerance = 0.684, VIF = 1.462), no heteroscedasticity (random scatterplot pattern), and no autocorrelation (Durbin-Watson = 1.683). The regression model $Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$ was employed, where Y represented user satisfaction, X_1 denoted system quality, and X_2 indicated information quality, with hypothesis testing conducted at $\alpha = 0.05$ significance level using SPSS statistical software.

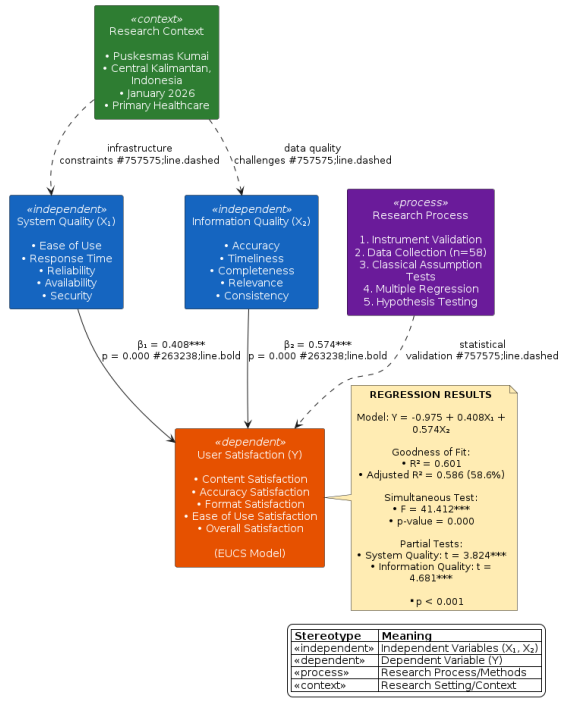

Figure 1. E-Puskesmas User Satisfaction Research Framework

3. Results and Discussion

Results

Research Setting and Participant Characteristics

This study was conducted at Puskesmas Kumai, a primary healthcare facility located in Kotawaringin Barat Regency, Central Kalimantan Province, Indonesia. Puskesmas Kumai was established in 1975 and has evolved from a basic health clinic to a comprehensive community health center providing both outpatient and inpatient services. The facility serves as a critical node in Indonesia's national health system, implementing the E-Puskesmas electronic medical record system as mandated by Ministry of

Health Regulation No. 24/2022. The research was conducted in January 2026, capturing the experiences of healthcare workers during a pivotal period of digital health transformation in a geographically remote region characterized by infrastructure challenges and limited connectivity. The study population comprised all 58 staff members who directly used E-Puskesmas in patient service delivery and data management processes. Saturation sampling was employed, ensuring complete population representation without sampling error. Table 1 presents the demographic and professional characteristics of respondents. The majority of participants were female (81.0%, n = 47), reflecting the gender composition typical of Indonesia's healthcare workforce. Age distribution showed concentration in the 31-40 years category (53.4%, n = 31), indicating a predominantly mid-career workforce with substantial professional experience. Nursing staff constituted the largest professional group (41.4%, n = 24), followed by midwives (24.1%, n = 14) and physicians (13.8%, n = 8). Work tenure analysis revealed that 44.8% (n = 26) had 1-5 years of service, suggesting relatively recent workforce entry and potential exposure to digital systems during their professional education.

Table 1. Respondent Characteristics (N = 58)

Characteristic	Category	n	%
Gender	Male	11	19.0
	Female	47	81.0
Age (years)	21-30	16	27.6
	31-40	31	53.4
	41-50	5	8.6
	51-60	6	10.3
Position	Nurse	24	41.4
	Midwife	14	24.1
	Physician	8	13.8
	Pharmacist	4	6.9
	Medical Recorder	4	6.9
	Analyst	2	3.4
	Dentist	2	3.4
Work Tenure	1-5 years	26	44.8
	6-10 years	15	25.9
	11-15 years	5	8.6
	>15 years	12	20.7

The demographic profile of respondents has important implications for E-Puskesmas implementation. The female-dominated workforce aligns with global patterns in primary healthcare, where women constitute the majority of nursing and midwifery professionals. The concentration of respondents in the 31-40 age range suggests a generation of healthcare workers who may have received initial exposure to electronic systems during their professional training, yet who also retain experience with paper-based workflows that inform their comparative assessments. The substantial proportion of nursing staff reflects the hierarchical structure of Indonesian primary care, where nurses serve as the backbone of service delivery. The relatively short work tenure for nearly half of respondents indicates that many healthcare workers at Puskesmas Kumai are in early-to-mid career stages, potentially more adaptable to technological change but also requiring sustained training and support. These characteristics contextualize the user satisfaction findings that follow, as satisfaction judgments are shaped by professional background, generational technology exposure, and organizational tenure.

Descriptive Analysis of Research Variables

Descriptive analysis was conducted to characterize the distribution of responses across the three research variables: system quality, information quality, and user satisfaction. The Three Box Method was applied to classify index scores into categorical levels (low: 14.50-29.00; moderate: 29.01-43.50; high: 43.51-58.00), enabling nuanced interpretation beyond simple mean comparisons. This approach facilitates identification of specific dimensions requiring intervention while acknowledging overall positive assessments. System quality assessment revealed a total index score of 395.25 with a mean index of 79.05, classified in the high category overall. However, dimensional analysis uncovered significant variation. Security emerged as the strongest dimension (mean index 44.875, high category), with respondents affirming that patient data was stored securely and access restricted to authorized personnel. Conversely, system reliability registered the lowest score (mean index 34.625, moderate category), with particular concerns regarding system errors during peak service hours and unexpected downtime. Response time (mean index 38.625) and system availability (mean index 37.875) also fell in the moderate category, indicating that while E-Puskesmas was generally accessible, performance degradation during high-demand periods affected user experience. Ease of use achieved a borderline moderate-high classification (mean index 41.625), suggesting that interface design was acceptable but not optimal for all user skill levels.

Table 2. System Quality Dimensions (N = 58)

Dimension	Indicators	Total Score	Index	Category
Ease of Use	KS1: Easy to learn and use	157	39.25	Moderate
	KS2: Menu display understandable	176	44.00	High
	Subtotal	333	41.625	Moderate
Response Time	KS3: Fast response when searching patient data	164	41.00	Moderate
	KS4: Fast and smooth data saving process	145	36.25	Moderate
	Subtotal	309	38.625	Moderate
System Reliability	KS5: Rarely experiences errors	135	33.75	Moderate
	KS6: Functions stably during service hours	142	35.50	Moderate
	Subtotal	277	34.625	Moderate
Availability	KS7: Accessible anytime when needed	163	40.75	Moderate
	KS8: Login rarely disconnected or down	140	35.00	Moderate
	Subtotal	303	37.875	Moderate
Security	KS9: Patient data stored securely	178	44.50	High
	KS10: Access limited to authorized personnel	181	45.25	High
	Subtotal	359	44.875	High
Total System Quality		395.25	79.05	High

Information quality achieved the highest overall assessment among the three variables, with a total index of 428.00 and mean index of 85.60 (high category). Relevance emerged as the paramount dimension (mean index 45.00, high category), with respondents affirming that E-Puskesmas information aligned with their professional tasks and supported clinical decision-making. Completeness (mean index 43.75) and consistency (mean index 43.75) also achieved high category classification, indicating that patient data was generally comprehensive and stable over time. However, accuracy (mean index 40.625) and timeliness (mean index 40.875) registered moderate scores, revealing persistent concerns regarding data entry errors and delays in real-time information updates. These

findings suggest that while E-Puskesmas successfully delivers relevant and comprehensive information, the integrity and currency of that information requires continued attention.

Table 3. Information Quality Dimensions (N = 58)

Dimension	Indicators	Total Score	Index	Category
Accuracy	KI1: Information free from errors	145	36.25	Moderate
	KI2: Data matches actual patient condition	180	45.00	High
	Subtotal	325	40.625	Moderate
Timeliness	KI3: Data updated quickly/real-time	160	40.00	Moderate
	KI4: Information available when needed	167	41.75	Moderate
	Subtotal	327	40.875	Moderate
Completeness	KI5: Displays comprehensive patient data	171	42.75	Moderate
	KI6: Ensures all important information filled	179	44.75	High
	Subtotal	350	43.75	High
Relevance	KI7: Information matches staff tasks and needs	181	45.25	High
	KI8: Reports support decision-making	179	44.75	High
	Subtotal	360	45.00	High
Consistency	KI9: Information consistent over time	177	44.25	High
	KI10: Displayed data does not change without reason	173	43.25	Moderate
	Subtotal	350	43.75	High
Total Information Quality		428.00	85.60	High

User satisfaction registered a total index of 392.75 with mean index of 78.55 (high category), though dimensional decomposition revealed concerning patterns. Accuracy satisfaction achieved the highest score (mean index 43.375, high category), reflecting appreciation for the reliability of patient data once correctly entered. However, overall satisfaction registered the lowest score (mean index 33.875, moderate category), indicating that despite positive assessments of specific dimensions, holistic user experience remained suboptimal. Format satisfaction (mean index 39.25) and ease of use satisfaction (mean index 38.125) also fell in the moderate category, with particular concerns regarding interface aesthetics and operational efficiency. Content satisfaction (mean index 41.75) approached the high threshold but remained in moderate classification. These findings suggest that user satisfaction with E-Puskesmas is compartmentalized—users appreciate specific functionalities while remaining dissatisfied with the overall experience.

Table 4. User Satisfaction Dimensions (N = 58)

Dimension	Indicators	Total Score	Index	Category
Content Satisfaction	KP1: Satisfied with information completeness	160	40.00	Moderate
	KP2: Information meets needs	174	43.50	Moderate
	Subtotal	334	41.75	Moderate
Accuracy Satisfaction	KP3: Satisfied with data accuracy	178	44.50	High
	KP4: Data trustworthy and not confusing	169	42.25	Moderate

	Subtotal	347	43.375	High
Format Satisfaction	KP5: Information displayed attractively	143	35.75	Moderate
	KP6: Format facilitates reading and understanding	171	42.75	Moderate
	Subtotal	314	39.25	Moderate
Ease of Use Satisfaction	KP7: Satisfied with ease of use	155	38.75	Moderate
	KP8: Easy to operate without many errors	150	37.50	Moderate
	Subtotal	305	38.125	Moderate
Overall Satisfaction	KP9: Overall satisfaction with system	134	33.50	Moderate
	KP10: Experience very satisfying	137	34.25	Moderate
	Subtotal	271	33.875	Moderate
Total User Satisfaction		392.75	78.55	High

The descriptive findings reveal a pattern of dimensional heterogeneity across all three variables: while aggregate indices suggest satisfactory performance, specific dimensions—particularly those related to technical performance (system reliability, response time) and holistic experience (overall satisfaction, format)—lag behind. This pattern has important implications for intervention prioritization, suggesting that aggregate satisfaction scores may mask critical improvement opportunities. The dominance of security and relevance dimensions indicates that E-Puskesmas successfully addresses fundamental requirements of data protection and professional utility, while the relative weakness in reliability and timeliness dimensions reflects infrastructure constraints characteristic of remote healthcare settings.

Classical Assumption Testing for Regression Analysis

Prior to hypothesis testing, comprehensive classical assumption tests were conducted to ensure the validity of multiple linear regression analysis. Four critical assumptions were evaluated: normality of residuals, absence of multicollinearity, homoscedasticity, and independence of residuals. All tests confirmed that the data met requirements for parametric regression analysis, supporting the reliability of subsequent inferential statistics. Normality was assessed through visual inspection of the P-P plot of regression standardized residuals and confirmed through the Kolmogorov-Smirnov test with Lilliefors correction. The P-P plot demonstrated that observed cumulative probabilities closely followed the expected diagonal line, with points distributed evenly around the reference without systematic deviation. This visual pattern was supported by statistical testing, confirming that residuals were normally distributed and satisfying the normality assumption required for valid hypothesis testing. Multicollinearity was evaluated through tolerance values and Variance Inflation Factor (VIF). As presented in Table 5, both independent variables demonstrated tolerance values of 0.684, substantially exceeding the conventional threshold of 0.10. Correspondingly, VIF values of 1.462 were well below the critical value of 10, indicating that system quality and information quality were not highly correlated with each other and could be simultaneously included in the regression model without distortion of coefficient estimates.

Table 5. Multicollinearity Test Results

Variable	Tolerance	VIF	Interpretation
System Quality (X_1)	0.684	1.462	No multicollinearity
Information Quality (X_2)	0.684	1.462	No multicollinearity
Criterion	> 0.10	< 10	Satisfied

Heteroscedasticity was assessed through visual inspection of the scatterplot of standardized residuals against standardized predicted values. The plot revealed a random distribution of points without discernible pattern, funnel shape, or systematic variation across the range of predicted values. This random scatter pattern confirmed homoscedasticity, indicating that error variance remained constant across all levels of the independent variables and supporting the validity of standard error estimates for hypothesis testing.

Autocorrelation was tested using the Durbin-Watson statistic, with critical values obtained from standard tables based on sample size (n = 58) and number of independent variables (k = 2). The calculated Durbin-Watson value of 1.683 fell within the acceptable range between the lower bound (du = 1.647) and upper bound (4-du = 2.353), confirming the absence of positive or negative autocorrelation in residuals. This finding indicates that observations were independent and that standard error estimates were not inflated by correlated errors. The comprehensive classical assumption testing confirms that the multiple linear regression model meets all parametric requirements. The absence of multicollinearity ensures that coefficient estimates for system quality and information quality reflect their independent contributions rather than shared variance. Homoscedasticity and normality guarantee that confidence intervals and p-values are valid for hypothesis testing. These foundations support confident interpretation of the regression results presented in subsequent sections.

Hypothesis Testing Results

Hypothesis testing was conducted through multiple linear regression analysis to examine the effects of system quality and information quality on E-Puskesmas user satisfaction. Three hypotheses were evaluated: the partial effect of system quality (H_1), the partial effect of information quality (H_2), and the simultaneous effect of both variables (H_3). All hypotheses were tested at $\alpha = 0.05$ significance level using two-tailed tests.

Table 6. Multiple Linear Regression Results

Variable	B	Std. Error	Beta (β)	t	p-value	Decision
(Constant)	-0.975	3.137	-	-0.311	0.757	-
System Quality (X_1)	0.408	0.107	0.394	3.824	0.000	H_1 Accepted
Information Quality (X_2)	0.574	0.123	0.482	4.681	0.000	H_2 Accepted

Model Fit Statistics:
R = 0.775
R^2 = 0.601
Adjusted R^2 = 0.586
Standard Error of Estimate = 2.464
F-value = 41.412
p-value (F-test) = 0.000

The regression model achieved strong explanatory power, with adjusted R^2 of 0.586 indicating that 58.6% of variance in user satisfaction was explained by system quality and information quality. The remaining 41.4% of variance is attributable to other factors not included in the model, such as service quality, organizational support, individual technology readiness, and contextual factors specific to Puskesmas Kumai. The standard error of estimate (2.464) suggests reasonable precision in predicting user satisfaction scores based on the two quality dimensions.

Hypothesis 1: System Quality Effect

The partial effect of system quality on user satisfaction was statistically significant and positive (β = 0.408, t = 3.824, p = 0.000). This finding indicates that for every one-point increase in system quality assessment, user satisfaction increased by 0.408 points, holding information quality constant. The standardized beta coefficient (0.394) suggests a moderate effect size, indicating that system quality is a meaningful but not dominant predictor of satisfaction. This result supports the theoretical proposition of the DeLone and McLean model that technical system performance directly influences user evaluations. The significance of this effect persisted despite the moderate category classification of several system quality dimensions in

descriptive analysis, suggesting that users integrate multiple performance cues into overall quality judgments.

Hypothesis 2: Information Quality Effect

The partial effect of information quality on user satisfaction was statistically significant, positive, and stronger than the system quality effect ($\beta = 0.574$, $t = 4.681$, $p = 0.000$). For every one-point increase in information quality assessment, user satisfaction increased by 0.574 points, holding system quality constant. The standardized beta coefficient (0.482) indicates a moderately strong effect, and the comparison with system quality ($0.574 > 0.408$) reveals that information quality exerts greater influence on user satisfaction in the E-Puskesmas context. This finding aligns with O'Brien's (2006) emphasis on information quality dimensions in healthcare decision-making and reflects the professional priorities of healthcare workers who depend on accurate, timely patient data for clinical practice.

Hypothesis 3: Simultaneous Effect

The simultaneous test of model significance yielded $F = 41.412$ with $p = 0.000$, indicating that system quality and information quality together significantly explained variance in user satisfaction. This finding validates the theoretical model proposing that both technical system characteristics and information outputs jointly determine user evaluations. The substantial F-value relative to degrees of freedom indicates a robust model fit that is unlikely to have occurred by chance. The simultaneous significance confirms that neither variable alone is sufficient to explain satisfaction; rather, users integrate assessments of how the system works (system quality) with assessments of what the system produces (information quality) in forming satisfaction judgments. The regression equation derived from this analysis is:

$$\text{User Satisfaction} = -0.975 + 0.408(\text{System Quality}) + 0.574(\text{Information Quality})$$

The negative constant (-0.975) suggests that in the theoretical absence of both system quality and information quality, user satisfaction would be negative, though this intercept has limited practical interpretation given that zero values on quality scales are empirically impossible. The differential coefficient magnitudes ($0.574 > 0.408$) provide clear guidance for resource allocation: improvements in information quality will yield greater satisfaction returns than equivalent improvements in system quality, though both warrant attention.

Comparative Analysis and Theoretical Implications

The findings from Puskesmas Kumai can be situated within the broader literature on healthcare information system success, revealing both consistencies and context-specific patterns. The confirmation of significant effects for both system quality and information quality aligns with the majority of studies applying the DeLone and McLean model in healthcare settings, including research by Rahmi *et al.* (2025) on EMR implementation, Putri *et al.* (2023) on outpatient EMR systems, and Yuniarti *et al.* (2021) on disease surveillance systems. However, the relative magnitude of effects—information quality exceeding system quality—differs from some studies finding comparable or system-dominant effects, suggesting contextual moderation.

Table 7. Comparison with Previous Studies

Study	Context	System Quality Effect	Information Quality Effect	Relative Dominance
Present Study	E-Puskesmas, Primary Care, Remote	$\beta = 0.408$***	$\beta = 0.574$***	Information > System

Rahmi *et al.* (2025)	EMR, Multiple Settings	t = 5.362***	t = 5.266***	Comparable
Putri *et al.* (2023)	Outpatient EMR, Hospital	β = 0.213***	β = 0.199***	System > Information
Yuniarti *et al.* (2021)	NCD Surveillance, Urban	p = 0.001**	p = 0.000***	Information > System
Nurhayati *et al.* (2024)	E-Puskesmas, Urban	Not significant	β = 0.408***	Information only
Audina *et al.* (2024)	Accounting IS	p = 0.04*	p = 0.01**	Information > System

The pattern of information quality dominance observed at Puskesmas Kumai may reflect several contextual factors. First, in resource-constrained settings with unreliable infrastructure, users may develop adaptive expectations regarding system performance, effectively "discounting" technical limitations while maintaining stringent standards for information accuracy and relevance. Second, the professional culture of primary healthcare emphasizes clinical decision-making based on patient data, elevating the salience of information quality relative to system aesthetics or speed. Third, the integration of E-Puskesmas with the national Satusehat platform increases the consequences of information quality failures, as data errors propagate beyond local systems to national repositories.

The coefficient of determination ($R^2 = 0.586$) falls within the moderate-to-strong range for social science research, though the unexplained variance (41.4%) indicates substantial room for model extension. Candidate variables for future inclusion include service quality (technical support, training provision), organizational factors (leadership support, change management), individual differences (technology self-efficacy, generational digital literacy), and contextual factors (infrastructure stability, workload pressure). The inclusion of service quality, in particular, would complete the three-quality model proposed by DeLone and McLean (2003) and potentially account for significant additional variance. The validated regression model provides empirical support for the DeLone and McLean framework in a developing country primary care context, extending the model's generalizability beyond the hospital and corporate settings that have dominated prior research. The specific coefficient estimates offer benchmark values for comparison with future E-Puskesmas studies across Indonesia's diverse geographical and infrastructural contexts. The identification of information quality as the dominant satisfaction determinant suggests that policy and investment priorities should emphasize data accuracy mechanisms, real-time synchronization, and completeness assurance, even as technical infrastructure improvements continue.

Summary of Key Findings

This study's investigation of E-Puskesmas user satisfaction at Puskesmas Kumai yields several interconnected findings with theoretical and practical significance. First, descriptive analysis reveals a pattern of aggregate-positive, dimensionally-heterogeneous assessments: while overall indices classify system quality, information quality, and user satisfaction in high categories, specific dimensions—particularly system reliability, timeliness, and overall satisfaction—remain in moderate classification and require targeted intervention. Second, inferential analysis confirms that both system quality and information quality significantly and positively affect user satisfaction, validating the DeLone and McLean model in this context. Third, information quality exerts stronger influence than system quality ($\beta = 0.574$ vs. $\beta = 0.408$), indicating that healthcare professionals prioritize the accuracy, relevance, and completeness of patient data over technical system performance. Fourth, the model explains 58.6% of satisfaction variance, leaving substantial unexplained variance that invites future research incorporating service quality, organizational factors, and individual differences.

Table 8. Summary of Research Findings

Research Question	Finding	Significance	Implication
How does system quality affect satisfaction?	β = 0.408, p = 0.000***	Highly significant	Technical improvements yield moderate satisfaction gains
How does information quality affect satisfaction?	β = 0.574, p = 0.000***	Highly significant, dominant	Data quality improvements yield greatest satisfaction returns
How do both variables simultaneously affect satisfaction?	F = 41.412, p = 0.000*** R^2 = 0.586	Model highly significant	Integrated quality improvement strategy required
Which dimensions need priority attention?	System reliability, timeliness, overall satisfaction	Moderate category	Targeted interventions in infrastructure and system design

These findings collectively support a quality prioritization strategy for E-Puskesmas enhancement that emphasizes information integrity while maintaining technical system improvements. The remote location of Puskesmas Kumai, with its associated infrastructure constraints, does not appear to have fundamentally altered the relationship between quality dimensions and satisfaction, though it likely influences absolute levels of quality achievement. The generalizability of these findings to other Indonesian primary care settings—particularly those with similar infrastructure profiles—warrants investigation through multi-site comparative research.

Discussion

The findings of this study confirm that both system quality and information quality significantly influence E-Puskesmas user satisfaction at Puskesmas Kumai, supporting the theoretical propositions of the DeLone and McLean Information Systems Success Model (2003). This result aligns with Suwarti *et al* (2025), who demonstrated that system quality and information quality simultaneously affected user satisfaction of outpatient electronic medical records with comparable effect directions. Similarly, Rifial *et al* (2024) found that all three quality dimensions—including system quality and information quality—significantly influenced EMR user satisfaction across multiple Indonesian healthcare facilities. The consistency of these findings across different healthcare settings and system types suggests that the DeLone and McLean model possesses robust generalizability for evaluating health information system success in Indonesia's diverse healthcare landscape. However, the specific coefficient magnitudes in our study (β = 0.408 for system quality; β = 0.574 for information quality) diverge who reported more comparable effect sizes (β = 0.213 and β = 0.199 respectively), indicating potential contextual moderation by facility type and infrastructure maturity. The dominant influence of information quality over system quality observed in this study (β = 0.574 > β = 0.408) converges with Yuniarti *et al* (2021), who found that information quality exerted stronger effects on user satisfaction than system quality in the context of Palembang's Non-Communicable Disease Surveillance Information System. This pattern is further supported by Audina *et al* (2024), who reported that information quality (p = 0.01) showed more consistent significance than system quality (p = 0.04) in their study of accounting information systems. The primacy of information quality may reflect the professional culture of healthcare workers, who prioritize accurate, relevant, and timely patient data for clinical decision-making over technical system aesthetics or speed. However, this finding contradicts Nurhayati *et al* (2024), who reported no significant effect of system quality on E-Puskesmas user satisfaction in Sumedang, suggesting that infrastructure conditions and user expectations may moderate the system quality-satisfaction relationship. The persistence of significant system quality effects in our remote setting indicates that even with infrastructure constraints, technical performance remains salient for user evaluations. The dimensional decomposition of system quality revealing security as the strongest dimension while

reliability remained weakest aligns with infrastructure challenges documented in prior research. Aisyah *et al.* (2025) reported that only 24.85% of Indonesian Puskesmas had sufficient and fast internet access, with 7.18% lacking connectivity entirely, contextualizing the reliability concerns observed at Puskesmas Kumai. Ferniawan *et al.* (2024) similarly identified system reliability and response time as critical concerns in their study of SIMKES implementation in Ngawi District, noting that technical disruptions during peak service hours significantly undermined user confidence. The contrast between high security satisfaction and moderate reliability satisfaction suggests that E-Puskesmas successfully addresses data protection requirements—likely due to standardized authentication protocols—while struggling with performance consistency under variable infrastructure conditions. This pattern supports the argument by Heryawan *et al* (2025) that Indonesia's digital health transformation requires not only application development but also substantial infrastructure investment, particularly in remote regions like Central Kalimantan.

The moderate classification of overall user satisfaction despite high aggregate indices for specific dimensions reveals a compartmentalization phenomenon previously documented in health information system research. Salshabila *et al* (2025), applying the EUCS methodology to E-Puskesmas at Siulak Mukai Health Center, found that while individual satisfaction dimensions scored positively, holistic assessments remained constrained by systemic challenges including dual data entry requirements and workflow disruptions. Similarly, Utami & Wardani (2021) reported significant variation in E-Puskesmas adoption readiness across 27 Puskesmas in Mojokerto Regency, with only one facility achieving 100% patient data entry and nine facilities below 80% completion rates. Our finding that overall satisfaction (mean index 33.875) lagged behind accuracy satisfaction (mean index 43.375) suggests that users distinguish between specific functional capabilities and comprehensive system experience, supporting the multidimensional conceptualization of satisfaction in the EUCS framework. This compartmentalization has practical implications: interventions targeting isolated dimensions may improve specific scores without enhancing holistic satisfaction, requiring integrated improvement strategies. The explained variance of 58.6% ($R^2 = 0.586$) in our model, while substantial, leaves considerable unexplained variance that invites comparison with prior research incorporating additional variables. Rahmi (2025) achieved higher explanatory power by including service quality alongside system and information quality, demonstrating that technical support and training provision significantly augment satisfaction beyond intrinsic system characteristics. Naveen & Gurtoo (2020) similarly found that service quality partially mediated the relationship between system quality and satisfaction, suggesting that organizational support mechanisms can compensate for technical limitations. The absence of service quality in our model represents a deliberate scope limitation that likely contributes to unexplained variance, as healthcare workers at Puskesmas Kumai frequently cited inadequate training and technical support during informal feedback. Future research extending the present model to include service quality, organizational factors, and individual technology readiness—following the comprehensive framework applied by Thokala *et al* (2024)—would likely improve explanatory power and provide more nuanced guidance for intervention prioritization in resource-constrained primary care settings.

4. Conclusion

This study confirms that both system quality and information quality significantly influence E-Puskesmas user satisfaction at Kumai Community Health Center, supporting the DeLone and McLean Information Systems Success Model in a remote primary care setting. The findings reveal that while aggregate assessments classify system quality, information quality, and user satisfaction in high categories, dimensional analysis exposes critical weaknesses—particularly in system reliability, timeliness, and overall satisfaction—which remain in moderate classification. Notably, information quality exerts a stronger influence on user satisfaction ($\beta = 0.574$) compared to system quality ($\beta = 0.408$), indicating that healthcare professionals prioritize accurate, relevant, and complete patient data over

technical system performance. The regression model explains 58.6% of satisfaction variance, demonstrating that improvements in data integrity yield greater satisfaction returns than equivalent technical upgrades. These results suggest that in resource-constrained environments like Central Kalimantan, users develop adaptive expectations regarding infrastructure limitations while maintaining stringent standards for information quality essential to clinical decision-making. Based on these findings, we recommend a dual-track improvement strategy that prioritizes information quality enhancements while addressing foundational system quality issues.

First, policymakers and system developers should focus on implementing robust data validation mechanisms, real-time synchronization protocols, and automated completeness checks to ensure accuracy and timeliness of patient records, given that these dimensions showed moderate performance despite high overall information quality scores. Second, infrastructure investments must target system reliability and response time improvements, particularly during peak service hours, through enhanced server capacity, offline functionality, and stable internet connectivity solutions tailored to remote settings. Additionally, healthcare facilities should establish comprehensive training programs and technical support systems to address the service quality gap not captured in this model, as informal feedback indicated inadequate support as a persistent concern. Future research should extend the DeLone and McLean framework by incorporating service quality, organizational factors, and individual technology readiness to capture the remaining 41.4% of unexplained variance, enabling more nuanced intervention strategies for Indonesia's ongoing digital health transformation across diverse geographical contexts.

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