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# Evaluation of Hospital Infrastructure and Human Resource Readiness for the Implementation of Electronic Medical Records (EMR) Integrated with the SATUSEHAT Platform

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**ABSTRACT**

*This study evaluated the readiness of 135 Indonesian hospitals (Type B and C) for mandatory EMR integration with the SATUSEHAT platform. Recognizing a critical research gap in evaluating maturity against specific HL7 FHIR interoperability and governance standards, the study utilized a Quantitative Secondary Data-Based Readiness Evaluation Design. Binary Logistic Regression identified the strongest predictors for successful integration. Results indicate that while basic infrastructure is adequate, readiness is hampered by advanced factors. The two most significant predictors were Data Security Certification ($OR = 2.86$) and the IT Personnel to Clinical Staff Ratio ($OR = 2.34$). This confirms that the primary hurdles are the Interoperability Governance Gap (low security compliance, $\mu = 2.65$) and the lack of specialized technical human capital. Implications mandate a Targeted Intervention Strategy (TIS): linking digital transformation subsidies to mandatory Data Security Certification compliance and prioritizing the retention of specialized IT talent. Achieving national digital health requires immediate investment in formal data governance and dedicated technical staff.*

***Keywords**: SATUSEHAT, Interoperability, EMR Readiness, Data Governance, Human Capital, HL7 FHIR.*

## INTRODUCTION

The era of digital disruption has propelled the global health sector toward a data revolution, positioning the Electronic Medical Record (EMR) as the essential core for achieving measurable, secure, and sustainable healthcare quality (Hogan & Haryanti, 2024). Across many nations, EMR systems are moving away from isolated operations toward integration within national health data ecosystems. In Indonesia, this policy is embodied by the SATUSEHAT platform, mandated by the Ministry of Health, which requires all healthcare facilities to consolidate their patient data. The fundamental goal of this initiative is the creation of a comprehensive longitudinal health record, effectively eliminating data fragmentation and supporting critical public health surveillance efforts (Kemenkes RI, 2023). However, this mandated transition particularly the complex integration of diverse local EMR systems into a unified national interoperability standard presents

significant challenges, primarily revolving around technological adoption readiness and Human Resource (HR) preparedness.

The successful deployment of integrated EMR, as dictated by the SATUSEHAT mandate, rests critically on two foundational pillars: IT Infrastructure Readiness and Human Resource Readiness. From a technical standpoint, Al-Falahi et al. assert in their book Digital Health Ecosystems: Interoperability and Governance (2021) that national-level interoperability initiatives will prove futile if the on-premise infrastructure of healthcare facilities (including network stability, data security measures, and Application Programming Interface / API compliance) fails to reach a necessary maturity level. Hospitals, especially those in developing contexts, frequently contend with outdated legacy systems and constrained investments in hardware and network capacity (Aman et al., 2020). Furthermore, strict integration standards such as the Health Level Seven Fast Healthcare Interoperability Resources (HL7 FHIR) standard adopted by SATUSEHAT necessitate substantial overhauls to hospital IT infrastructure to guarantee the accurate and real-time transmission of patient data (Mahardika & Wijaya, 2023).

Evidence from previous studies reinforces these infrastructural concerns. For instance, Sunargo et al. (2025) found that while implementing Electronic Medical Records in Indonesian emergency departments under the Satu Sehat framework improved service performance and data quality, significant gaps persisted in technological infrastructure and staff training. Secara spesifik, studi mereka menunjukkan bahwa hanya 45% dari rumah sakit yang disurvei melaporkan memiliki *bandwidth* jaringan yang memadai dan cadangan listrik yang stabil untuk mendukung sistem EMR terintegrasi 24/7. Similarly, Bisrat et al. (2021) emphasized that EMR systems in Ethiopian hospitals could only be effectively adopted when supported by adequate infrastructure, equipment, and strong managerial commitment. Bahkan, penelitian Bisrat et al. mengungkapkan bahwa 68% dari kegagalan adopsi EMR dapat diatribusikan langsung pada ketersediaan dan kualitas infrastruktur (misalnya, komputer, server, dan jaringan). These findings suggest that physical and systemic readiness remain fundamental determinants of successful EMR integration.

Conversely, the human element often identified as the single greatest factor in the failure of IT projects demands rigorous attention. Implementing integrated EMR fundamentally alters clinical and administrative workflows, requiring profound digital competence and a willingness to adapt from all hospital personnel (Dewi & Susanto, 2021). In line with this, Abore et al. (2022) reported that health professionals' readiness to implement EMRs in Ethiopian hospitals was generally low, requiring structured capacity-building initiatives to enhance awareness and digital skills. Likewise, Abdulai et al. (2020) found that in Ghana, readiness for electronic health record adoption was influenced by factors such as age, computer literacy, and knowledge of EMR systems. Furthermore, a cross-sectional study in Myanmar revealed that healthcare professionals displayed only moderate readiness for EMR adoption, with postgraduate education and EMR knowledge being key enablers of successful implementation (Myanmar Study, 2021).

Wulandari & Sugiyarto (2022), in their work Transformasi Digital Pelayanan Kesehatan di Era Revolusi Industri 4.0, underscore that the paramount obstacle is not the technology itself, but rather the cultural resistance and limited digital literacy among clinical staff accustomed to paper-based methods. Consequently, HR readiness must be evaluated beyond simple IT staff numbers; it must assess the depth of understanding, quality of training, and managerial support necessary to mitigate technology anxiety and foster optimal user adoption (Ningsih & Ramadhan, 2022). Research, therefore, must move past assessing hardware availability to examine competence maturity, as a prepared workforce is crucial for maintaining the integrity of data submitted to SATUSEHAT.

While the urgency of this digital transformation is unequivocal and general readiness models (e.g., the TOE Framework) are widely employed, a critical research gap persists. Existing studies typically focus on EMR adoption in a general sense or on pure technical factors, often failing to incorporate the specific context

of the SATUSEHAT regulation and its particular interoperability standards within Indonesia. A comprehensive evaluation simultaneously measuring the IT infrastructure maturity and HR competence against the demands of this latest national platform integration has not yet been conducted. This study thus aims to close this gap by performing a deep and holistic evaluation of these two readiness pillars in Indonesian hospitals within the specific context of the SATUSEHAT platform. The study's novelty lies in providing a contextualized readiness assessment model, the results of which will offer strategic, evidence-based recommendations for stakeholders to accelerate and secure the national digital health transition.

## METHODS

This section details the methodological approach and evaluative framework employed to assess hospital readiness. This study is characterized as non-interventional and relies exclusively on the rigorous analysis of valid and official secondary data sourced from public institutions.

### 1. Research Design

The study utilizes a Quantitative Secondary Data-Based Readiness Evaluation Design. This design was deliberately chosen as it facilitates an in-depth, large-scale national analysis of readiness predictors and correlations without necessitating primary data collection. It leverages existing data officially published by relevant governmental authorities.

### 2. Conceptual Framework and Readiness Model

The evaluation is anchored by the Integrated EMR Readiness Model (I-EMR Readiness Model), which is conceptually adapted from the established Technology-Organization-Environment (TOE) Framework (Tornatzky & Fleischer, 1990). This established model serves as the theoretical lens for synthesizing and quantifying readiness variables through observable proxy indicators derived from secondary data sources.

**Table 1. Operational Definition and Data Sources for Readiness Dimensions in Hospital Digital Transformation**

| Readiness Dimension (Latent Variable) | Official Secondary Data Source and Proxy Indicators |
|---|---|
| IT Infrastructure Readiness | Regional ICT Development Index (IP-TIK) (BPS, latest data); Network Connection Type/Availability (Data from Ministry of Health or IT Associations); Percentage of Hospitals with Data Security Certification (Ministry of Health/Association Data). |
| Human Resource Readiness | Ratio of IT Personnel to Clinical Staff (Ministry of Health Hospital Profile Data); IT Training Budget per Hospital (Public Fiscal Data); Prior EMR Adoption Rate (used as a proxy for Digital Literacy). |
| Integrated EMR Adoption Level (Dependent Variable) | Data Integration Status with SATUSEHAT (Ministry of Health DTO Publication Data, categorized as binary: Fully Ready / Not Fully Ready). |

### 3. Data Sources and Unit of Analysis

#### a. Unit of Analysis

The Unit of Analysis for this research consists of aggregated data points pertaining to General Hospitals (RSU) of Type B and Type C across Indonesia.

#### b. Official and Valid Secondary Data Sources

Data was meticulously curated from publicly available, authoritative sources to ensure validity and robustness:

1) Ministry of Health of Indonesia (Digital Transformation Office): Utilized to acquire the SATUSEHAT Integration Status data at the hospital or regional level, and HR profile data (IT personnel ratios). The specific data used is the latest public *snapshot* released by the Ministry.
2) Statistics Indonesia (BPS): Used to obtain the Regional ICT Development Index (IP-TIK) at the provincial or municipal level. This index serves as a critical proxy for the underlying Environmental and foundational Infrastructure readiness.
3) Relevant Governmental/Regulatory Bodies: Public records detailing security certifications (e.g., data on hospitals possessing TIK-related ISO/SNI Certification).

**c. Data Acquisition and Processing Procedures**

Secondary data was procured from official public data repositories (*open data* platforms), institutional annual reports, and formal government publications. The processing workflow involved three key steps: (1) Data Identification and Acquisition; (2) Data Standardization and Cleansing to ensure consistent formatting and address inconsistencies across disparate sources; and (3) Data Merging based on unique hospital codes or provincial/regional identifiers to enable comprehensive cross-source analytical linking.

**4. Data Analysis Techniques**

**a. Descriptive Analysis**

Descriptive statistics (Mean, Standard Deviation, and distribution frequencies) were employed to characterize the aggregate regional readiness profiles and visually articulate the disparities observed across the various *proxy indicators* (e.g., average IP-TIK scores versus average IT personnel ratios).

**b. Inferential Quantitative Analysis**

1) Multiple Linear Regression and Correlation Analysis: Applied to examine the predictive strength and direction of the relationship between the *proxy indicators* for Infrastructure Readiness (e.g., IP-TIK) and HR Readiness (e.g., IT personnel ratio) concerning pre-existing EMR adoption rates.
2) Binary Logistic Regression Analysis: This served as the primary analytical technique. The dependent variable was the binary status of "Fully Ready for SATUSEHAT Integration" (coded as 1) versus "Not Fully Ready" (coded as 0), derived from Ministry of Health data. The independent variables comprised the synthesized readiness *proxy indicators*. Results are reported using the Odds Ratio (OR) and 95% Confidence Interval (CI) to pinpoint the most influential predictors of successful integration outcomes.
3) Statistical Reporting: All inferential statistical results are comprehensively reported, including the p-value, degrees of freedom, and relevant effect size measures (e.g., Partial Eta Squared $\eta_p^2$ or $R^2$ to ensure robust interpretation and transparency of findings.

## RESULTS

This section presents the findings derived from the analysis of official secondary data sources, structured according to the proposed Integrated EMR Readiness Model. The results highlight the quantitative correlation between proxy indicators for IT Infrastructure and Human Resource readiness and the actual status of SATUSEHAT integration across Indonesian hospitals.

**1. Aggregate Profile of Hospital Readiness and IT Infrastructure**

This sub-section provides descriptive statistics on the aggregated sample and the evaluation of the Technology dimension using official proxies.

**a. Sample Distribution and Regional Readiness Context**

The analysis incorporated aggregated data from 135 General Hospitals (RSU) of Type B (40%) and Type C (60%), strategically mapped across regions representing high, medium, and low ICT Development Index (IP-TIK), as sourced from the latest BPS publications. The data showed a distinct regional disparity: regions with high IP-TIK scores (mu = 6.95, SD = .40) had a significantly higher proportion of Type B

hospitals (65%) compared to low IP-TIK regions (mu = 4.88, SD = .65), underscoring the correlation between regional digital maturity and hospital classification.

The distribution of Type B hospitals strongly clusters in regions categorized by high IP-TIK, suggesting that the foundational digital environment plays a crucial, though indirect, role in organizational capacity (Irawan & Sari, 2021).

**b. Evaluation of Infrastructure Readiness Proxies**

The Infrastructure dimension was assessed using publicly available proxies (Table 2). The highest mean score was observed for the proxy of basic TIK infrastructure availability (Network Availability data), likely reflecting high national investment in fundamental connectivity. However, the lowest score was recorded for the Data Security Certification proxy, indicating a low compliance rate with formal security standards among the sample hospitals.

**Table 2. Descriptive Statistics of IT Infrastructure Readiness Proxies (N=135 Hospitals)**

| Infrastructure Proxy Indicator | Mean Score (Normalized to 5.0) | Standard Deviation (SD) |
|---|---|---|
| Regional ICT Development Index (IP-TIK) | 3.94 | 0.88 |
| Network Availability/Connection Type (Proxy for Stability) | 4.15 | 0.72 |
| Data Security Certification (Proxy for Security) | 2.65 | 1.10 |
| Composite Infrastructure Readiness Mean | 3.58 | 0.65 |

**2. Human Resource Readiness and Inferential Analysis**

This sub-section reports the findings on the organizational dimension and the results of the primary inferential tests.

**a. Human Resource Competence Proxies**

Human Resource (HR) readiness was evaluated using proxies reflecting personnel capacity and digital experience. The Ratio of IT Personnel to Clinical Staff showed a normalized mean of 3.35, suggesting a moderate but potentially insufficient level of dedicated TIK personnel to support complex integration demands. The moderate-to-low IT personnel ratio aligns with findings by Aman et al. (2020).

**b. Binary Logistic Regression Analysis for SATUSEHAT Integration Success**

The primary analysis utilized Binary Logistic Regression to determine which readiness proxies significantly predict the dependent variable: Status of Fully Integrated SATUSEHAT (Yes=1/No=0), derived from DTO Kemenkes data. The model was statistically significant ($x^2(4)$= 31.8, p < .001), explaining a substantial portion of the variance in integration status (Nagelkerke $R^2$ = .28).

The strongest predictor was the Data Security Certification proxy (text{OR} = 2.86), indicating that hospitals formally compliant with security standards were almost three times more likely to achieve full SATUSEHAT integration.

**Table 3. Binary Logistic Regression Predicting Full SATUSEHAT Integration Status**

| Readiness Proxy | B (Coefficient) | Sig. (p) | Odds Ratio (OR) | 95% CI |
|---|---|---|---|---|
| Data Security Certification | 1.05 | .001 | 2.86 | [1.55, 5.28] |

| | | | | |
|---|---|---|---|---|
| IT Personnel to Clinical Staff Ratio | 0.85 | .003 | 2.34 | [1.32, 4.15] |
| Regional IP-TIK Score | 0.40 | .051 | 1.49 | [0.99, 2.25] |
| Prior EMR Adoption Rate | 0.22 | .310 | 1.25 | [0.81, 1.93] |

**c. Multiple Linear Regression on Prior EMR Adoption**

The results of a separate Multiple Linear Regression analysis, using Prior EMR Adoption Rate as the dependent variable, are summarized in Table 4. The overall model was statistically significant, $F(4,130) = 8.12$, $p < .001$, indicating that the readiness proxies collectively explain a significant amount of the variance in a hospital's historical EMR adoption success ($R^2 = .20$).

**Table 4. Multiple Linear Regression Predicting Prior EMR Adoption Rate ($F(4, 130) = 8.12$, $p < .001$, $R^2 = .20$)**

| Predictor | Standardized β | t | Sig. (p) |
|---|---|---|---|
| Data Security Certification | 0.15 | 1.56 | 0.120 |
| IT Personnel to Clinical Staff Ratio | 0.35 | 3.11 | 0.002 |
| Regional IP-TIK Score | 0.05 | 0.45 | 0.654 |
| Infrastructure Stability Proxy (Network Availability) | -0.10 | -1.02 | 0.309 |

*Note: Only IT Personnel to Clinical Staff Ratio emerged as a significant positive predictor ($p = 0.002$), confirming that the availability of IT human resources strongly and positively influences the past EMR adoption rate.*

## DISCUSSION

This quantitative, secondary data-based study provides compelling evidence concerning the hurdles encountered by Indonesian healthcare institutions as they navigate the mandatory transition to the SATUSEHAT integrated national digital health ecosystem. By rigorously analyzing official proxy indicators from the Ministry of Health (DTO) and the Central Bureau of Statistics (BPS), the analysis shifts the discourse from qualitative challenges to providing statistical validation of the key impediments, which pivot from basic technological accessibility to governance maturation and the acquisition of specialized technical expertise

**1. The Interoperability Governance Gap: A New Focus for Digital Transformation**

The descriptive statistics reveal a pivotal shift in the digital readiness agenda: hospitals, particularly those situated in regions with moderate-to-high Regional ICT Development Index (IP-TIK), have largely conquered the initial obstacle of securing basic IT infrastructure (e.g., hardware and network presence). However, the central and most taxing requirement now resides in the institutional and technical sophistication demanded for national interoperability.

The most forceful finding from the Binary Logistic Regression is the overwhelming significance of the Data Security Certification proxy (OR=2.86) as a success predictor. This outcome is crucial because formal security certification represents a robust measure of organizational data governance maturity and adherence to stringent operational protocols, which is far more critical than simply possessing digital hardware. Hospitals that demonstrate formal compliance (e.g., with ISO 27001 or comparable national mandates) are statistically much better positioned to execute the complex, secure, and standardized data exchange mandated by HL7 FHIR SATUSEHAT. This result strongly supports the theoretical premise posited by Al-Falahi et al. (2021) that the success of national interoperability efforts is contingent upon fortified data governance at the facility

level. The low mean score (μ= 2.65) associated with this proxy suggests a majority of hospitals, despite operating EMRs, still lack the high-level governance structure necessary to guarantee the integrity and confidentiality of transmitted patient records.

This security shortfall explains the non-significance of the Prior EMR Adoption Rate in predicting final integration success. While EMR adoption is a prerequisite, it does not ensure that the system's underlying data architecture, API, and security posture conform to the specialized HL7 FHIR standard required by the central platform. This defines the "Interoperability Governance Gap": a significant divide between simple digitalization and true digital maturity.

**2. Specialized Human Capital: A Decisive Organizational Asset**

The evaluation of the Organizational dimension underscores the decisive role played by technical human capital, evidenced by the strong predictive power of the IT Personnel to Clinical Staff Ratio proxy (OR=2.34). This finding refines the conventional emphasis on broad *digital literacy* among clinical practitioners (Wulandari & Sugiyarto, 2022). Although general literacy facilitates routine EMR use, integration demands specialized competencies specifically, proficiency in data mapping, secure API administration, and HL7 FHIR protocol implementation (Mahardika & Wijaya, 2023).

The high predictive strength of the IT Personnel Ratio implies that successful integration is achieved by hospitals that have either cultivated or retained dedicated technical teams capable of performing the complex system modifications necessary for communication with the national platform. This investment signals an institutional dedication to meeting the digital health mandate. This aligns with findings across the global Health Information Systems literature (Aman et al., 2020), which consistently identifies the shortage of technical experts as the most severe constraint in resource-limited settings, assuming managerial support is secured.

Furthermore, the initial Multiple Linear Regression indicated that the IT Personnel Ratio was a strong predictor of Prior EMR Adoption (β = .35). This demonstrates a developmental process: robust technical staffing first ensures *initial* system stability and uptake, subsequently establishing the organizational bandwidth required for the *advanced, specialized* undertaking of national integration. The policy implication is unambiguous: strategic efforts must prioritize developing and retaining specialized IT talent over merely increasing generic IT staff to ensure the sustainability of the national digital health vision.

**3. Addressing Regional Disparities and Policy Implications**

Although the Regional IP-TIK Score was marginally non-significant in the primary model (p=.051), its proximity to the significance threshold spotlights the critical issue of regional digital equity. Descriptive data showed a clear clustering of high-readiness Type B hospitals in high IP-TIK regions, suggesting that hospitals operating in environments with underdeveloped public infrastructure (low IP-TIK regions) face systemic disadvantages that amplify their internal challenges.

This finding mandates a sophisticated and differentiated policy approach. Government intervention must transcend generic regulation. For healthcare facilities in low IP-TIK environments (frequently Type C hospitals), policy should include compensatory mechanisms, such as subsidized cloud-based EMR solutions to bypass local infrastructure limitations, combined with targeted training and mentorship programs designed specifically to establish the critical IT Personnel Ratio required for both initial adoption and sustained integration. Failure to implement such customized support risks deepening existing health data disparities between digitally advanced and lagging regions.

**4. Limitations and Future Research Directions**

This study is inherently constrained by its reliance on aggregated secondary data proxies. While essential for achieving a non-interventional national scope, the use of proxies prevents the precise measurement of essential latent variables such as *change readiness* or *system usability*, which typically require primary

qualitative or survey data. For instance, Data Security Certification only verifies adherence to a standard, not the dynamic operational effectiveness of data governance in practice.

Based on these findings and methodological constraints, future research should be directed towards:

a. Developing a Granular Interoperability Maturity Index: Future work should aim to construct a direct HL7 FHIR Technical Maturity Index utilizing specific audit metrics (as opposed to generalized security certification proxies) to accurately quantify a hospital's capability to meet SATUSEHAT technical specifications.
b. Modeling Contextual Effects: Subsequent research should employ advanced spatial econometric or multi-level modeling to explicitly evaluate the moderating impact of the Regional IP-TIK score on the relationship between the *IT Personnel Ratio* and *Integration Success*, thereby clarifying the challenges of digital equity.
c. Qualitative Validation: A focused qualitative investigation (involving interviews with key IT managers and clinical leaders) should be executed to explore the behavioral and cultural determinants underlying the observed Data Security Certification and IT Personnel Ratio variables, providing richer context for the quantitative results.

## CONCLUSIONS

This study, employing a rigorous Quantitative Secondary Data-Based Readiness Evaluation Design, successfully provided a comprehensive and contextualized assessment of the readiness levels of Indonesian hospitals' IT Infrastructure and Human Resources for mandated integration with the SATUSEHAT national platform. By leveraging official and validated proxy indicators from the Ministry of Health (DTO) and Statistics Indonesia (BPS), the research achieved strong compatibility with its initial objectives, conclusively identifying the two most potent predictors of successful integration and effectively filling the critical research gap surrounding the Interoperability Governance Gap. The empirical evidence unequivocally demonstrates that the challenge for Indonesian hospitals is no longer rooted in the mere absence of basic technology but is concentrated in the realm of advanced governance maturity and securing specialized human capital.

The core conclusion regarding the Technology Dimension is that hospital readiness hinges on Data Security Certification (OR = 2.86), which emerged as the single most compelling predictive factor. This finding is transformative for policy formulation, as it asserts that the mere existence of an Electronic Medical Record (EMR) system is insufficient; success is fundamentally conditional upon the facility's demonstrated commitment to stringent organizational and technical data governance maturity necessary for secure, standardized, and trusted HL7 FHIR data exchange (Al-Falahi et al., 2021). The low mean score observed for this security proxy across the sampled hospitals confirms that the prevailing obstacle is the Interoperability Governance Gap a chasm separating organizations that possess digital tools from those that possess the technical and regulatory maturity to participate fully in a national health data ecosystem. Consequently, the study's central finding shifts policy imperative from promoting generalized digitalization to mandating and enforcing governance compliance.

Correspondingly, the analysis of the Organizational Dimension confirmed that specialized human capital is the decisive non-technical asset, evidenced by the strong predictive strength of the IT Personnel to Clinical Staff Ratio proxy (OR = 2.34). This crucial finding refines the traditional focus of human resource readiness by demonstrating that integration success requires a committed, adequately staffed internal technical team capable of specialized tasks like data mapping and HL7 FHIR protocol implementation (Mahardika & Wijaya, 2023). This capability is what enables the stability and acceptance of the system during the advanced integration phase, building upon the initial foundation of EMR adoption, a process which was also significantly predicted by the IT Personnel Ratio ($\beta = .35$). Therefore, policy must prioritize the cultivation and retention of

specialized IT talent, as the scarcity of this particular expertise (Aman et al., 2020) acts as a powerful brake on the national digital health vision.

The implications of these findings are highly actionable for both policy and future academic endeavor. The study mandates a shift toward a Targeted Intervention Strategy (TIS): national policy must now utilize Data Security Certification status as a condition precedent for granting digital transformation subsidies, linking financial incentives directly to governance compliance. Simultaneously, the significant role of the IT Personnel Ratio necessitates the establishment of national Specialized TIK Scholarship and Retention Programs to ensure that all hospitals, particularly Type C facilities in low-scoring Regional ICT Development Index (IP-TIK) areas, can acquire the necessary technical competence. While the Regional IP-TIK score itself was only marginally non-significant (p=.051), its contextual importance mandates that future academic research employ Spatial Econometric Modeling to explicitly evaluate the moderating effect of the regional environment on the relationship between Human Resources and integration success, thereby addressing the crucial issue of digital equity (Purnomo & Utami, 2021). Ultimately, the research provides an operational blueprint for policymakers and hospital management by translating empirical findings into a Targeted Intervention Strategy (TIS). To secure a compliant, sustainable, and successful integration with the national SATUSEHAT platform, the immediate focus must shift toward mitigating the two highest predictive risks. We strongly recommend the following:

1. Mandate Advanced Governance: Enforce Data Security Certification as a precondition for integration and funding, directly addressing the Interoperability Governance Gap.
2. Cultivate Specialized Capital: Immediately invest in TIK Scholarship and Retention Programs to bridge the specialized IT personnel scarcity identified by the IT Personnel Ratio OR = 2.34).

This study concludes that organizational maturity in data governance and the commitment to specialized human capital are the fundamental determinants of a successful digital health transition in Indonesia.

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