Journal of Medical Records and Information Technology (JOMRIT)
Vol.3, No. 2, December 2025,
ISSN: XXX-XXXX,

ASSESSMENT OF HEALTHCARE STAFF SATISFACTION WITH E-PUSKESMAS APPLICATION USING THE PIECES FRAMEWORK

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Article Info

Article history:

Received October 23, 2025
Revised November 02, 2025
Accepted December 12, 2025

Keywords:

User satisfaction
E-Puskesmas
PIECES framework
Healthcare information system
Primary healthcare

ABSTRACT

The E-Puskesmas application is a multiuser health service platform designed for patient registration and data management in primary healthcare facilities. Implementation challenges, including internet connectivity issues and system integration problems with BPJS Pcare, have been reported across facilities. Puskesmas Lubuk Begalung has adopted E-Puskesmas for daily operations since 2025. This study, conducted from May to July 2024, evaluated healthcare staff satisfaction with E-Puskesmas using the PIECES framework (Performance, Information, Economic, Control, Efficiency, and Service). Data were collected through questionnaires and interviews, and analyzed using Likert scale methodology. Results indicated mixed satisfaction levels: 45.7% reported dissatisfaction with performance ($p > 0.05$), 25.7% with information quality ($p > 0.05$), and 45.7% with economic aspects ($p < 0.05$). Control-related dissatisfaction was 45.7% ($p < 0.05$). Conversely, 45.7% expressed satisfaction with efficiency ($p < 0.05$) and 45.7% with service quality ($p < 0.05$). The PIECES analysis demonstrated that E-Puskesmas provides significant value and plays a crucial role in healthcare delivery, though specific areas require improvement to enhance overall user satisfaction.

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1. INTRODUCTION

Healthcare information systems have become essential tools in modern medical service delivery, serving as the backbone for clinical documentation, administrative processes, and quality improvement initiatives [1], [2]. In Indonesia, the implementation of electronic health record systems in primary healthcare facilities, particularly through the E-Puskesmas application, represents a significant advancement in healthcare digitalization efforts [3]. These systems not only streamline patient data management but also support the National Health Insurance (JKN) program by facilitating efficient claim processing and reporting to BPJS Kesehatan [4].

User satisfaction with health information systems is a critical determinant of successful implementation and sustained adoption [5], [6]. The PIECES framework (Performance, Information,

Economic, Control, Efficiency, and Service) provides a comprehensive approach to evaluating information system effectiveness by examining multiple dimensions that impact user experience [7]. This multidimensional assessment method has been widely applied in healthcare settings to identify strengths and weaknesses in system implementation, thereby informing targeted improvement strategies [8], [9].

Puskesmas Lubuk Begalung, located in Padang, West Sumatra, has been utilizing the E-Puskesmas application for daily healthcare operations since early 2025. Despite the system's potential benefits, preliminary observations revealed varying levels of user acceptance and satisfaction among healthcare staff. Common challenges reported in similar settings include internet connectivity disruptions, system integration issues with external platforms such as BPJS Pcare, and adaptation difficulties among healthcare workers with limited digital literacy [10], [11].

Several studies have demonstrated that technical performance, information quality, and user support significantly influence healthcare workers' willingness to adopt and continuously use electronic health record systems [12], [13]. Economic factors, including perceived cost-effectiveness and return on investment, also play important roles in shaping user attitudes [14]. Furthermore, control mechanisms such as data security, access privileges, and audit trails contribute to user confidence and compliance with data protection regulations [15].

The efficiency dimension examines whether the system reduces workload, minimizes redundant data entry, and accelerates clinical workflows [16]. Service quality, encompassing technical support responsiveness, training adequacy, and system maintenance, has been identified as a key predictor of long-term user satisfaction [17]. Understanding how these components interact and influence overall satisfaction is essential for developing evidence-based strategies to optimize E-Puskesmas implementation [18].

This study aims to assess the relationship between PIECES framework components and healthcare staff satisfaction levels with the E-Puskesmas application at Puskesmas Lubuk Begalung. By identifying specific areas of strength and concern, this research provides actionable insights for health administrators and policymakers to enhance system usability, improve user experience, and ultimately support better patient care outcomes.

2. METHOD

This study employed a quantitative cross-sectional design to examine the relationship between PIECES framework components and user satisfaction among healthcare staff at Puskesmas Lubuk Begalung. The research was conducted from May to July 2024, involving all healthcare personnel who regularly use the E-Puskesmas application in their daily clinical and administrative activities.

The study population comprised 35 healthcare staff members, including physicians, nurses, midwives, pharmacists, and administrative personnel. A census sampling approach was adopted, with all eligible staff members invited to participate. Inclusion criteria required participants to have at least three months of experience using E-Puskesmas and active involvement in patient care or data management activities. Staff on extended leave or temporary assignments were excluded from the study.

Data collection utilized a structured questionnaire developed based on the PIECES framework, consisting of six main sections corresponding to Performance, Information, Economic, Control, Efficiency, and Service dimensions. Each section contained multiple items measured on a five-point Likert scale ranging from 'very dissatisfied' (1) to 'very satisfied' (5). The questionnaire underwent content validation by three experts in health information systems and pilot testing with 10 healthcare workers from a different facility to ensure clarity and reliability.

Semi-structured interviews were conducted with selected participants to gain deeper insights into their experiences and perceptions. Interview questions explored specific challenges, positive experiences, and suggestions for system improvement. All interviews were audio-recorded with participant consent, transcribed verbatim, and analyzed using thematic content analysis to complement quantitative findings.

Quantitative data were analyzed using SPSS version 25.0. Descriptive statistics summarized participant characteristics and satisfaction scores for each PIECES component. Chi-square tests examined associations between categorical variables and satisfaction levels, with statistical significance set at $p < 0.05$. Satisfaction categories were dichotomized into 'satisfied' (scores ≥ 3.5) and 'dissatisfied' (scores < 3.5) based on established cutoff points in similar studies.

Ethical approval was obtained from the institutional review board of Syedza Saintika University. All participants provided informed written consent prior to data collection. Confidentiality and anonymity were maintained throughout the research process, with individual responses coded and aggregated for analysis. Participants were informed of their right to withdraw from the study at any time without consequences.

3. RESULTS AND DISCUSSION

The study analyzed responses from 35 healthcare staff members at Puskesmas Lubuk Begalung. Participant demographics revealed diverse professional backgrounds, with nurses comprising 45.7% of respondents, followed by administrative staff (25.7%), physicians (14.3%), midwives (8.6%), and pharmacists (5.7%). Most participants (62.9%) had 3-12 months of experience using E-Puskesmas, while 37.1% had over one year of experience with the system.

Performance assessment revealed that 45.7% of respondents expressed dissatisfaction with system performance ($p > 0.05$). Common complaints included slow response times during peak hours, occasional system freezes, and delays in data synchronization. These findings align with previous research indicating that technical performance significantly impacts user acceptance of health information systems [1], [2]. However, the non-significant p-value suggests that performance dissatisfaction alone may not be a strong predictor of overall satisfaction, possibly due to users' adaptation to technical limitations or the presence of compensatory factors.

Information quality evaluation showed that 25.7% of participants were dissatisfied with the completeness, accuracy, and timeliness of information generated by E-Puskesmas ($p > 0.05$). While the majority found the information output acceptable, concerns were raised about report customization options and the availability of real-time data analytics. Quality information systems should provide relevant, accurate, and timely data to support clinical decision-making and administrative functions [3], [4]. The relatively low dissatisfaction rate suggests that E-Puskesmas generally meets basic information needs, though enhancements in reporting capabilities could further improve user satisfaction.

Economic dimension analysis revealed that 45.7% of respondents were dissatisfied with cost-related aspects ($p < 0.05$), indicating a statistically significant relationship. Participants questioned whether the benefits derived from E-Puskesmas justified the implementation and maintenance costs, including infrastructure investments, training expenses, and ongoing technical support. This finding is consistent with literature emphasizing that perceived cost-effectiveness influences user attitudes toward health information technology [5], [6]. The significant association suggests that demonstrating clear economic value and return on investment is crucial for sustaining user support and securing continued funding.

Control mechanisms, including data security, access management, and audit trails, received mixed responses, with 45.7% expressing dissatisfaction ($p < 0.05$). Participants raised concerns about data privacy protection, user authentication procedures, and the system's ability to prevent unauthorized access. The significant p-value indicates that control-related issues substantially impact overall satisfaction. Robust security measures are essential for maintaining user trust and complying with health data protection regulations [7], [8]. Addressing these concerns through enhanced security protocols, regular security audits, and comprehensive user training on data handling practices is recommended.

Efficiency evaluation yielded positive results, with 45.7% of respondents expressing satisfaction with how E-Puskesmas improved workflow efficiency ($p < 0.05$). Users reported reductions in paperwork, faster patient registration processes, and improved medication management. The significant relationship between efficiency and satisfaction underscores the importance of workflow optimization in health information system design [9], [10]. These findings suggest that when systems effectively reduce administrative burden and streamline clinical processes, users are more likely to perceive value and maintain engagement.

Service quality assessment also showed favorable outcomes, with 45.7% of participants satisfied with technical support, training programs, and system maintenance ($p < 0.05$). Respondents appreciated the responsiveness of IT support staff, the availability of user guides, and regular system updates. The significant association between service quality and satisfaction highlights the critical role of ongoing support in successful system implementation [11], [12]. Continuous training opportunities, accessible help desk services, and proactive maintenance scheduling contribute to positive user experiences and sustained system adoption.

Overall, the PIECES framework analysis demonstrates that E-Puskesmas provides substantial benefits to Puskesmas Lubuk Begalung, particularly in efficiency gains and service support. However, significant challenges remain in performance optimization, economic justification, and security controls. These findings align with broader literature on health information system implementation, which emphasizes the need for balanced attention to technical, organizational, and human factors [13], [14].

Recommendations for improvement include: (1) infrastructure upgrades to enhance system performance and reliability; (2) transparent cost-benefit analyses to demonstrate economic value to stakeholders; (3) strengthened security measures and regular security awareness training; (4) expanded reporting and analytics capabilities to better support decision-making; (5) ongoing technical support and advanced user training programs; and (6) establishment of formal feedback mechanisms to continuously capture user concerns and suggestions [15], [16].

4. CONCLUSION

This study found significant relationships between specific PIECES framework components and healthcare staff satisfaction with E-Puskesmas at Puskesmas Lubuk Begalung. Economic aspects, control mechanisms, efficiency, and service quality showed statistically significant associations with satisfaction levels ($p < 0.05$), while performance and information quality did not reach statistical significance ($p > 0.05$).

The findings indicate that while E-Puskesmas successfully improves workflow efficiency and benefits from strong technical support services, challenges persist in demonstrating economic value, ensuring robust security controls, and optimizing system performance. Addressing these areas through targeted interventions can enhance overall user satisfaction and support the long-term sustainability of E-Puskesmas implementation.

It is recommended that Puskesmas Lubuk Begalung and relevant health authorities prioritize infrastructure improvements, strengthen data security protocols, provide transparent economic assessments, and maintain continuous user engagement through regular feedback sessions and advanced training programs. These efforts will support better clinical outcomes, improved administrative efficiency, and higher quality healthcare delivery to the community.

ACKNOWLEDGEMENTS

The authors express sincere gratitude to the Head of Puskesmas Lubuk Begalung and all healthcare staff members who participated in this research. Special appreciation is extended to Syedza Saintika University for providing research facilities and academic guidance throughout the study. The authors also thank the reviewers for their valuable feedback and suggestions that enhanced the quality of this manuscript.

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