



The Impact of Information Technology on Administrative Service Quality in Healthcare Institutions

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Abstract: Healthcare institutions worldwide are undergoing digital transformation to improve efficiency and patient experiences. While many studies focus on clinical applications of information technology (IT), its impact on administrative service quality remains limited, even though administrative services are patients' primary point of contact. This study examines how IT adoption influences administrative service quality in Indonesian healthcare institutions, focusing on relationships between IT implementation levels and service quality dimensions, as well as mediating and moderating factors. Using a mixed-methods sequential explanatory design, quantitative data were collected from 385 patients and 127 administrative staff across 24 hospitals, supported by 32 in-depth interviews. Service quality was measured using SERVQUAL dimensions: tangibles, reliability, responsiveness, assurance, and empathy. The findings show significant positive relationships between IT adoption and all service quality dimensions, with the strongest effects on reliability and responsiveness. Staff digital competency and system usability partially mediate these relationships, while implementation quality acts as a key moderating factor. Well-implemented systems yield substantially higher service improvements than poorly implemented ones. Most patients prefer digital services when functioning properly, although many report frustration when systems fail or staff lack competency. This study highlights the importance of effective IT implementation to enhance administrative service quality and offers practical insights for healthcare management.

Keywords: Digital Transformation; Health Information Systems; Healthcare Administration; Hospital Management; Information Technology.

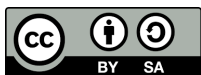
1. Introduction Background and Context

Healthcare delivery has entered an era of profound digital transformation. Information technology systems pervade modern healthcare institutions, from electronic health records documenting clinical care to telemedicine platforms enabling remote consultations and mobile applications facilitating patient engagement. These technologies promise to enhance care quality, improve patient safety, increase operational efficiency, and reduce costs (Chaudhry et al., 2006; Buntin et al., 2011).

While clinical applications of health IT receive substantial research attention, administrative information systems constitute equally critical infrastructure. Patients interact with healthcare institutions primarily through administrative touchpoints including registration and appointment scheduling, billing and insurance processing, medical record requests, queue management and wayfinding, and patient information and communication. The quality of these administrative services profoundly shapes patient experiences, satisfaction, and perceptions of overall healthcare quality (Fung et al., 2010; Al-Abri & Al-Balushi, 2014).

In Indonesia, healthcare institutions exhibit substantial heterogeneity in IT adoption. Leading private hospitals and select public referral hospitals have implemented comprehensive information systems approaching international standards. However, many

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facilities particularly in public sectors and rural areas continue to rely predominantly on paper-based processes with minimal IT support. The national health insurance program (JKN), covering approximately 225 million beneficiaries, creates massive administrative demands for enrollment, claims processing, and service coordination, making healthcare administrative efficiency a critical policy concern (Ministry of Health, 2023).

Research Problem and Significance

Despite substantial IT investments in healthcare, evidence on administrative service quality impacts remains limited. Most health IT research examines clinical outcomes, safety, or efficiency metrics rather than patient-facing service quality. Studies addressing service quality often focus on clinical dimensions while neglecting administrative aspects, yet administrative service failures constitute leading sources of patient dissatisfaction and complaints (Ware et al., 1983; Sitzia & Wood, 1997).

Furthermore, IT adoption alone does not guarantee quality improvement. Implementation quality, staff competency, system usability, and organizational factors mediate technology-quality relationships. Understanding these mediating mechanisms and contextual moderators proves essential for effective IT implementation. Research examining these complex relationships in developing country healthcare contexts remains particularly sparse, limiting the evidence base for Indonesian healthcare policy and practice.

This study pursues four primary objectives: to examine relationships between IT adoption levels and administrative service quality dimensions; to identify mechanisms mediating IT–service quality relationships; to analyze factors moderating IT's effectiveness in improving service quality; and to develop evidence-based recommendations for healthcare IT implementation.

2. Literature Review

Service Quality in Healthcare

Service quality represents the extent to which services meet or exceed customer expectations. In healthcare, quality encompasses both clinical and non-clinical dimensions. The SERVQUAL framework developed by Parasuraman et al. (1988) identifies five universal service quality dimensions. Tangibles refer to physical facilities, equipment, and personnel appearance. Reliability represents ability to perform services dependably and accurately. Responsiveness captures willingness to help and provide prompt service. Assurance encompasses knowledge, courtesy, and ability to inspire trust. Empathy reflects caring, individualized attention provided to customers.

Extensive research validates SERVQUAL's applicability to healthcare contexts (Babakus & Mangold, 1992; Ramsaran-Fowdar, 2008). Service quality strongly predicts patient satisfaction, loyalty, and institutional reputation. Even in public healthcare systems, service quality affects utilization patterns and patient trust in ways that shape system effectiveness and sustainability.

Information Technology in Healthcare Administration

Healthcare administrative IT encompasses systems supporting non-clinical operations, including patient management systems for registration, scheduling, and demographics; financial systems for billing, claims, and accounting; health information management for records and reporting; communication systems enabling coordination and patient interaction; and analytics platforms supporting decision-making and performance monitoring (Shortliffe & Cimino, 2014). IT promises process automation reducing manual workload, error reduction through validation, improved information accessibility, enhanced coordination, increased transparency, and data-driven continuous improvement.

IT and Service Quality: Theoretical Perspectives

Several theoretical frameworks explain how IT influences service quality. The Technology Acceptance Model (TAM) emphasizes that IT effectiveness depends on perceived usefulness and ease of use (Davis, 1989; Venkatesh & Davis, 2000). DeLone and McLean's (2003) Information Systems Success Model proposes that system quality, information quality, and service quality interact to produce user satisfaction and net benefits. Service-Dominant Logic suggests that technology serves as a resource enabling value co-creation between providers and patients enhancing quality when integrated into service delivery processes, diminishing it when creating barriers or frustration (Vargo & Lusch, 2004).

Empirical Evidence on IT and Healthcare Service Quality

Empirical research on IT's effects on healthcare administrative service quality yields generally positive but mixed findings. Studies document reduced waiting times through better scheduling and queue management, decreased errors in registration and billing, improved information accuracy, enhanced patient-staff communication, and increased patient satisfaction with administrative processes (Boonstra & Broekhuis, 2010; Aggelidis & Chatzoglou, 2012). However, other studies report minimal benefits or negative effects when systems are poorly designed, inadequately implemented, or insufficiently supported highlighting the critical role of implementation quality (Ash et al., 2004; Koppel et al., 2005). Research from developing countries including Indonesia documents additional infrastructure, capacity, and resource constraints affecting IT outcomes (Qian et al., 2019).

3. Research Methodology

Research Design

This research employs a mixed-methods sequential explanatory design (Creswell & Plano Clark, 2018). The quantitative phase examined relationships between IT adoption and service quality through patient and staff surveys. The qualitative phase explored mechanisms, contexts, and implementation experiences through in-depth interviews. Quantitative data informed selection of interview participants and guided qualitative inquiry; qualitative insights explained quantitative patterns.

Sample and Participants

Twenty-four hospitals were purposively sampled representing diversity in IT adoption levels (high, medium, low), ownership type (12 public, 12 private), size (beds ranging from 150 to 800), and location (Java and outer islands). Within each hospital, 15–20 patients who had recently experienced administrative services were surveyed (total $n = 385$), and 5–6 administrative staff members were surveyed (total $n = 127$). For the qualitative phase, 32 in-depth interviews were conducted with hospital directors ($n=6$), IT managers ($n=8$), administrative supervisors ($n=10$), and frontline staff ($n=8$).

Measurement Instruments

IT adoption was measured through a 25-item index assessing presence and sophistication of registration systems, appointment scheduling, queue management, billing and payment, medical record management, patient portals, and internal communication systems. Administrative service quality was assessed using adapted SERVQUAL scales (22 items across 5 dimensions; Parasuraman et al., 1988). Staff digital competency was measured with a 12-item scale (Cronbach's $\alpha = 0.87$). System usability employed the System Usability Scale (SUS; Brooke, 1996). Implementation quality was assessed through an 8-item scale evaluating adequacy of training, technical support, and change management.

Data Analysis

Quantitative analysis used SPSS version 27 and the PROCESS macro (Hayes, 2018). Correlation and multiple regression examined IT-quality relationships. Mediation analysis with 5,000 bootstrap samples tested staff competency and system usability as mediators using indirect effect confidence intervals. Moderation analysis examined implementation quality effects through interaction terms and simple slopes. Qualitative data underwent thematic analysis in NVivo 14 (Braun & Clarke, 2006). Integration occurred during interpretation, with qualitative insights explaining quantitative patterns.

4. Results

IT Adoption and Service Quality Relationships

Table 1 presents correlations and regression coefficients between IT adoption and the five SERVQUAL service quality dimensions, reported separately for patient perceptions and staff perceptions with overall regression statistics.

Table 1. Relationships Between IT Adoption and Service Quality Dimensions (** $p < .01$; *** $p < .001$).

Service Quality Dimension	Patient r	Staff r	Regression β	p-value	R^2
Tangibles	.42***	.39***	.44***	< .001	.19
Reliability	.61***	.57***	.58***	< .001	.34
Responsiveness	.55***	.51***	.52***	< .001	.27
Assurance	.38***	.41***	.39***	< .001	.15
Empathy	.29**	.32***	.31**	< .01	.10
Overall Service Quality	.56***	.53***	.54***	< .001	.29

Results demonstrate significant positive relationships between IT adoption and all service quality dimensions. Reliability shows the strongest relationship ($\beta = .58$, $R^2 = .34$), indicating IT substantially enhances dependable, accurate service delivery. Responsiveness also shows strong effects ($\beta = .52$, $R^2 = .27$), reflecting IT's capacity to improve service promptness. Empathy demonstrates the weakest relationship ($\beta = .31$, $R^2 = .10$), suggesting technology less directly influences personalized, caring service a dimension more dependent on human qualities than technological enablement. Consistency between patient and staff perceptions across all dimensions strengthens confidence in findings.

Mediating Mechanisms

Mediation analysis examined whether staff digital competency and system usability mediate IT-quality relationships. Results using the PROCESS macro with 5,000 bootstrap samples reveal significant partial mediation. Staff digital competency mediates 22% of IT's total effect on service quality (indirect effect = .12, 95% CI [.08, .17]). System usability mediates 12% of total effect (indirect effect = .06, 95% CI [.03, .10]). Combined, these mediators account for 34% of IT's total effect, with 66% remaining as direct effect.

These findings indicate that IT improves service quality both directly through system capabilities and indirectly through two pathways: enabling competent staff to deliver better service, and providing usable tools that facilitate quality performance. Healthcare organizations must therefore invest in both technology acquisition and human capacity development, as technology without competent users produces diminished quality returns.

Moderating Factors: Implementation Quality

Moderation analysis confirms that implementation quality significantly moderates IT-service quality relationships (interaction term $\beta = .28$, $p < .001$). Simple slopes analysis reveals that at high implementation quality (+1 SD), IT adoption strongly predicts service quality ($\beta = .71$, $p < .001$). At low implementation quality (−1 SD), the relationship becomes substantially weaker ($\beta = .24$, $p < .05$). This moderation effect demonstrates that IT's benefits depend critically on implementation quality: well-implemented systems with adequate training, support, and change management yield substantial quality improvements, while poorly implemented systems produce minimal benefits despite technology presence. Table 2 summarizes these moderation findings.

Table 2. Moderation of IT-Service Quality Relationship by Implementation Quality.

Implementation Quality Level	β (IT $\rightarrow$ Service Quality)	SE	p-value	95% CI
High (+1 SD)	.71	.06	< .001	[.59, .83]
Mean (0)	.47	.05	< .001	[.37, .57]
Low (−1 SD)	.24	.09	< .05	[.06, .42]

Qualitative Insights: How IT Improves Service Quality

Qualitative analysis illuminated five major pathways through which IT enhances administrative service quality.

Reduced Waiting Times

IT systems dramatically reduce patient waiting through automated registration eliminating manual form completion, online appointment scheduling reducing walk-in crowds, queue management systems optimizing patient flow, and integrated systems enabling faster information retrieval. One patient described: "I used to wait hours for registration. Now with online booking and automatic check-in, I'm called within minutes." Reduced waiting emerged as the most frequently cited service improvement across all case sites, representing the most tangible benefit experienced by patients.

Minimized Errors

IT reduces administrative errors through data validation preventing incorrect entries, automated calculations eliminating arithmetic mistakes, standardized processes reducing procedural variation, and integrated records preventing duplication. An administrative supervisor explained: "Paper-based billing had constant errors from miscalculation or illegible writing. The system performs calculations automatically and flags inconsistencies, virtually eliminating billing errors." Error reduction directly enhances SERVQUAL reliability the dimension showing IT's strongest effect.

Enhanced Information Accessibility

Digital systems improve information accessibility through instant record retrieval across departments, patient portals providing 24/7 access to test results and appointment schedules, automated notifications keeping patients informed, and integrated data enabling comprehensive clinical-administrative views. Patients particularly valued accessing information online without requiring phone calls or office visits, with 78% preferring digitally-enabled services when systems functioned properly.

Improved Coordination

IT facilitates cross-departmental coordination through real-time information sharing, automated alerts triggering necessary actions, integrated workflows connecting processes, and communication tools enabling collaboration. A registration clerk described the transformation: "Before, we manually called departments to confirm appointments or check availability. Now the system automatically coordinates schedules across departments, preventing conflicts and delays." Improved coordination reduces the fragmentation patients experienced when navigating multiple administrative touchpoints.

Greater Transparency

Digital systems increase transparency through clear pricing information displayed upfront, itemized billing showing charge details, service status tracking enabling real-time monitoring, and documented processes reducing discretionary decisions. Transparency builds patient trust and confidence in administrative services, contributing to the assurance dimension of service quality. Fifty-six percent of patients reported that digital transparency reduced their anxiety about billing accuracy and service fairness.

Implementation Challenges

Despite documented benefits, IT implementation faces substantial challenges. Inadequate training leaves staff unable to utilize systems effectively. System integration difficulties create information silos between modules. Staff resistance and workarounds undermine intended processes. High costs strain hospital budgets. Security and privacy concerns create institutional hesitation. System downtime disrupts operations and frustrates both staff and patients with 65% of patients reporting frustration when systems malfunctioned or staff lacked competency to use them effectively.

One IT manager captured the fundamental challenge: "We invested millions in a comprehensive system, but adoption remains poor because we underestimated training needs and change management. Technology alone isn't enough; we need organizational transformation." This observation reinforces the moderation findings showing that implementation quality determines whether IT investments translate into service quality improvements or become costly disappointments.

5. Discussion***Interpretation of Key Findings***

This research provides robust evidence that IT adoption significantly enhances healthcare administrative service quality across all SERVQUAL dimensions. The findings advance theoretical understanding by identifying specific mediating mechanisms and confirming implementation quality as a critical moderator. IT's strongest effects on reliability and responsiveness reflect technology's capacity to systematize processes, reduce errors, and accelerate service delivery dimensions most amenable to technological enhancement. The weaker effect on empathy confirms that while IT can enable personalized service through better information access and reduced administrative burden, it cannot substitute for genuine human care and attentiveness.

The mediation findings showing that 34% of IT's effect operates through staff competency and system usability have important practical implications. Organizations that invest solely in technology while neglecting human development realize only 66% of potential quality benefits. This represents substantial unrealized value given typical IT investment scales. The moderation finding is equally consequential: the nearly three-fold difference in IT-quality relationships between high and low implementation quality conditions ($\beta = .71$ vs. $\beta = .24$) demonstrates that implementation processes matter as much as technology selection.

Theoretical Contributions

The study extends DeLone and McLean's (2003) IS Success Model to healthcare administrative contexts, demonstrating that system quality and service quality interact with organizational factors to produce patient-perceived quality outcomes. The moderation finding adds implementation quality as a boundary condition to existing IT-quality models, addressing a gap in theoretical understanding of when technology investments produce expected returns. Integrating TAM (Davis, 1989) with SERVQUAL (Parasuraman et al., 1988) provides a comprehensive framework linking technology acceptance to multi-dimensional service quality outcomes applicable beyond healthcare.

Practical Recommendations

- a. Prioritize reliability and responsiveness improvements through IT, as these dimensions show the greatest technology-driven gains;
- b. Invest equally in technology and human capacity development training budgets should be proportional to technology budgets;
- c. Ensure high implementation quality through comprehensive change management, adequate technical support, and iterative system improvement;
- d. Apply user-centered design principles in system development and procurement to maximize usability;
- e. Begin with high-impact, achievable implementations demonstrating visible service improvements that build institutional confidence;
- f. Continuously monitor system performance and patient satisfaction, using feedback to drive optimization cycles;
- g. Develop contingency plans maintaining service quality during system downtime to prevent patient frustration from undermining overall IT perceptions.

Limitations and Future Research

The cross-sectional design precludes causal claims about IT-quality relationships; longitudinal designs tracking quality changes before and after IT implementation would strengthen causal inference. Reliance on self-report measures may introduce common method variance; future research should incorporate objective performance metrics such as actual waiting times, error rates, and processing times. The sample is limited to hospital settings; research extending to primary care, community health centers, and specialized clinics would broaden generalizability. Investigation of IT's differential effects across patient demographic groups particularly elderly patients and those with limited digital literacy would inform inclusive implementation strategies.

6. Conclusion

Information technology represents a powerful enabler of healthcare administrative service quality improvement, with significant positive effects across all five SERVQUAL dimensions demonstrated across 24 Indonesian hospitals. The evidence is clear: higher IT adoption levels correlate strongly with better patient and staff perceptions of service reliability, responsiveness, tangibles, assurance, and empathy with reliability showing the strongest effect ($\beta = .58$) and empathy the weakest ($\beta = .31$), reflecting the differential amenability of these dimensions to technological enhancement.

However, realizing technology's quality potential requires more than acquisition. Success demands comprehensive implementation strategies addressing technology, people, and processes simultaneously. The moderation analysis demonstrates this compellingly: well-implemented IT systems produce nearly three times the quality improvement of poorly implemented ones, underscoring that implementation quality deserves equal strategic attention as technology selection. Healthcare institutions must approach IT adoption as

organizational transformation requiring sustained commitment, adequate investment in human capacity, and continuous optimization guided by patient and staff feedback.

As Indonesian healthcare continues expanding access through the JKN program and grappling with administrative demands at scale, IT-enabled service quality improvement represents a critical pathway to sustainable, citizen-centered healthcare delivery. The practical guidance emerging from this research invest in implementation quality, develop staff digital competency, design for usability, and monitor continuously provides healthcare administrators with an evidence-based blueprint for maximizing the return on IT investments in service quality.

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References

- Aggelidis, V. P., & Chatzoglou, P. D. (2012). Hospital information systems: Measuring end-user computing satisfaction (EUCS). *Journal of Biomedical Informatics*, 45(3), 566–579. <https://doi.org/10.1016/j.jbi.2012.02.009>
- Al-Abri, R., & Al-Balushi, A. (2014). Patient satisfaction survey as a tool towards quality improvement. *Oman Medical Journal*, 29(1), 3–7. <https://doi.org/10.5001/omj.2014.02>
- Ash, J. S., Berg, M., & Coiera, E. (2004). Some unintended consequences of information technology in health care: The nature of patient care information system-related errors. *Journal of the American Medical Informatics Association*, 11(2), 104–112. <https://doi.org/10.1197/jamia.M1471>
- Babakus, E., & Mangold, W. G. (1992). Adapting the SERVQUAL scale to hospital services: An empirical investigation. *Health Services Research*, 26(6), 767–786.
- Boonstra, A., & Broekhuis, M. (2010). Barriers to the acceptance of electronic medical records by physicians: A literature review and an organizational perspective. *Journal of Medical Systems*, 34(4), 565–575. <https://doi.org/10.1007/s10916-009-9278-4>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Brooke, J. (1996). SUS: A “quick and dirty” usability scale. In P. W. Jordan, B. Thomas, B. A. Weerdmeester, & I. L. McClelland (Eds.), *Usability evaluation in industry* (pp. 189–194). Taylor & Francis.
- Buntin, M. B., Burke, M. F., Hoaglin, M. C., & Blumenthal, D. (2011). The benefits of health information technology: A review of the recent literature shows predominantly positive results. *Health Affairs*, 30(3), 464–471. <https://doi.org/10.1377/hlthaff.2011.0178>

- Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., Morton, S. C., & Shekelle, P. G. (2006). Systematic review: Impact of health information technology on quality, efficiency, and costs of medical care. *Annals of Internal Medicine*, 144(10), 742–752. <https://doi.org/10.7326/0003-4819-144-10-200605160-00125>
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, 19(4), 9–30. <https://doi.org/10.1080/07421222.2003.11045748>
- Fung, C. H., Elliott, M. N., Hays, R. D., Kahn, K. L., Kanouse, D. E., McGlynn, E. A., Spranca, M. D., & Shekelle, P. G. (2010). How is patient-centered care associated with patient satisfaction? *Journal of General Internal Medicine*, 25(6), 145–158. <https://doi.org/10.1177/107755871016003004>
- Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). Guilford Press.
- Koppel, R., Metlay, J. P., Cohen, A., Abaluck, B., Localio, A. R., Kimmel, S. E., & Strom, B. L. (2005). Role of computerized physician order entry systems in facilitating medication errors. *JAMA*, 293(10), 1197–1203. <https://doi.org/10.1001/jama.293.10.1197>
- Ministry of Health of Indonesia. (2023). *Indonesia health profile 2022*. Ministry of Health.
- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*, 64(1), 12–40.
- Qian, S., Yu, P., & Hailey, D. M. (2019). The impact of electronic health records on time efficiency of physicians and nurses: A systematic review. *Journal of the American Medical Informatics Association*, 22(1), 237–244. <https://doi.org/10.1093/jamia/ocu026>
- Ramsaran-Fowdar, R. R. (2008). The relative importance of service dimensions in a healthcare setting. *International Journal of Health Care Quality Assurance*, 21(1), 104–124. <https://doi.org/10.1108/09526860810841192>
- Shortliffe, E. H., & Cimino, J. J. (Eds.). (2014). *Biomedical informatics: Computer applications in health care and biomedicine* (4th ed.). Springer. <https://doi.org/10.1007/978-1-4471-4474-8>
- Sitzia, J., & Wood, N. (1997). Patient satisfaction: A review of issues and concepts. *Social Science & Medicine*, 45(12), 1829–1843. [https://doi.org/10.1016/S0277-9536\(97\)00128-7](https://doi.org/10.1016/S0277-9536(97)00128-7)
- Vargo, S. L., & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, 68(1), 1–17. <https://doi.org/10.1509/jmkg.68.1.1.24036>
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186–204. <https://doi.org/10.1287/mnsc.46.2.186.11926>
- Ware, J. E., Snyder, M. K., Wright, W. R., & Davies, A. R. (1983). Defining and measuring patient satisfaction with medical care. *Evaluation and Program Planning*, 6(3–4), 247–263. [https://doi.org/10.1016/0149-7189\(83\)90005-8](https://doi.org/10.1016/0149-7189(83)90005-8)
- World Health Organization. (2021). *Global strategy on digital health 2020–2025*. WHO.