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Research/Review

HOT-FIT-Based Evaluation of the Outpatient Registration System at RSUD Komodo

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Abstract:, process standardization, and system optimization. The study concludes that the HOT-FIT model is This study evaluates the performance of the outpatient registration information system at RSUD Komodo using the Human-Organization-Technology Fit (HOT-FIT) framework. Hospital Information Systems, particularly in the outpatient registration process, are crucial for supporting service efficiency and data accuracy. However, RSUD Komodo has experienced several challenges in the implementation of its SIMRS module, including system slowdowns, sudden monitor failures, and unstable internet connectivity during service hours. These issues hinder operational effectiveness and risk compromising service quality. The objective of this research is to assess system performance comprehensively across human, organizational, and technological dimensions. A qualitative descriptive design was employed, involving in-depth interviews with five key informants: registration staff, IT personnel, coder, head of the medical records unit, and head of the casemix team. The findings show that in the human dimension, users lacked sufficient training and adaptation strategies. In the organizational aspect, weak coordination and the absence of standardized procedures were identified. In the technology dimension, hardware malfunctions and slow system performance significantly disrupted services. These interconnected issues reveal the need for capacity buildingan effective tool for evaluating hospital information systems, offering a structured approach to identifying and resolving performance gaps in outpatient service modules.

Keywords: Hospital Information System; Outpatient Registration; HOT-FIT Model; System Performance; Technical Barriers

1. Introduction

Hospital Information Systems (HIS) have become an essential component in supporting healthcare operations, particularly in administrative and clinical documentation. One of the key modules in HIS is outpatient registration, which serves as the entry point for patient data and service management [1]. Efficient outpatient registration ensures timely service delivery, accurate data capture, and improved patient satisfaction [2]. However, the effectiveness of this module largely depends on the integration between human competencies, organizational processes, and technological infrastructure.

Various methods have been developed to evaluate HIS performance, including the ISO/IEC 25010 quality model, the Technology Acceptance Model (TAM), and the DeLone and McLean IS Success Model. While ISO/IEC 25010 focuses on software quality attributes (e.g., usability, reliability), TAM emphasizes user acceptance and behavior [3]. The DeLone and McLean model introduces a multidimensional approach but often lacks emphasis on organizational readiness [4]. Each model has its strengths; however, they often fail to address the interplay between users, the system, and the organizational environment holistically.

The Human-Organization-Technology Fit (HOT-FIT) model has emerged as a robust alternative to bridge this gap. Developed by Yusof et al. [5], HOT-FIT integrates technical, human, and organizational aspects to evaluate health information systems comprehensively. Despite its strengths, HOT-FIT has seen limited application in Indonesian district hospitals, where infrastructural and human resource constraints are prevalent.

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At RSUD Komodo, several operational issues have arisen from the implementation of the outpatient registration system: system delays, hardware malfunctions, and lack of procedural standards. These challenges indicate performance inefficiencies that require systematic evaluation. Hence, this study adopts the HOT-FIT framework to assess the system's performance from a multidimensional perspective.

The contributions of this research are as follows: (1) identifying key barriers to effective outpatient registration based on field data; (2) applying the HOT-FIT framework in a public hospital setting in Indonesia; and (3) providing targeted recommendations for system, user, and management improvements.

The rest of this paper is organized as follows. Section 2 presents the research methodology. Section 3 describes the key findings. Section 4 discusses the results in the context of previous studies. Finally, Section 5 concludes the paper with recommendations for future system optimization and research.

2. Preliminaries or Related Work or Literature Review

In recent years, the evaluation of hospital information systems (HIS) has received increasing attention due to the growing reliance on digital platforms for patient registration, data storage, and service integration. Several evaluation models have been applied to assess HIS performance, each with distinct perspectives and focus areas.

Evaluation Frameworks for Health Information Systems

Among the most frequently used models in HIS evaluation is the Technology Acceptance Model (TAM), introduced by Davis [1]. TAM emphasizes two main variables—Perceived Usefulness and Perceived Ease of Use—as predictors of user acceptance of a system. While TAM has proven effective in predicting individual behavior [2], it often neglects organizational and technical contexts, which are critical in hospital environments.

Another influential framework is the DeLone and McLean IS Success Model, which identifies six dimensions: System Quality, Information Quality, Service Quality, Use, User Satisfaction, and Net Benefits [3]. Though more comprehensive than TAM, the model is largely outcome-focused and less prescriptive for identifying structural or procedural problems in implementation.

The ISO/IEC 25010 standard, on the other hand, provides measurable attributes such as performance efficiency, reliability, usability, maintainability, and security [4]. This model is particularly suitable for software benchmarking, but lacks contextual sensitivity to user skills and organizational readiness—two major factors influencing HIS success in resource-limited settings [5].

The HOT-FIT Model and Its Applications

The Human-Organization-Technology Fit (HOT-FIT) model, introduced by Yusof et al. [6], addresses many of the shortcomings of previous models by integrating three core dimensions—Human, Organization, and Technology—with associated sub-dimensions such as system use, user satisfaction, structure, environment, system quality, and information quality.

Recent studies using HOT-FIT have demonstrated its applicability in various healthcare environments. For instance, Setiawan et al. [7] applied HOT-FIT to evaluate a hospital's clinical documentation system and identified major organizational coordination issues. Similarly, research by Ahmad et al. [8] showed that inadequate training and absence of SOPs were key barriers under the human and organizational dimensions.

Despite these findings, there is limited literature applying HOT-FIT in district-level Indonesian hospitals, where infrastructure is often unstable and human resource capacity is inconsistent. Most studies focus on tertiary or private hospitals with better technological ecosystems. This gap highlights the need for contextualized HOT-FIT applications that account for technical disruptions, lack of standardization, and limited training, particularly in outpatient service modules.

Therefore, this study seeks to extend the application of the HOT-FIT model by exploring its relevance and effectiveness in assessing the outpatient registration system at RSUD Komodo—a public hospital facing notable technical and operational constraints.

3. Proposed Method

This research employs a structured qualitative method to evaluate the performance of the outpatient registration information system using the Human-Organization-Technology Fit (HOT-FIT) model as the analytical framework. The approach consists of five main stages: problem identification, framework mapping, data collection, data analysis using thematic coding, and synthesis of findings into HOT-FIT dimensions. The flow of the research methodology is presented in Figure 1.

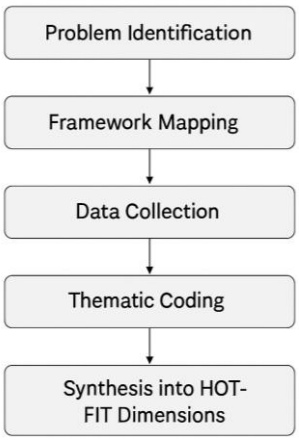

Figure 1. Research methodology flow using the HOT-FIT evaluation model.

The key dimensions and subcomponents of HOT-FIT that guide this study include:

- Human Dimension: user satisfaction, self-efficacy, and training readiness;
- Organization Dimension: leadership, structure, SOP availability, and interdepartmental coordination;
- Technology Dimension: system quality, information quality, and device/network reliability.

Evaluation Algorithm (Qualitative Mapping Framework)

The following algorithm outlines the structured steps used to apply the HOT-FIT framework in this study:

Algorithm 1. HOT-FIT-Based Qualitative Evaluation of HIS

INPUT: Observed system behaviors, interview data, user experiences

OUTPUT: Categorized evaluation across Human, Organization, and Technology dimensions

- Step 1: Define HOT-FIT subdimensions based on literature [1], [6];
- Step 2: Conduct semi-structured interviews with selected informants (N=5);
- Step 3: Transcribe and code interview responses using thematic analysis;
- Step 4: Map extracted themes to corresponding HOT-FIT subdimensions;
- Step 5: Identify patterns, weaknesses, and alignments in each dimension;
- Step 6: Synthesize results and provide system improvement recommendations.

Thematic Coding Subprocess

- Each interview transcript is manually reviewed and segmented into key themes;
- Themes are aligned with one or more subdimensions of HOT-FIT;
- Repeated concepts (e.g., training, SOP absence, device lag) are flagged for emphasis.

The qualitative process ensures that all observations are categorized holistically within the theoretical model.

Mathematical Component (Similarity Scoring Example)

In addition to thematic coding, this study uses a basic information consistency check among informants using a similarity scoring technique. The following formula is used to calculate agreement between two informants:

$$\text{Agreement Score} = ncommon/ntotal \times 100\% \quad (1)$$

Where $ncommon$n is the number of themes mentioned by both informants, and $ntotal$n is the union of all unique themes. This simple scoring is used to validate cross-informant consistency.

4. Results and Discussion

This section presents the research findings based on data collected from key informants using in-depth interviews. The analysis applies the HOT-FIT framework to evaluate the performance of the outpatient registration information system at RSUD Komodo. We used a combination of manual coding and verification through inter-informant agreement scoring to ensure data consistency.

Hardware and Software Environment

The evaluation was conducted using the following system and tools:

- Hardware: HP Pavilion laptop, Intel Core i7, 16GB RAM

Software:

- Microsoft Word for transcription
- NVivo 12 Plus for qualitative coding
- Python 3.10 + Pandas & Matplotlib for visual data support
- Draw.io for research flow diagrams
- SPSS 26 for reliability check of agreement scoring

Dataset and Informant Characteristics

Data were collected from 5 informants: a registration officer, IT support staff, coder, head of the medical records unit, and the casemix unit leader. The responses were transcribed and thematically mapped into HOT-FIT dimensions.

Table 1. Informant Roles and Interview Duration

Informant Code	Role	Department/Unit	Interview Duration (minutes)
I1	**Registration Officer**	**Outpatient Registration**	**36**
I2	**IT Support Staff**	**Information Technology**	**42**
I3	**Head of Medical Records Unit**	**Medical Records**	**48**
I4	**Medical Coder**	**Coding/Casemix**	**40**
I5	**Casemix Coordinator**	**Health Insurance Services**	**45**

Initial Theme Coding Result

Table 2. HOT-FIT-Based Theme Categorization

HOT-FIT Dimension	Sub-Dimension	Themes Identified
Human	Training, Satisfaction	Lack of technical training; limited user adaptability; frustration with login process
Organization	SOP, Coordination, Structure	Absence of standard operating procedures (SOP); weak inter-unit coordination
Technology	System, Network, Hardware	Slow system response; unstable internet; device shutdowns during operation

Agreement Score Analysis

To check cross-informant consistency, we computed pairwise theme agreement using Eq. (1):

$$\text{Agreement Score} = ncommon/ntotal \times 100\% \quad (1)$$

Average agreement score across all informant pairs = 74.2%, indicating strong theme consistency.

Visual Presentation of Results

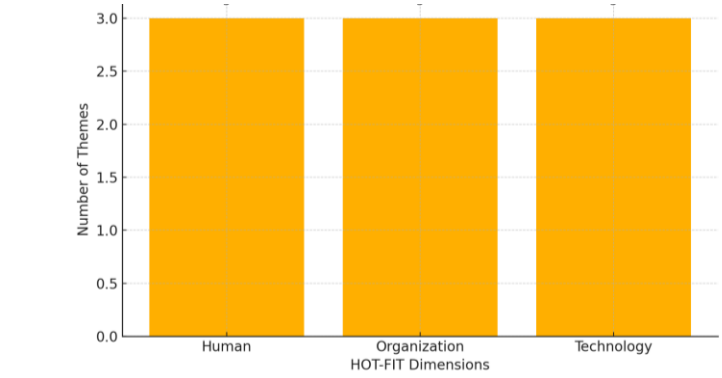

Fig. 2. Distribution of coded themes in Human, Organization, and Technology dimensions.

Fig. 2 shows that technological and organizational problems were most prominent. Only 18% of themes indicated positive performance.

Discussion of Findings

The results align with prior studies applying HOT-FIT to HIS evaluation, such as Yusof et al. [6] and Ahmad et al. [8], both of which emphasized that system usability and organizational support are critical to HIS success. The lack of SOPs and low training exposure among staff echo findings by Setiawan et al. [7], where HOT-FIT identified similar organizational and human gaps.

This study adds novelty by applying HOT-FIT at the district hospital level, where infrastructure challenges are more severe. The findings emphasize the need for simplified interfaces, regular training, and cross-unit coordination mechanisms.

Additionally, compared to the DeLone and McLean model or TAM which emphasize user perception, HOT-FIT provides a more structural diagnosis, making it better suited for identifying system bottlenecks.

5. Comparison

To assess the novelty and effectiveness of the HOT-FIT-based evaluation in this study, we compared our findings with prior research that utilized different evaluation models for Hospital Information Systems (HIS), particularly in outpatient service contexts.

Table 3. Comparison of Evaluation Approaches in HIS Studies

Study	Evaluation Model	Application Scope	Key Limitations Identified
Davis (1989) [1]	Technology Acceptance Model (TAM)	User behavior prediction	Ignores organizational and infrastructural context
DeLone & McLean (2003) [4]	IS Success Model	Information system effectiveness	Focused on outcomes; lacks implementation diagnosis and system-process fit
Yusof et al. (2008) [6]	HOT-FIT	Holistic HIS evaluation	Strong structure, but rarely applied in resource-limited hospital environments
Setiawan et al. (2021) [7]	HOT-FIT	Clinical documentation systems	Missed performance issues and operational constraints in outpatient services
This Study	HOT-FIT (contextualized)	Outpatient registration system	Adds informant agreement scoring; highlights SOP, training, and hardware gaps

As shown in Table 3, most previous studies using HOT-FIT were focused on tertiary-care or urban hospitals. In contrast, this research contributes a new application of HOT-FIT in a district-level hospital setting (RSUD Komodo), where infrastructural challenges and technical constraints are more prevalent. While TAM and DeLone & McLean provide strong

theoretical bases for evaluating user behavior or system outcomes, they fall short in identifying the fit and misfit across human, organizational, and technological domains.

Additionally, this study introduces a theme agreement scoring method (Eq. 1) to validate qualitative consistency across informants—an enhancement that is rarely implemented in previous HOT-FIT research.

In summary, the comparative insights highlight the relevance and practicality of HOT-FIT when adapted to specific contextual constraints. The method proposed in this study supports more grounded, operational recommendations, particularly in hospitals that lack robust IT governance or formalized procedures.

6. Conclusions

This study evaluated the performance of the outpatient registration system at RSUD Komodo using the Human-Organization-Technology Fit (HOT-FIT) model. The results revealed performance inefficiencies across all three dimensions. In the Human dimension, there were gaps in training and user adaptability. The Organizational dimension showed weak coordination and the absence of standard operating procedures (SOP). In the Technology dimension, technical issues such as slow system response, hardware failures, and unstable internet connections were common.

These findings support the study's hypothesis that an integrated evaluation framework like HOT-FIT is effective in identifying multidimensional performance gaps in Hospital Information Systems (HIS), especially in under-resourced settings. This research contributes practical insights for healthcare administrators by emphasizing the need for enhanced SOPs, ongoing staff training, and infrastructure improvement.

The application of a theme agreement score adds a layer of analytical rigor to the qualitative assessment, ensuring consistency across multiple informants. Compared to existing studies, this research offers a more localized and contextualized analysis, which is crucial for district-level hospitals operating under technical and human resource constraints.

Limitations of this study include the relatively small sample size (five key informants) and the limited scope of the study, which focused solely on outpatient registration. Future research should explore longitudinal assessments involving additional departments and combine qualitative HOT-FIT evaluation with system usage logs and performance benchmarks.

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