



Digital Transformation of BPJS Primary Healthcare Administration: A Qualitative Study of E-Module Implementation and Service Quality Improvement

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Track Record Article	Abstract
<p>Revised: 13 December 2025 Accepted: 21 February 2026 Published: 31 March 2026</p> <p>How to cite : Situmorang, B., Wisuda, A. C., Herlina, & Febriantika. (2026). Digital Transformation of BPJS Primary Healthcare Administration: A Qualitative Study of E-Module Implementation and Service Quality Improvement. <i>Contagion : Scientific Periodical of Public Health and Coastal Health</i>, 8(1), 183–199.</p>	<p><i>Indonesia's National Health Insurance system (BPJS Kesehatan) continues to face persistent administrative challenges in primary healthcare, including limited accessibility, bureaucratic complexity, long waiting times, and patient dissatisfaction. To address these issues, digital transformation initiatives have introduced electronic modules (e-modules) aimed at improving administrative efficiency, service quality, and data accuracy. This qualitative study collected data through in-depth interviews with twenty participants: twelve BPJS beneficiaries and eight primary healthcare officers from four community health centers in Sibolga City, North Sumatra. Participants were purposively selected based on their experience with BPJS e-module services. Interviews were transcribed verbatim and analyzed thematically using NVivo 12 through open coding, categorization, and theme development. Four themes emerged: 1) Administrative accessibility improved as e-modules simplified access to procedural information; 2) Service efficiency increased through shorter waiting times and faster processing; 3) User satisfaction improved, especially among digitally literate participants who perceived greater transparency and predictability, and 4) Administrative accuracy strengthened due to standardized digital documentation, reducing manual errors. Nonetheless, barriers persisted, including limited digital literacy, uneven internet connectivity, and insufficient technical support at facility level. E-modules represent an effective administrative innovation that reduces procedural complexity and enhances service consistency in primary healthcare. However, uneven benefits resulting from infrastructural constraints, organizational inertia, and varying user capacity underscore the need to align technological implementation with institutional readiness and user support to prevent widening service disparities.</i></p> <p>Keywords: <i>BPJS Health, Primary Healthcare, E-Module, Digital Health Administration, Service Quality.</i></p>

INTRODUCTION

Patient safety remains one of the most pressing challenges in global public health, contributing substantially to preventable mortality and long-term disability (Akbarian *et al.*, 2024). According to the World Health Organization (WHO), unsafe healthcare practices in low- and middle-income countries result in around 134 million adverse events each year, leading to nearly 2.6 million preventable deaths (Chandran *et al.*, 2022). These incidents are not solely attributable to clinical errors but are also linked to administrative failures, including inaccurate documentation, ineffective information management, and poor communication across service units (Autio *et al.*, 2024; Endalamaw *et al.*, 2025). In Indonesia, reports of patient

safety incidents continue surface at different levels of healthcare delivery, including primary care, indicating ongoing systemic challenges in ensuring safe, efficient, and high-quality service provision (Ke *et al.*, 2020). Addressing these barriers requires more than clinical improvements; strengthening administrative processes has emerged as a crucial strategy for reducing risks and ultimately safeguarding patient outcomes. Rapid advances in information and communication technology have reshaped healthcare administration and health information management (Agung *et al.*, 2022; Al-Rahmi *et al.*, 2021).

In Indonesia, this transformation is most visible in the role of BPJS Kesehatan, the Social Security Administering Body for Health, which serves as the backbone of universal health coverage and provides access to care for millions. Established under Law No. 24 of 2011, BPJS Kesehatan operates alongside BPJS Employment within the broader national social security framework (Putra, 2024; Hidayatullah, 2024; Simanjuntak, 2023). Yet despite its extensive reach, BPJS Kesehatan continues to face structural administrative challenges such as limited accessibility, procedural complexity, prolonged waiting times, and patient dissatisfaction (Andria *et al.*, 2021). These inefficiencies are especially problematic in primary healthcare, where administrative processes directly shape clinical decisions, continuity of care, and ultimately, patient safety (BPJS, 2021).

With more than 200 million participants, BPJS Kesehatan faces enormous challenges in managing data, processing claims, and coordinating with healthcare facilities (Pratistha, 2024). To meet these demands, digital administrative innovations, most notably electronic modules (e-modules), have been introduced to standardize documentation, streamline workflows, and expand service access (Isabel, 2024). By design, e-modules are expected to mitigate operational issues such as lengthy waiting times, registration difficulties, and limited process transparency (Agustina, 2023). Evidence from international settings suggests that digital administrative systems can accelerate service delivery, reduce errors, and improve user satisfaction (Chandran *et al.*, 2022; Herlinawati *et al.*, 2021). These improvements resonate with the broader vision of digital health transformation, which emphasizes efficiency, transparency, and reliability in patient care.

Nevertheless, existing scholarship highlights several important gaps. Most prior studies have examined e-module implementation mainly through measures of general service performance or user satisfaction, paying little attention to how administrative quality influences patient safety, especially in primary healthcare settings (Marpaung *et al.*, 2022; Juanita, 2002). International research has tended to focus on hospital-based digital systems or large integrated networks, while Indonesian studies often emphasize hospital efficiency rather than community-

level services (Konopik & Blunck, 2023). Very few empirical investigations explore how e-modules shape administrative processes that could reduce documentation errors, service delays, or communication breakdowns within BPJS primary healthcare facilities (Gillespie, 2022). To address this gap, a qualitative inquiry is needed to capture lived experiences, implementation dynamics, and the contextual barriers that shape digital adoption.

This study aims to evaluate the effectiveness of e-modules in improving BPJS administrative service quality within Indonesian primary healthcare, with particular attention to accessibility, service efficiency, user satisfaction, and administrative reliability. By incorporating perspectives from both service users and healthcare providers, it offers empirical insights into how digital administrative tools shape operational workflows and the adaptation challenges highlighted in the findings. This study seeks to inform the design of inclusive digital governance strategies that strengthen infrastructure readiness, improve digital literacy, and expand technical support systems, advancing administrative quality and reinforcing patient safety in the evolving landscape of BPJS healthcare services.

METHODS

This study adopted a qualitative research design to gain an in-depth understanding of experiences, perceptions, and challenges surrounding the implementation of BPJS e-modules in health service administration. A qualitative approach was deemed appropriate because the research sought to explore contextual and experiential dimensions of digital administrative practices, elements that cannot be fully captured through quantitative measures alone (Gillespie, 2022). This design allowed for a comprehensive examination of how e-modules are used, perceived, and adapted within primary healthcare settings.

The study was conducted at four Community Health Centers (Puskesmas) in Sibolga City, North Sumatra Province, Indonesia, with data collection carried out between November 2024 and January 2025. Sibolga City was chosen as the research site due to its specific challenges in implementing BPJS e-modules, particularly limited internet connectivity and varying levels of digital literacy among healthcare workers and service users (Ostermeier, 2022). The city also reflects diverse socio-economic conditions, making it a relevant context for examining the effectiveness of e-modules in BPJS service administration at the primary healthcare level. Study participants included BPJS service users and community health center officers directly involved in the use and administration of BPJS e-modules. Participants were selected using purposive sampling to ensure the inclusion of individuals with relevant experience and knowledge of e-module implementation. Healthcare officers were eligible if

they were engaged in BPJS administrative services and directly used modules, while service users were selected based on their experience accessing BPJS services through primary healthcare facilities. Data collection continued until information saturation was reached.

Data were gathered through in-depth interviews and direct observations (Ibda, 2023). Semi-structured interview guides were used to explore participants' experiences, perceptions, and challenges in using e-modules for BPJS service administration. Observations complemented the interviews by capturing how e-modules were applied in daily administrative practices and by identifying contextual factors that influenced their use. All interviews were conducted with informed consent and were audio-recorded to ensure accuracy (Veitch, 2022).

The qualitative data were analyzed using thematic analysis. Interview transcripts and observation notes were read multiple times to achieve familiarity with the data, followed by systematic coding to identify meaningful patterns and themes. The themes were then reviewed and refined to ensure coherence and alignment with the research objectives (Price, 2022). This analytical process provided a structured interpretation of participants' perspectives on the effectiveness of e-modules in improving BPJS service administration. To strengthen the trustworthiness of the study, credibility was ensured through data triangulation between interviews and observations. Member checking was conducted by summarizing key findings and confirming them with selected participants. Dependability and confirmability were supported by maintaining detailed documentation of the research process and analytic decisions (Kimani-Murage, 2022).

Following the coding process and analysis of relationships between themes, the researcher compiled the findings into a narrative that reflected the views and experiences of the informants (Aberese-Ako, 2023). This analysis highlights factors that either support or hinder the effectiveness of e-modules in improving the quality of BPJS service administration. Ethical approval for this study was obtained from the Health Research Ethics Committee of Mitra Medika Premiere General Hospital prior to data collection (Approval No.: 007/KET/DIR/RSMMP/II/2025). All participants were informed about the objectives, procedures, and voluntary nature before participation. Verbal informed consent was obtained from each participant, and confidentiality and anonymity were ensured throughout the research process.

RESULT

To further understand the impact of implementing e-modules in BPJS administrative services, thematic analysis grouped findings into four main categories: Effectiveness of the e-

Module, Implementation Challenges, Perceptions of Health Workers, and Impact on Patients. Participants consisted of BPJS beneficiaries and primary healthcare officers with diverse demographic and experiential backgrounds.

Characteristics of participants

Table 1. Characteristics of Study Participants (N = 20)

Participant Group	Number of Participants (n)	Recruitment Criteria	Study Setting
BPJS Beneficiaries	12	Direct experience using BPJS e-module services	Four community health centers, Sibolga City, North Sumatra
Primary Healthcare Officers	8	Involved in administering BPJS e-module services	Four community health centers, Sibolga City, North Sumatra
Total	20	Purposive sampling	—

Table 1 presents the characteristics of the study participants. A total of 20 individuals were recruited through purposive sampling based on their direct engagement with BPJS e-module services. Of these, 12 participants were BPJS beneficiaries who had firsthand experience using the e-module system for administrative purposes, while 8 primary healthcare officers were responsible for administering or supporting its implementation. All participants were drawn from four community health centers located in Sibolga City, North Sumatra. This distribution ensured representation from both service users and providers, enabling a comprehensive understanding of administrative efficiency and service implementation related to the BPJS e-module.

Research Nodes

The coding process generated hierarchical research nodes representing the structure of the qualitative findings. These nodes and their descriptions are summarized below.

Table 2. Research Nodes

Node	Child Node	Description
Effectiveness of e-Module	Accessibility	Ease of BPJS participants in accessing e-modules and obtaining service information) (Darmawan, 2022)
	Service Speed	Influence of e-modules in accelerating administrative processing (Darmawan, 2022)
	User Satisfaction	Level of satisfaction after implementation (Darmawan, 2022)
	Administrative Errors	Changes in error rates in documentation (Darmawan, 2022)
Implementation Challenges	Infrastructure Limitations	Internet/device barriers (Sari, 2023)
	User Understanding	Digital literacy level (Sari, 2023)
	Technical Support	Availability of assistance (Sari, 2023)
Perceptions of Health	Work Efficiency	Workload and administrative impact (Hidayat,

Node	Child Node	Description
Workers	Adaptation Difficulty	2023) Adjustment barriers (Hidayat, 2023)
	Service Improvement	Perceived service benefits (Hidayat, 2023)
Impact on Patients	Ease of Claim Process	Speed and clarity of claims (Syahputra, 2021)
	Interaction with Officers	Communication changes (Syahputra, 2021)
	Expectations for Services	Future expectations (Syahputra, 2021)

Table 2 shows that findings were classified into four major categories with multiple analytical indicators. Accessibility reflected ease of obtaining information and system use (Iannone, 2021), while service speed and satisfaction indicated perceived improvements in administrative processes. Implementation challenges included digital literacy and support limitations (Gong, 2020). Health worker perceptions described efficiency and adaptation experiences, and patient impacts highlighted procedural clarity and communication shifts.



Figure 1. E-module Socialization of Tongkol Community Health Center

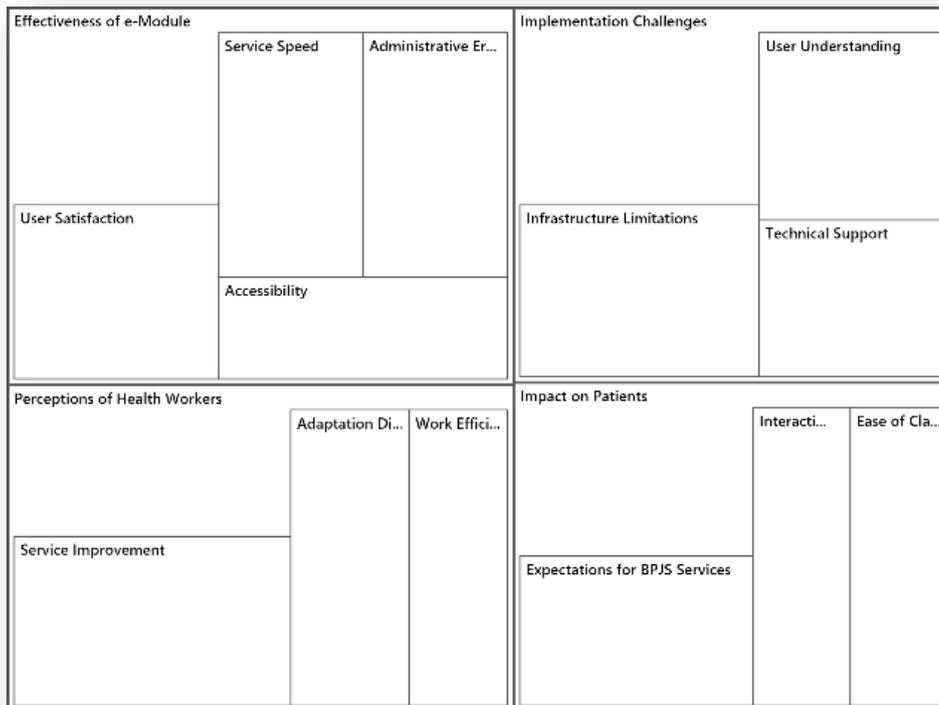


Figure 2. Interview Node Hierarchy

Interview Findings

Interview data provided contextual support for thematic findings. Many participants reported improved accessibility and reduced waiting time when using the system (Shankar, 2021). For example:

“Previously, I had to queue for hours... Now with the e-module application, I can register and monitor my claim from home.” (Mrs. Siti, 45)

Health workers described workflow efficiency:

“Everything can be accessed on one digital platform, so my work is faster and more organized.” (Dr. Andi, 38)

However, digital literacy barriers emerged:

“I'm not used to using applications... I don't know what to do if there are problems.” (Mr. Rudi, 52)

Limited support was also reported:

“Many patients still have difficulty... sometimes we help them enter data manually.” (Sister Lina, 40)

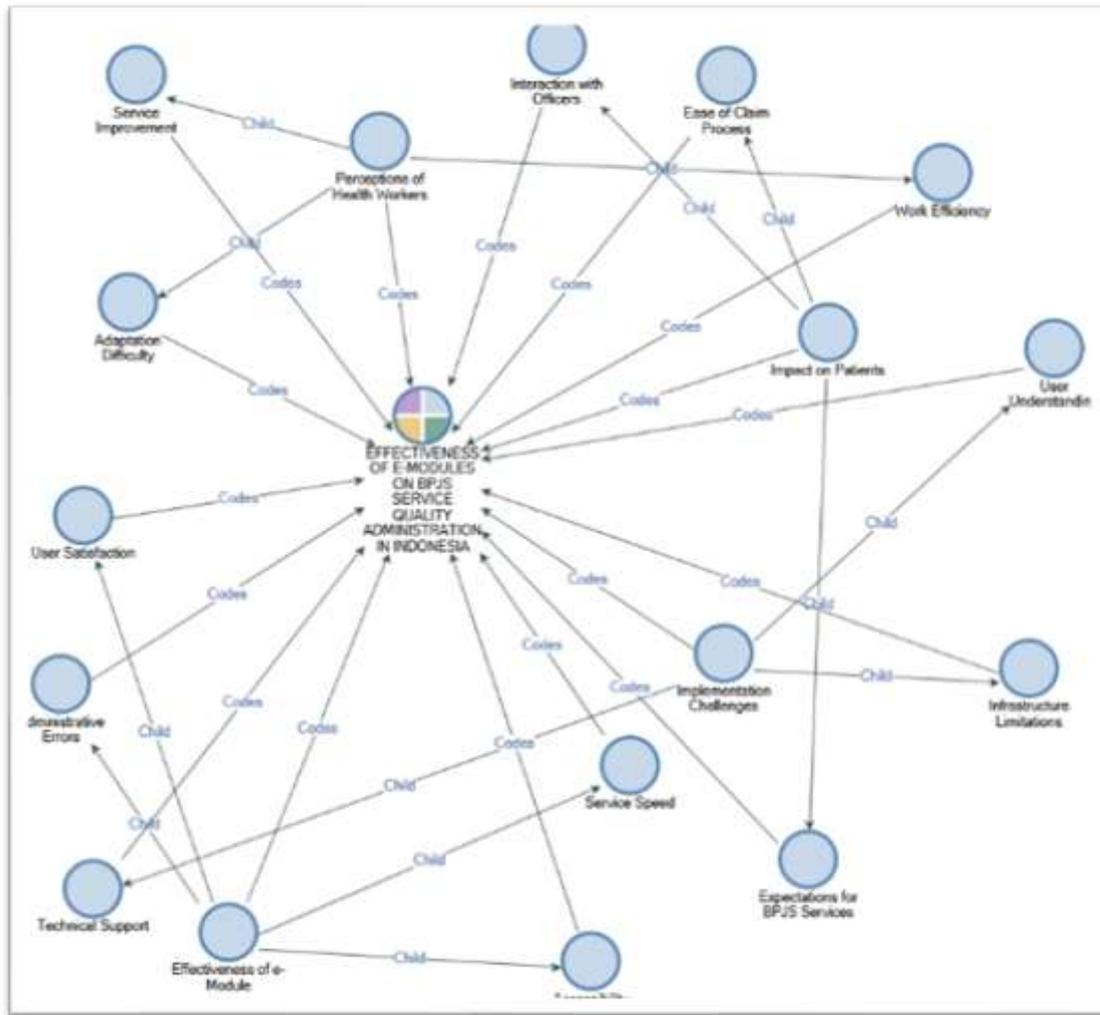


Figure 3. Distribution of Research Nodes



Figure 4. Aek Habil Community Health Center Officers

Word Frequency Analysis

Table 3. Word Frequency

Word	Length	Count
Interviewer	11	57
Participant	11	36
Application	11	24
Technology	10	19
Experience	10	18
Understand	10	16
Administration	14	10
Cellphones	10	10
Especially	10	9
Information	11	8
Participants	12	8
Researcher	10	8
Difficulty	10	7
Everything	10	6
Improvements	12	6
Understanding	13	6
Accustomed	10	5
Difficulties	12	5
Accessible	10	4
Administrative	14	4

Table 3 indicates that the most frequently occurring words in the interview transcripts were “Interviewer” and “Participant,” reflecting the dialogical nature of qualitative data collection and intensive researcher–respondent interaction. Beyond these procedural terms, the prominence of “Application” and “Technology” shows that discussions were primarily centered on the use of digital systems within BPJS administrative services. The frequent appearance of “Experience” and “Understand” suggests that participants emphasized their personal encounters and comprehension when navigating the e-module, highlighting user interaction and cognitive engagement as central aspects of the interviews. Administrative concerns were also evident through terms such as “Administration” and “Administrative,” while references to “Cellphones” and “Information” indicate reliance on mobile access and the platform’s informational role. Words related to “Difficulty,” “Difficulties,” and “Understanding” point to ongoing usability and digital literacy challenges, whereas “Improvements,” “Accessible,” and “Accustomed” reflect perceived benefits and gradual adaptation to digital services. Overall, the word distribution demonstrates that participant narratives were shaped by technological interaction, administrative processes, user experience, and adaptation challenges, reinforcing the study’s broader thematic findings.

DISCUSSION

Effectiveness of e-Module

The findings indicate that the implementation of the e-module significantly enhanced administrative accessibility, processing speed, and user satisfaction, aligning with broader trends in the digital transformation of health administration systems. The improvements in transparency and workflow efficiency observed in this study support existing evidence that digitized platforms streamline documentation, reduce procedural redundancies, and facilitate real-time information exchange (Hasankhani, 2021; Iannone, 2021; Aulia, 2014). Beyond operational acceleration, the reduction in documentation errors suggests that standardized digital interfaces foster procedural consistency and traceability, thereby strengthening governance accountability and service reliability. These results demonstrate that the e-module functions not only as a technical tool but also as an institutional mechanism for optimizing administrative coordination. Consequently, these outcomes reinforce the argument that digital administrative innovations can reshape service delivery structures by promoting accuracy, responsiveness, and data-driven decision support within public health insurance systems.

Implementation Challenges

Despite these advantages, barriers to implementation, such as infrastructure readiness, digital literacy, and technical support, reflect persistent structural challenges commonly noted in digital health adoption research (Gong, 2020; Ou, 2022; Esposito, 2020). Limited connectivity and uneven technological familiarity among users risk exacerbating existing inequities, potentially marginalizing populations with restricted access or lower digital competencies. These disparities underscore that technological innovation alone does not ensure inclusive service transformation; rather, effective adoption requires socio-technical alignment between infrastructure, user capability, and institutional support. These findings highlight the need to integrate capacity-building initiatives, adaptive training strategies, and infrastructure investment into implementation planning to mitigate exclusion risks. Addressing these systemic constraints is therefore essential not only for maximizing utilization but also for ensuring equitable distribution of administrative benefits across diverse population groups.

Perceptions of Health Workers

Health worker perceptions reveal the complexity of organizational transition during digital system integration. While participants reported gains in efficiency and workload organization, adaptation challenges underscore the importance of institutional readiness and effective change management processes, consistent with workforce transition literature (Wright, 2020). Resistance or uncertainty in the early stages of adoption may arise from altered

task structures, increased cognitive demands associated with system navigation, or insufficient technical orientation. These dynamics suggest that successful digital integration requires sustained professional development, participatory implementation strategies, and responsive technical support frameworks. By strengthening competencies and fostering positive engagement, healthcare institutions can build workforce resilience and facilitate smoother technological assimilation. Ultimately, health workers' perceptions serve as critical indicators of operational sustainability, as their acceptance and proficiency directly shape the long-term effectiveness of digital systems.

Impact on Patients

Patient experiences suggest that digital engagement through the e-module improved administrative convenience, reduced procedural ambiguity, and enhanced communication clarity. These benefits align with conceptual frameworks that link perceived accessibility and usability to greater satisfaction and acceptance (Das, 2024; Shankar, 2021). At the same time, the emergence of heightened expectations among users points to a dynamic feedback effect, in which technological exposure recalibrates service standards and demand levels. This evolving landscape underscores the need for continuous service refinement to sustain trust and perceived value. Furthermore, patient responses highlight the dual role of digital platforms, as administrative facilitators and as experiential touchpoints shaping perceptions of institutional responsiveness. Sustaining positive patient outcomes, therefore, requires balancing system functionality with user-centered design principles that prioritize accessibility, clarity, and responsiveness.

Linguistic Pattern Findings

Linguistic analyses derived from word clouds and frequency mapping further corroborate thematic findings by highlighting strong emphasis on technological interaction, experiential interpretation, and comprehension challenges. The prominence of technology-related terminology underscores the centrality of system engagement in shaping participant narratives, while references to understanding and difficulty point to cognitive adaptation processes associated with digital use. These patterns align with research on user adjustment dynamics in digital health environments (Schlarb, 2021; Li, 2022), reinforcing the view that usability and digital literacy remain decisive factors for sustaining adoption. By triangulating qualitative themes with linguistic indicators, the study enhances interpretive validity and demonstrates how communication patterns can reveal underlying behavioral and experiential dimensions of technology acceptance.

Overall Implications

To sum up, the findings show that e-modules significantly enhance administrative efficiency while also revealing structural and socio-technical barriers that require targeted intervention. The interplay between technological capability, user readiness, and institutional support underscores the multidimensional nature of digital transformation in public health administration. Strategic investment in infrastructure, expansion of digital literacy initiatives, and development of responsive technical support mechanisms are therefore essential to ensure sustainable and equitable service delivery. Addressing these dimensions will not only optimize operational outcomes but also strengthen long-term digital governance and system resilience within BPJS administrative frameworks.

Strengths, Limitations, and Implications

This study offers several strengths, including its qualitative design, which enabled in-depth exploration of experiences from both BPJS beneficiaries and healthcare officers, providing multi-perspective insights into the effectiveness and challenges of e-module implementation. The use of thematic analysis supported a rich contextual understanding of accessibility, efficiency, and adaptation dynamics, while linguistic pattern analysis enhanced analytical credibility through methodological triangulation. Nonetheless, certain limitations should be acknowledged. The restricted geographic scope, limited to four community health centers in a single city, reduces generalizability. The purposive sample size and reliance on self-reported data may also introduce response bias, while the absence of longitudinal observation also constrains the evaluation of long-term sustainability. Despite these limitations, the findings carry important implications. They emphasize the need to strengthen digital infrastructure, expand internet access, and improve digital literacy to ensure equitable system utilization, alongside continuous technical support and workforce training to enhance organizational readiness. From a policy perspective, integrating user-centered design and ongoing system evaluation into BPJS digital governance is essential. Future research should adopt broader sampling, comparative or mixed-method approaches, and outcome-focused assessments to further examine cost-efficiency, patient safety, and long-term user adaptation in digital administrative healthcare systems.

CONCLUSION

This study examined the role of e-modules in enhancing the quality of BPJS administrative services within Indonesian primary healthcare through a qualitative exploration of user experiences, implementation challenges, health worker responses, and patient perspectives. The findings suggest that e-modules contribute positively to service quality by

improving accessibility, accelerating administrative processes, increasing user satisfaction, and reducing documentation errors, demonstrating the potential of digital administrative tools to support safer, more efficient healthcare service delivery. At the same time, several constraints were identified, including infrastructural limitations, uneven digital literacy, and insufficient technical support. These challenges particularly affect older populations and individuals in areas with limited internet connectivity, raising concerns about equity and consistency in service access. Health workers generally viewed the system as beneficial for workflow efficiency, though transitional adaptation difficulties were noted, while patients reported simplified procedures and reduced waiting times alongside usability challenges among those less familiar with digital platforms.

Overall, these findings highlight the importance of user-centered system design, continuous capacity-building initiatives, and institutional readiness to sustain digital transformation outcomes. Ultimately, the effectiveness of e-modules is shaped not only by technological deployment but also by the interplay of infrastructure, user preparedness, and ongoing system refinement. Strengthening digital literacy programs, expanding connectivity in underserved regions, and enhancing technical support mechanisms are therefore critical strategies to maximize long-term benefits and position e-modules as a sustainable approach for improving administrative service quality and supporting patient safety within BPJS primary healthcare systems.

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