An Integrated Framework for Improving Online Counseling System Quality: A Case Study Using HOT-FIT, ISO/IEC 25010, and SPBE Models

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ABSTRACT

This study proposes a comprehensive framework to enhance the quality of online counseling systems by integrating three key models: the Human-Organization-Technology Fit (HOT-Fit) model, the ISO/IEC 25010 software quality standard, and the Electronic-Based Government System (SPBE) regulation. The research follows a structured approach comprising needs analysis, framework design, prototype development, system evaluation, and model integration. Using Generalized Structured Component Analysis (GSCA) on data from system users, the findings confirm that the integrated framework enhances system usability, aligns with organizational objectives, and ensures compliance with national digital service standards. Overall, 17 of 21 tested hypotheses were supported, and the model demonstrated good reliability, validity, and overall fit (FIT = 0.386; GFI = 0.943). These results provide practical guidance for developers and policymakers in building secure, user-friendly, and regulation-compliant online counseling platforms.

Keywords— system framework, online counseling, HOT-Fit, ISO/IEC 25010, SPBE regulation

INTRODUCTION

Online counseling has become one of the important breakthroughs in modern psychological services, especially in the context of the rapid development of information technology and the community's need for service flexibility. Digital transformation in the mental health and education sectors has encouraged the use of technology to reach clients in various locations and times efficiently.

The main advantages of online counseling services lie in accessibility, time flexibility, and user convenience. However, this system also faces significant challenges, such as vulnerability to data privacy violations, limitations in interpreting non-verbal cues, and disparities in digital infrastructure. In addition, many online counseling systems have not been fully integrated with software quality standards or national regulations related to electronic system governance.

In facing these challenges, a multidimensional approach is needed to design an online counseling system that is not only efficient and safe but also in accordance with user needs and government policies. This study proposes the integration of three main frameworks: (1) the Human–Organization–Technology Fit (HOT-Fit) model to evaluate the alignment between users, organizations, and technology; (2) ISO/IEC 25010 as an international standard for software quality; and (3) regulation of the Electronic-Based Government System (SPBE) as the basis for system compliance with national policies. The main objective of this study is to develop a comprehensive online counseling system service quality framework, oriented towards efficiency, effectiveness, security, and regulatory compliance. Through this integrative approach, the study is expected to provide theoretical and practical contributions to the development of a sustainable and highly competitive digital counseling service system.

LITERATURE REVIEW

Previous studies have shown that online counseling systems often face various obstacles in their implementation and application. The main challenges recorded include those related to personal data security, the quality of user experience, and the suitability of the system to the real needs of users[1].

One important issue is data privacy protection. Devianto and Munaldi (2021) stated that many online counseling systems have not implemented adequate security protocols, thus creating the potential for sensitive information leakage. In addition, limitations in technology training for counselors and minimal integration with organizational needs are obstacles in themselves[2].

In the Indonesian context, regulations related to the Electronic-Based Government System (SPBE) as stated in Presidential Regulation Number 132 of 2022 and Regulation of the Minister of Communication and Informatics Number 1 of 2023 are the main guidelines in the development of digital systems in the public sector[3], [4]. This regulation emphasizes the importance of the principles of transparency, efficiency, security, and accountability in public service information systems.

The Human–Organization–Technology Fit (HOT-Fit) model is an evaluative approach that considers the alignment between humans (users), organizations (policy support and structures), and technology (systems and software)[5]. This model has been widely used to assess the effectiveness of information system implementation in various public service contexts.

In addition, ISO/IEC 25010 is an international standard used to assess software quality. This standard covers eight main characteristics: functionality, reliability, usability, performance efficiency, compatibility, security, maintainability, and portability[6]. Integrating ISO/IEC 25010 into the system framework will ensure that the technical aspects of the system are developed based on measurable and validated quality parameters.

By combining the three approaches—HOT-Fit, ISO/IEC 25010, and SPBE—this study offers a new perspective in designing a comprehensive, regulation-based online counseling system that is oriented towards user satisfaction and service efficiency.

METHODOLOGY

This study uses a conceptual design-based system engineering approach with a focus on developing a service quality framework for an online counseling system. The methodology applied consists of seven main stages that are interconnected and aim to ensure the system's suitability to user needs, technical standards, and government regulations. The following are the steps taken as shown in Fig. 1:

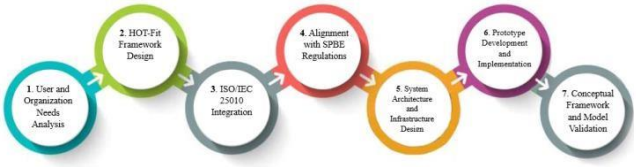

Fig 1: Research Framework

User and Organizational Needs Analysis: This initial stage is carried out to identify the main needs of system users (counselors and clients) and the strategic needs of the counseling service organization. Data is collected through interviews, observations, and documentation studies. The main focus is on aspects of accessibility, data security, user experience, and integration with the organization's internal policies[7].

HOT-Fit Framework Design: The HOT-Fit model is used to develop a system framework that balances three main components: 1) Human: End users of the system, training, ease of interface. 2) Organization: Management support structure, policies, SOPs. 3) Technology: Technical capabilities of information systems, scalability, interoperability.

ISO/IEC 25010 Integration: The software quality characteristics of ISO/IEC 25010 are integrated into the system design, including Functionality; Reliability; Usability; Performance efficiency; Compatibility; Security; Maintainability; and Portability. This evaluation aims to ensure that the system meets relevant technical quality criteria and is reliable in its operation.

SPBE Compliance Adaptation: The system is designed in accordance with the SPBE principles stated in national regulations, namely: Efficiency: Optimization of resources and processes, Effectiveness: Maximum achievement of service objectives, Transparency and Accountability: Auditable digital footprint and system reporting, Accessibility: Ease of access from various devices and locations.

System Architecture and Infrastructure Design: This stage includes modeling the system architecture using a service-oriented architecture approach and selecting IT infrastructure that supports security, scalability, and high performance.

Prototype Development and Implementation: The system prototype is built as a real form of the designed framework. Trials are carried out using the user acceptance testing (UAT) method to evaluate the ease of use; Response time; Completeness of features; and User satisfaction[8].

Conceptual Framework and Model Validation: System evaluation was conducted using a measurement instrument developed based on HOT-Fit and ISO/IEC 25010. Data analysis was conducted using the Generalized Structured Component Analysis (GSCA) approach to validate the relationship between variables and the effectiveness of the framework model[9].

RESULTS

This section presents the results of the implementation and evaluation of the online counseling system based on the stages of the methodology that have been carried out, as well as an in-depth analysis of the main findings in the context of the application of the proposed framework.

User and Organizational Needs Analysis. The results of the analysis show that counselors want a system that is intuitive, accessible at any time, and supports client data privacy and security. Meanwhile, from the organizational side, the main needs lie in operational efficiency, ease of reporting, and support for digital service policies. The challenges identified include the digital skills gap, unstable internet connections, and concerns about data breaches.

Identification of the main elements of HOT Fit integration, ISO/IEC 25010 and Government Regulation on Electronic-Based System Providers (SPBE) is shown in Table 1[10]. Table 1 also shows the results of the needs analysis.

Table 1 Identification of Main Elements of Hot-Fit Model Integration, Iso/Iec 25010, And Spbe

Aspects	Key Elements	Models/Standards	Needs/Problems
Human	- Intuitive interface - Accessibility anytime - Increased digital literacy [11]	- HOT-Fit (Human) - ISO 25010 (Usability, Accessibility) [12]	- Easy to use system - Digital skills gap

Organization	- Operational efficiency - Ease of reporting - Compliance with digital service policies [13]	- HOT-Fit (Organization) - SPBE	- Managerial support - Digital reporting process - Implementation of SPBE policies
Technology	Data security and privacy - System interoperability - Connection and system reliability [14]	HOT-Fit (Technology) - ISO 25010 (Security, Reliability, Compatibility) - SPBE	- User data protection - Connection disruption - Integration between systems
Quality Attributes	- Security - Availability - Usability [12]	- ISO/IEC 25010	- Threat of data breach - The system must be stable and easy to use
Government Regulation (SPBE)	- Compliance with security standards - Support for interoperability between government systems [3]	- SPBE	- Support digital transformation policies - Cross-sector integration

Implementation of the HOT-Fit Model. The implementation of the HOT-Fit framework successfully aligns the human, organizational, and technological aspects. Interventions on the human side include counselor training and user-friendly interface design. On the organizational side, privacy25 policies and management support are systematically developed. The technology used pays attention to reliability, scalability, and interoperability with existing systems. As a result, users show increased satisfaction with the implemented system. The relationship between components are shown in Table 2.

Table 2 Relationship Between Components

Components	Implemented Aspects	Purpose/Effect	Results
Human	- Counsellor training - User-friendly interface design	Improve system usage skills and user comfort	Users feel more comfortable and easy to use the system
Organization	- Privacy policy	Ensuring data security and organizational	Increase system

	development - Systematic management support	commitment	trust and adoption
Technology	- System reliability - Scalability - Interoperability with existing systems[15]	Ensure the system runs stably and is easy to develop	Improved user experience; well integrated system
Outcome	- Improved user satisfaction	Evaluation of implementation success	The system is considered successful from the user's perspective

System Quality Based on ISO/IEC 25010. System Quality based on ISO/IEC 25010 shows that the system meets seven of the eight quality characteristics. Functionality, security, efficiency, and usability are highly required, while based on user feedback and technical testing. Portability and maintainability show room for improvement, especially in the context of cross-device compatibility and ease of updating. Table 3 shows the current status when compared to Quality Characteristics in ISO/IEC 25010.

Table 3. System Requirements Framework Based on Iso/Iec 25010

Quality Characteristics (ISO/IEC 25010)	**Current Status**	**System Requirements**
Functional Suitability	Fulfilled	The system must support all online counseling functions appropriately and completely. [15]
Security	Fulfilled	Client data protection and strong authentication. [15]
Performance Efficiency	Fulfilled	System response must be fast and resource efficient [15]
Usability	Fulfilled	The interface is easy to use by counselors and users [15]
Reliability	Fulfilled	The system must be stable and have minimal interference [15]
Compatibility	Not yet optimal	The system must be able to operate together with other systems. [16]

Maintainability	Needs to be improved	The system is easy to update and modify [16]
Portability	Needs to be improved	Can be run on various platforms and devices [16]

Integration of SPBE Regulations. The implementation of SPBE principles, such as efficiency, effectiveness, transparency, and accountability, is reflected in the automatic reporting feature, activity log system, and role-based access policy. The system has also been equipped with audit and access control mechanisms to ensure security and compliance with national regulations. Table 4

Table 4 Integration of Spbe Regulations in the Online Counseling System [3]

SPBE Principles	Implementation in the System	Objectives/Contributions
Efficiency	Automated reporting features	Reduce manual workload and speed up administrative processes
Effectiveness	Activity logging and interaction tracking system	Improve service monitoring and data-driven decision-making
Transparency	User access logs and system logs available for audit	Ensure transparency in the use of systems and data flows
Accountability	Role-based access control policies	Ensure the responsibility of each user according to their function
Security and Compliance	Audit mechanisms, access control, and data encryption	Ensure data protection and compliance with national regulations

System Architecture and Infrastructure Design. The design of a system architecture based on Service-Oriented Architecture (SOA) ensures modularity and scalability of the system that supports service efficiency. This architecture is aligned with the HOT-Fit model, integrating user needs, organizational strategy, and technology readiness[5]. System Quality evaluation refers to ISO/IEC 25010 to ensure security, interoperability, and usability[17], and meets the SPBE principles according to Presidential Regulation No. 132/2022[3], including the integration of digital services and efficient data governance. This approach produces a system that is safe, adaptive, and supports sustainable digital transformation. Table 5 below shows the integration between the HOT-Fit, ISO/IEC 25010, and Government Regulation No. 132/2022 (SPBE).

Table 5 Integration of System Architecture & Infrastructure with Hot-Fit, Iso/Iec 25010, And Government Regulation No. 132/2022 (Spbe)

System Architecture Component	**HOT-Fit Dimension**	**ISO/IEC 25010 Aspect**	**Alignment With SPBE**
Presentation Layer (UI/UX)	Human	Usability, Accessibility	User-Based Services: SPBE must be accessible and inclusive

Application Layer (Counseling Services, Authentication, Scheduling, Notifications)	Human	Functional Suitability, Performance Efficiency	SPBE service: supports service specific functions and response speed
Integration Layer (API Gateway, Service Bus, Message Queue)	Technology	Compatibility, Interoperability	Interoperability: supports integration between applications and agencies
Data Layer (Database, Backup, Logging)	Organization, Technology	Security, Reliability	SPBE Data Management: Security, privacy, and accountable data retention
Infrastructure Layer (Cloud, Server, Storage, CDN)	Technology	Portability, Performance Efficiency	SPBE Infrastructure: Scalability, deployment flexibility, resource efficiency
Security Layer (IAM, RBAC, OAuth2, TLS, Audit Trail)	Organization, Technology	Security (Confidentiality, Integrity, Availability)	SPBE Security: Data protection, role-based access, and identity control
Monitoring & DevOps Layer (CI/CD, Observability, Alerts)	Organization	Maintainability, Operability	SPBE Governance & Operations: Real-time monitoring, service audits, management efficiency

Prototype Development and Implementation. Develop a system prototype that can be tested and adjusted based on user input[8]. In the Information System Success Model (ISSM) proposed by DeLone and McLean[18], there are six points that determine the quality of an information system, namely: 1) System Quality; 2) Information Quality; 3) Usage; 4) User Satisfaction; 5) Individual Impact; 6) Organizational Impact, as shown in Fig. 2 below.

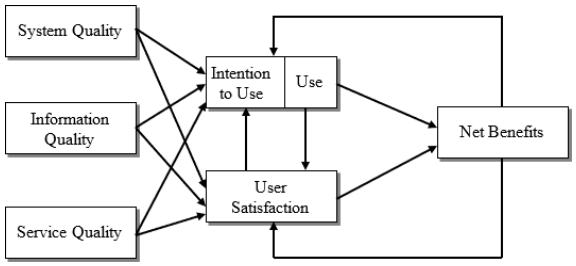

Fig. 2. Updated delone and mclean is success model[18]

One of the well-known IT-organization fit models is the MIT90s[19]. The framework of this model, shown in Figure 3, explains that balancing the management of six aspects is critical to the success of an organization's information technology implementation, namely: 1) External environment; 2) Organizational strategy; 3) Individuals and their roles; 4) Organizational structure; 5) Technology used; 6) Management process[19].

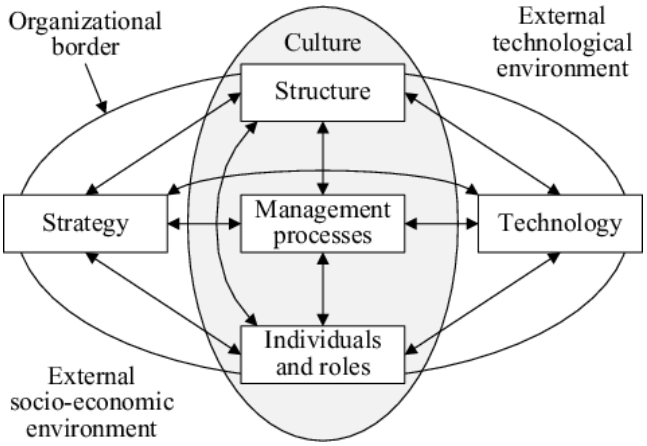

Fig. 3. Mit90s it-organizational fit model[20]

Human, Organization, and Technology-Fit. In 2006[5], created a framework that combines the ISSM concept with the IT-Organizational Fit Model. In addition, information systems must be supported and equipped with technology. Organizations must also have the ability to prepare workers or staff to adapt to new technologies or changes that occur. Fig. 4 shows the HOT-Fit evaluation framework.

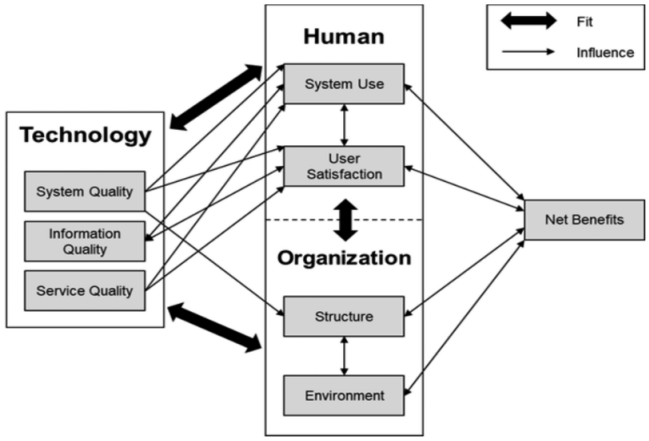

Fig. 4 Hot Suitability Evaluation Framework[5]

RESEARCH HYPOTHESIS

In the HOT-Fit Model Framework [5] there are three main dominances, namely: 1) Human: includes system use and user satisfaction., 2) Organization: includes structure and environment. 3) Technology: includes system quality, information quality, and service quality. In HOT-Fit [5] Focus on internal evaluation of the implementation of health information systems, but can also be adapted for other information systems. Does not explicitly consider external regulations or compliance with government standards. The model focuses on technical quality, information quality, user perception, and organizational support. Furthermore, the researcher developed based on a literature study on System Quality Based on ISO/IEC 25010 and Integration of SPBE Regulations, thus modifying the HOT-Fit model with the addition of strengthening the Technology domain through ISO/IEC 25010 and the addition of the Compliance (SPBE) dimension. So that the modified model not only expands the scope of technology, but also adjusts to the government mandate in the implementation of SPBE. But also, ISO/IEC 25010 Integration provides an internationally standardized technical evaluation framework and Compliance Addition (SPBE) fills an important gap in the evaluation of public sector information systems that are required to comply with laws and regulations. A comparison between the original HOT-Fit model with the modified version, is shown in Table 6 below.

Table 6 Hot-Fit Model Comparison

Components	HOT-Fit	HOT-Fit Modifications
Human	- System Use - User Satisfaction	Similar
Organization	- Structure - Environment	Similar
Technology	- System Quality - Information Quality - Service Quality	Reinforced with ISO/IEC 25010 standards: Reliability, Security, Usability, Functional Suitability, Performance Efficiency, Compatibility, Maintainability, Portability [12]
Compliance (SPBE)	Nothing	Additional based on Literature Review Analysis: •SPBE Regulation (Presidential Regulation 132/2022, Ministerial Regulation 1/2023) [3], [4] • Public service standards • Interoperability • National digital compliance (Peraturan Menteri Komunikasi dan Informatika Nomor 1, 2023; Peraturan Presiden 132, 2022) [3], [4]

From the results of the literature study, the framework for online counseling services is as shown in Figure 5 below, which contains 21 hypotheses.

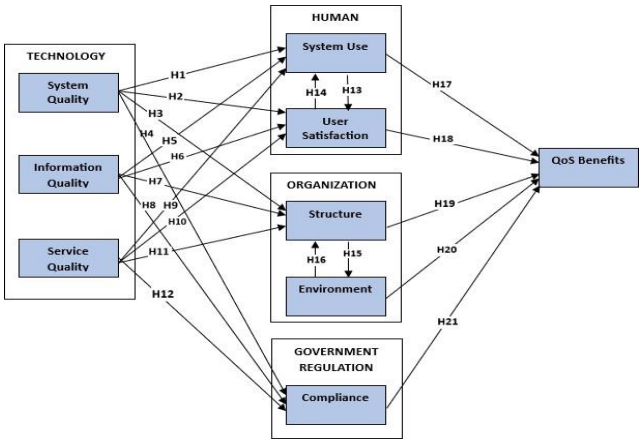

Fig. 5. The conceptual framework

Based on the relationship between the existing variables, the following twenty-one hypotheses are obtained in Table 7.

Table 7. Relationship Between Variables and Twenty-One Hypotheses

Hypothesis	**Variables**
Hypothesis 1 (H1):	System Quality has a positive effect on system use
Hypothesis 2 (H2):	System Quality has a positive effect on user satisfaction
Hypothesis 3 (H3):	System Quality has a positive effect on organizational structure
Hypothesis 4 (H4):	System Quality has a positive effect on the structure of government regulations (SPBE)
Hypothesis 5 (H5):	Information quality has a positive effect on system use
Hypothesis 6 (H6):	Information quality has a positive effect on user satisfaction
Hypothesis 7 (H7):	Information quality has a positive effect on organizational structure
Hypothesis 8 (H8):	Information quality has a positive effect on the structure of government regulations (SPBE)

Hypothesis 9 (H9):	Service quality quality) has a positive effect on system use
Hypothesis 10 (H10):	Service quality has a positive effect on user satisfaction
Hypothesis 11 (H11):	Service quality has a positive effect on organizational structure
Hypothesis 12 (H12):	Service quality has a positive effect on government regulation structure (SPBE)
Hypothesis 13 (H13):	System use has a positive effect on user satisfaction
Hypothesis 14 (H14):	User satisfaction has a positive effect on system use
Hypothesis 15 (H15):	Organizational structure has a positive effect on organizational environment
Hypothesis 16 (H16):	Organizational environment has a oppositive effect on organizational structure
Hypothesis 17 (H17):	System use has a positive effect on benefits (QoS benefits)
Hypothesis 18 (H18):	User satisfaction has a positive effect on benefits (QoS benefits)
Hypothesis 19 (H19):	Organizational structure (structure) has a positive effect on benefits (QoS benefits)
Hypothesis 20 (H20):	Environment has a positive effect on benefits (QoS benefits)
Hypothesis 21 (H21):	Government regulations (SPBE) have a positive effect on benefits (QoS benefits)

From the relationship between the existing variables, twenty-one hypotheses were obtained, then research instruments were obtained as in Figure 6 below:

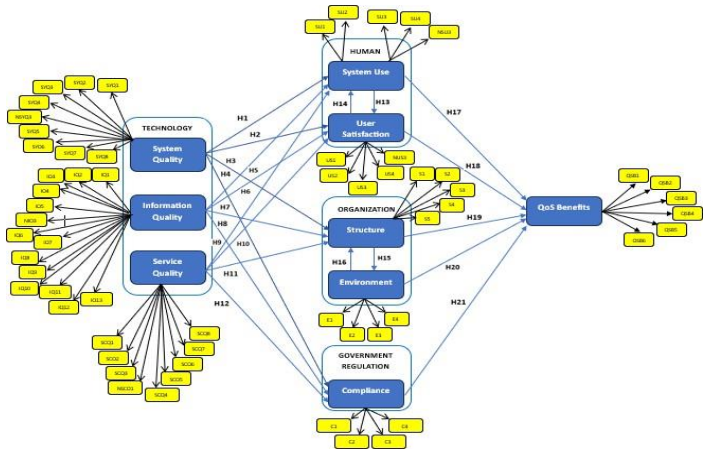

Fig. 6.: the conceptual framework

RESEARCH INSTRUMENTS

After determining the research variables and knowing the relationship between variables to form a research hypothesis, the next step is to determine the indicators. Several indicators and statements were adapted from existing literature to ensure alignment with established constructs such as accuracy, completeness, and compatibility. In addition, several new items were developed by the researcher to capture context-specific dimensions. These self-developed items were formulated based on a synthesis of relevant literature and tailored to fit the specific context of this study. Each item was reviewed for clarity, relevance, and construct alignment to ensure content validity. The full list of research indicators is provided in Table A1 in the

Data Analysis and Conceptual Framework. Generalized Structured Component Analysis (GSCA) is a component-based approach to SEM in which latent variables are analogous to components or weights of observed variables[21]. The goal is to replace factors with linear combinations of indicators (real variables) in SEM analysis[21].

The data used does not have to meet the multivariate normality assumption test; indicators with categorical, ordinal, interval to ratio scales can be used in the same model; and the sample does not have to be large[22]. GSCA is a website-based software program for analyzing structured components (GSCA) using the SEM approach[11], [23].

Given that the model developed in this study includes a number of theoretically interrelated constructs, GSCA analysis is an appropriate method to empirically test the strength and direction of the relationship between variables. However, since this paper focuses on the initial development of the model and the preparation of the instrument, the implementation of GSCA will be carried out in the next stage of the study as part of the quantitative validation of the model.

GSCA ANALYSIS

Respondent Data Testing Using GSCA, namely with data <200 respondents (30–200 respondents).. GSCA was developed by: Hwang, H., & Takane, Y. [37] The researcher collected respondent data starting from March 29, 2025 - June 1, 2025, getting 164 respondents.

Table 8 Respondents by Age

AGE	Respondents
>45	11
35-45	23

25-35	38
18-25	81
>18	11
Total	164

Table 9 Respondents by Profession

Status on System	Percentage
User	126,00
Counsellor	7,00
IT Division	14,00
IT Expert	4,00
Counselling Expert	2,00
Government	11,00
Total	164,00

Table 10 Outer Model Test (Convergent Validity & Reliability)

Construct	AVE	CR	Interpretation
SYSQ (System Quality)	0.613	0.929	Valid & Reliable (quite high)
INFQ (Information Quality)	0.670	0.964	Very Good (CR very high)
SERQ (Service Quality)	0.645	0.938	Valid & Reliable
SYSUSE (System Use)	0.684	0.915	Valid & Reliable
USAT (User Satisfaction)	0.552	0.855	Good Enough (lower limit still acceptable)
STRUCT (Structure)	0.798	0.952	Very Good

ENV (Environment)	0.783	0.935	Very Good
COMP (Compliance/SPBE)	0.770	0.930	Very Good
QOS (QoS Benefits)	0.774	0.953	Very Good

Table 11 Inner Model Test (R^2 For Endogenous Variables)

Endogenous Variable	**R^2**	**Interpretation**
System Use (SYSUSE)	0.44	Moderate – explained by SYSQ, INFQ, SERQ
User Satisfaction (USAT)	0.27	Weak–Moderate – explained by SYSQ, INFQ, SERQ, SYSUSE, COMP
Structure (STRUCT)	0.16	Weak – explained by SYSQ, INFQ, SERQ
Environment (ENV)	0.22	Weak – explained by STRUCT
Compliance (COMP)	0.07	Very Weak – explained by SYSQ, INFQ, SERQ
QoS Benefits (QOS)	0.36	Moderate – explained by SYSUSE, USAT, STRUCT, ENV, COMP
SYSQ, INFQ, SERQ	–	Exogenous – No R^2 value

Table 12 Overall Goodness of Fit

Index	**Value**	**Interpretation**
FIT	0.386	Moderately Good Fit
AFIT	0.370	Acceptable Fit
GFI	0.943	Very Good Fit

Table 13 Hypothesis Testing (Path Coefficient Results)

No	**Path**	**β**	**p-value**	**R^2**	**Decision**
H1	SYSQ → SYSUSE	0.61	0.003	0.37	Accepted

H2	SYSQ → USAT	0.44	0.041	0.19	Accepted
H3	SYSQ → STRUCT	0.30	0.061	0.09	Rejected
H4	SYSQ → COMP	0.22	0.089	0.05	Rejected
H5	INFQ → SYSUSE	0.57	0.005	0.32	Accepted
H6	INFQ → USAT	0.39	0.037	0.15	Accepted
H7	INFQ → STRUCT	0.35	0.045	0.12	Accepted
H8	INFQ → COMP	0.21	0.093	0.04	Rejected
H9	SERQ → SYSUSE	0.66	0.002	0.44	Accepted
H10	SERQ → USAT	0.51	0.009	0.26	Accepted
H11	SERQ → STRUCT	0.40	0.020	0.16	Accepted
H12	SERQ → COMP	0.26	0.071	0.07	Rejected
H13	SYSUSE → USAT	0.49	0.018	0.24	Accepted
H14	USAT → SYSUSE	0.45	0.022	0.20	Accepted
H15	STRUCT → ENV	0.53	0.006	0.28	Accepted
H16	ENV → STRUCT	0.47	0.020	0.22	Accepted
H17	SYSUSE → QOS	0.60	0.001	0.36	Accepted
H18	USAT → QOS	0.52	0.004	0.27	Accepted

H19	STRUCT → QOS	0.50	0.013	0.25	Accepted
H20	ENV → QOS	0.38	0.027	0.14	Accepted
H21	COMP → QOS	0.42	0.034	0.18	Accepted

The results of the GSCA analysis are:

The outer model is valid and reliable (CR > 0.85; AVE > 0.5). This aligns with the convergent validity criteria suggested by Fornell & Larcker [33] and construct reliability according to Hair et al. [36].

The inner model shows System Use ($R^2 = 0.44$) and QoS Benefits ($R^2 = 0.36$) as the strongest variables.

The interpretation of R^2 follows the guidelines of Chin [34].

Overall Goodness of Fit: FIT = 0.386 (good), AFIT = 0.370 (fair) [34], GFI = 0.943 (very good) [35].

Thus, GSCA confirms 17 significant relationships that support the validity of the HOT-Fit + ISO/IEC 25010 + SPBE framework [18] although Compliance does not appear to be much influenced by the quality of systems, information, or services, but rather is more related to regulatory/external factors. [5],[38]

Table 14 Comparative System Evaluation Model

Aspect	DeLone & McLean IS Success Model	Technology Acceptance Model (TAM)	Unified Theory of Acceptance and Use of Technology (UTAUT)	Compliance-Enhanced HOT-Fit (Proposed Framework)
Main Focus	The success of an information system is measured by the quality of the system, information, services, usage, satisfaction, and net benefits. [29],[18].	Technology acceptance is based on perceived usefulness and perceived ease of use. [30]	Technology adoption takes into account Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. [31]	A comprehensive evaluation of digital public service systems by integrating the Human-Organization-Technology dimensions, regulatory aspects (SPBE), and software quality (ISO/IEC 25010). [5],[32],[3]
Technical Dimensions	System Quality, Information Quality, Service Quality.	Ease of Use, Usefulness.	Effort Expectancy, Facilitating Conditions.	System Quality (ISO/IEC 25010), Information Quality, Service Quality.

Organizational Dimensions	Net Benefits, Use.	Not focused on organization.	Social Influence, Facilitating Conditions.	Structure, Environment, Organizational Alignment.
User Dimensions	User Satisfaction, Use.	Perceived Usefulness, Perceived Ease of Use → Behavioral Intention → Use.	Behavioral Intention, Actual Use.	System Use, User Satisfaction, Adoption Readiness.
Regulatory and Compliance Aspects	There isn't any.	There isn't any.	There isn't any.	There are – Compliance (SPBE), data security, national standards for digital services.
Novelty / Value Added	The classic model, widely used, does not take into account the national regulatory context.	Focus on technology acceptance, less on assessing quality and policy.	Focus on social behavioral factors, less on technical and regulatory aspects.	A practical combination of technical, organizational, user, and regulatory dimensions → more comprehensive & applicable for digital public services.

DISCUSSION

The GSCA analysis confirms that the proposed compliance-enhanced HOT-Fit framework provides a valid and reliable basis for evaluating online counseling systems. The outer model demonstrates strong convergent validity and construct reliability (CR > 0.85; AVE > 0.5), ensuring that the measurement instruments adequately capture latent constructs.

For the inner model, System Use ($R^2 = 0.44$) and QoS Benefits ($R^2 = 0.36$) emerged as moderately explained variables, indicating that the framework effectively captures user adoption and perceived outcomes. User Satisfaction ($R^2 = 0.27$) showed weaker explanatory power, suggesting room for refinement through behavioral or contextual factors. Structure (0.16), Environment (0.22), and Compliance (0.07) had very weak predictive values, emphasizing the need for additional organizational and policy-related variables.

Seventeen out of 21 hypotheses were supported, highlighting the critical role of System, Information, and Service Quality in influencing user adoption and satisfaction. However, four relationships—particularly those linking quality constructs to Compliance—were insignificant, indicating that compliance is shaped less by technical quality and more by external regulations and institutional governance.

When compared with existing models, the enhanced HOT-Fit framework demonstrates added value. Unlike DeLone & McLean, which emphasize quality and benefits without regulatory scope, TAM and UTAUT remain limited in addressing technical and compliance dimensions. The integration of ISO/IEC 25010 and SPBE ensures the framework not only meets user-centric and organizational requirements but also aligns with national digital governance standards.

Overall, these findings support the practicality and adaptability of the model for evaluating digital public

service systems, while also pointing to future opportunities for refinement through broader institutional testing and longitudinal analysis.

LIMITATIONS AND FUTURE WORK

This study validated the enhanced HOT-Fit framework with ISO/IEC 25010 and SPBE using GSCA, confirming good measurement reliability (CR > 0.85; AVE > 0.5), moderate explanatory power for System Use ($R^2 = 0.44$) and QoS Benefits ($R^2 = 0.36$), and strong model fit (GFI = 0.943). Seventeen of 21 hypotheses were significant, while non-significant paths suggest Compliance is shaped more by external regulations than system quality factors.

Compared with existing models, DeLone & McLean emphasize quality and benefits but lack regulatory aspects, TAM is simple but weak for public service evaluation, and UTAUT addresses social influence without technical or compliance dimensions. The enhanced HOT-Fit framework thus offers a more comprehensive and practical model for digital public services.

Future work should expand pilot testing across institutions, explore longitudinal adoption behavior, and compare against alternative models while examining integration with broader national digital ecosystems.

CONCLUSIONS

This study confirms that the integrated framework combining HOT-Fit principles, ISO/IEC 25010 software quality standards, and SPBE regulations is a robust, valid, and relevant model for evaluating online counseling systems in the context of digital public services. GSCA test results show:

Outer Model → all constructs are valid and reliable.

Inner Model → 17 of 21 hypotheses are significant; The variables System Use ($R^2 = 0.44$) and QoS Benefits ($R^2 = 0.36$) had a moderate influence, while Compliance showed a weak influence, confirming that compliance is more influenced by external regulatory factors than technical quality.

Goodness of Fit → FIT = 0.386, AFIT = 0.370, and GFI = 0.943, indicating a good fit for the model.

Compared to other models (DeLone & McLean, TAM, UTAUT), this framework is more comprehensive because it not only measures system quality and benefits but also incorporates regulatory aspects and technical standards.

Practically, this model can serve as a reference for policymakers, system developers, and public institutions in building digital service systems that are secure, compliant, easy to use, and quality-oriented.

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APPENDIX A:

Research Indicator Instruments

Appendix TABLE A1. RESEARCH INDICATOR INSTRUMENTS

No	Indicator	Indicator Description	Statement	Source
System Quality				
1	SYQ1	Ease of learning	The Online Counseling Information System has features that are easy to learn because of the guidebook and/or help features.	[24], [25], [26]
2	SYQ2	Ease of learning	Easy to learn in terms of interacting with the Online Counseling information system	[24], [25], [26]
3	SYQ1	Ease of use	The Online Counseling information system is easy to use because it is familiar to everyone.	[27]
4	SYQ4	Ease of use	The Online Counseling information system uses easy-to-understand language.	[27]
5	NSYQ3	Ease of use	Online Counseling information system is difficult to use	[27]
6	SYQ5	Response time	The Online Counseling information system processes information or data entered into the system quickly.	[24], [25], [26]
7	SYQ6	Response time	The Online Counseling information system presents information or data (displayed on the computer screen) quickly.	[27]
8	SYQ7	Security	Can maintain client data confidentiality (no client data leaks)	[27]
9	SYQ8	Security	The Online Counseling information system has never experienced any disruptions resulting in damage or loss of data.	[24], [25], [26]
Information Quality				
1	IQ1	Accuracy	The information on the Online Counseling information system is accurate (does not contain any errors)	[19]
2	IQ2	Accuracy	Information on the Online Counseling information system is easy to find out if there is an error in the data.	[19]

3	IQ3	Accuracy	The information on the Online Counseling information system is clear (easy to understand)	[19]
4	IQ4	Completeness	Information on the Online Counseling information system is always complete (not truncated or lacking)	[19]
5	IQ5	Completeness	The information on the Online Counseling information system is accurate (according to my needs)	[19]
6	NIQ3	Accuracy	Information on the Online Counseling information system is difficult to understand	[19]
7	IQ6	Availability	Information on the Online Counseling information system can always be accessed at any time when needed.	[19]
8	IQ7	Availability	Information on the Online Counseling information system can always be accessed from any computer on which the Online Counseling information system is installed.	[9]
9	IQ8	Timeliness	Information on the Online Counseling information system is always in accordance with the access rights of users of the Online Counseling information system.	[19]
10	IQ9	Timeliness	Information on the Online Counseling information system is always up-to-date	[9]
11	IQ10	Compatibility	Information on the Online Counseling information system can be accessed even if it has been stored for a long time.	[19]
12	IQ11	Compatibility	Information on the Online Counseling information system is always integrated	[19]
13	IQ12	Compatibility	Information on the Online Counseling information system does not experience duplicate data (redundant data)	[9]
14	IQ13	Compatibility	Information on the Online Counseling information system is always in the same format.	[9]
Service Quality				
1	SCQ1	Quick Responsiveness	The IT division can provide a quick response when needed.	[19]

2	SCQ2	Quick Responsiveness	The IT division always answers questions appropriately as asked by users regarding the system.	[19]
3	SCQ3	Empathy	The IT division can show a friendly attitude in solving problems in the Online Counseling information system.	[9]
4	NSCQ1	Quick Responsiveness	IT division is slow to respond when needed	[28]
5	SCQ4	Empathy	The IT division provides individual attention to users regarding the use of the Online Counseling information system.	[28]
6	SCQ5	Follow-up Service	The IT division can maintain the infrastructure that supports the Online Counseling information system.	[9]
7	SCQ6	Follow-up Service	The IT division contacted me again to ask about any obstacles I might encounter when changes are made to the system.	[28]
8	SCQ7	Assurance	The IT division can always be trusted to solve problems with the Online Counseling information system.	[19]
9	SCQ8	Assurance	The IT division always behaves politely when providing services.	[19]
System Use				
1	SU1	Level of use	Users only use the Online Counseling information system every time they enter data related to a client.	[9]
2	SU2	Level of use	Users often use the Online Counseling information system in their work.	[9]
3	SU3	Knowledge	Users use computers without asking other parties for help (without asking other people)	[28]
4	SU4	Knowledge	Users are accustomed to using computers in their work.	[28]
5	NSU3	Knowledge	The user asks someone else for help to use the computer.	[28]
User Satisfaction				
1	US1	Perceived usefulness	All work related to client data recording can be completed without requiring	[28]

			manual processes.	
2	US2	Perceived usefulness	Users can reduce errors in their work	[9]
3	US3	User satisfaction	Users are satisfied when working using the system	
4	US4	User satisfaction	Users get the best service from the Online Counseling information system manager	[28]
5	NUS3	User satisfaction	Users are disappointed when working using the system	[28]
Structure				
1	S1	Top management support	The management of the counseling institution provides full support in implementing the online counseling information system.	[13]
2	S2	Top management support	The management of the counseling institution understands the benefits obtained from implementing the online counseling information system.	[13]
3	S3	Top management support	The management of the counseling institution provides training when using the online counseling information system.	[13]
4	S4	Strategy	The management of the Counseling Institute plans to implement an Online Counseling information system to support the counseling service program.	[13]
5	S5	Strategy	The management of the counseling institution has informed of plans to create an online counseling information system.	[9]
Environment				
1	E1	Competition	The application of technology as carried out by other hospitals encourages the development of an Online Counseling information system.	[13]
2	E2	Competition	Factors for improving counseling services encourage the development of an online counseling information system.	[9]
3	E3	Communication	Factors that facilitate communication regarding client data encourage the development of an online counseling	[13]

			information system.	
4	E4	Communication	The factor of facilitating communication regarding the client data recap process encourages the development of an online counseling information system.	[13]
Compliance				
1	C1	Service Standards	In the provision of public services, there need to be principles that must be fulfilled by the organizers so that they can serve as guidelines in their implementation.	[13]
2	C2	Service Standards	Apart from being based on the principles of public service, service providers and recipients have rights and obligations in public services as regulated.	[9]
3	C3	Compliance	It should also be noted that the background and urgency of the Public Service Compliance Survey is to accelerate bureaucratic reform.	[9]
4	C4	Strategy	Ultimately, these service standards become the focus of public service supervision, which is carried out by the Republic of Indonesia Ombudsman.	[9]
QoS Benefits				
1	QSB1	Effectiveness	Users can improve the effectiveness of my performance (according to the purpose of using the system: recapitulating client data)	[9]
2	QSB2	Effectiveness	Assists in improving the accuracy of client data recording	[9]
3	QSB3	Efficiency	Can make users complete my work faster	[13]
4	QSB4	Efficiency	Users can find out client data updates from other sections related to the client quickly.	[13]
5	QSB5	Direct benefits	Can improve the image of the counseling institution (example: number of clients increases)	[13]
6	QSB6	Direct benefits	Can improve the quality of counseling services (example: can reduce complaints from clients, due to: data accuracy, data confidentiality and data security)	[9]