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Development of a hybrid model for website functional evaluation based on ISO/IEC 25010 and SERVQUAL

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Abstract: This study developed a hybrid model based on ISO/IEC 25010 and SERVQUAL to evaluate website quality holistically by combining technical dimensions and user perceptions. ISO / IEC 25010 is an international standard for evaluating the quality of software, including websites, based on technical characteristics such as Functional Suitability, Usability, Reliability, and Security. SERVQUAL, on the other hand, is used to measure quality based on user perception through five main dimensions: Tangibles, Reliability, Responsiveness, Assurance, and Empathy. This study aims to identify the gaps between user expectations and the reality of website performance by using both frameworks. The research method combines quantitative and qualitative approaches, with user surveys and direct observation as data collection tools. The results of the analysis showed that most website quality dimensions, such as Functional Suitability, Usability, Reliability, Responsiveness, and Security, were in the category of "very adequate," with a relatively small gap between actual and expected scores. This study also tested the validity and reliability of constructs using convergent and discriminant analysis, as well as hypothesis testing to identify significant influences between variables. Hypothesis test results show that usability, reliability, and satisfaction variables have a significant influence on user experience. At the same time, factors such as functional fit and physical appearance do not directly affect user experience. This hybrid model provides theoretical contributions by enriching the literature on website Quality Evaluation and practical contributions by providing guidance for website managers to improve the quality of their services based on the identification of gaps between actual performance and user expectations.

Keywords: hybrid model, ISO/IEC 25010, SERVQUAL, website quality evaluation

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Introduction

In the digital era, websites have become essential elements for various organizations, whether in business, education, or public service sectors. A website's role is not only limited to providing information but also as a service provider that directly interacts with users. Therefore, maintaining website quality is a crucial step to ensure optimal user experience, reliable functionality, and stable system performance [1]. As user expectations increase, website quality evaluation has become increasingly complex. Many traditional evaluation methods have not been able to combine technical performance and user perception thoroughly. This creates a need for a more integrated and holistic evaluation approach, which not only assesses technical aspects but also considers user satisfaction and expectations.

This research aims to address this challenge by developing a hybrid evaluation model that combines two main approaches, namely technical standards and service perceptions. This model is expected to provide a more comprehensive picture of website quality and identify gaps between actual performance and user expectations [2]. Specifically, the objectives of this research are develop a hybrid evaluation model based on ISO/IEC 25010 and SERVQUAL to improve the effectiveness of website functional quality assessment, identify the most influential dimensions and indicators on website quality and validate the model through factor analysis and hypothesis testing. This research also tests the model on an internship website that is used as a connecting

platform between job seekers and industries, thus directly contributing to the improvement of digital service quality.

Through this approach, the research is expected to make a theoretical contribution to the development of website quality evaluation methods, as well as a practical contribution in providing guidance for website managers in designing service improvement strategies based on data and user perceptions [3]. This study applies the hybrid evaluation model to analyze an apprenticeship website that provides career-related services to students and job seekers. The website functions as a bridge between industries seeking skilled professionals and individuals looking for employment opportunities [4]. By implementing the hybrid model, this study aims to demonstrate its applicability in assessing website quality and improving user satisfaction.

This research contributes to two main aspects. Theoretically, it enriches the literature on website quality evaluation by proposing a hybrid model that integrates technical and user experience perspectives. Practically, it offers valuable insights for website managers and developers in optimizing website performance based on a structured and user-centred evaluation framework [5]. By identifying and addressing gaps between actual performance and user expectations, website managers can implement targeted improvements to enhance overall service quality. Ultimately, this study provides a novel contribution to website evaluation methodologies, offering a systematic approach to improving digital service platforms.

Methodology

This research employs a mixed method approach, combining quantitative and qualitative methods to evaluate website quality comprehensively. The study aims to identify gaps between user expectations and actual website performance by integrating two main frameworks: ISO/IEC 25010 and SERVQUAL. This hybrid approach allows for a holistic assessment of both the software's technical quality and the user experience [1].

The quantitative approach involves evaluating website quality based on the dimensions of ISO/IEC 25010 and SERVQUAL, forming a hybrid model that provides a comprehensive analysis of technical and service quality aspects [2]. The integration of these frameworks is illustrated in Figure 1, which demonstrates the relationship between technical quality dimensions and service quality aspects, highlighting how both frameworks work together to deliver a complete website evaluation.

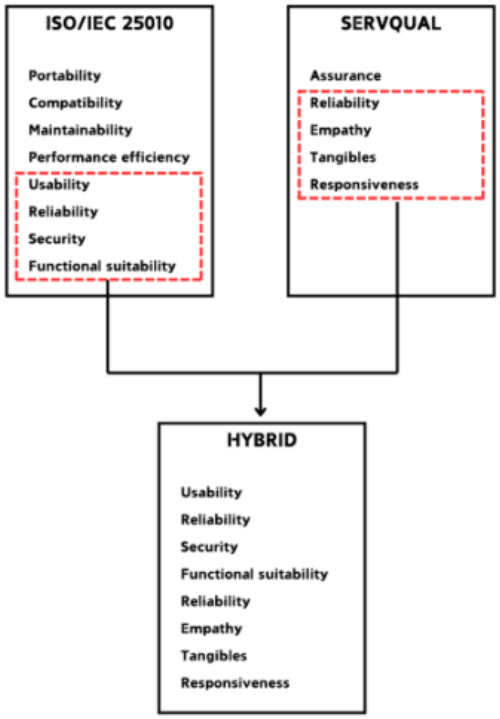

Figure 1. Hybrid model

Data Collection and Analysis

The website evaluation was conducted through user surveys and direct observation. The surveys collected user perceptions regarding various website quality dimensions, while direct observation assessed technical elements such as interface design, response speed, and security features [6]. Performance efficiency testing was conducted using Google's PageSpeed Insights tool, where website efficiency was categorized into three levels based on performance scores, as shown in Table 1.

Table 1. Performance score categories

Eligibility Criteria	Score Percentage (%)
Slow	0% - 49%
Average	50%-89%
Fast	90%-100%

A gap analysis was applied to compare website performance against user expectations, identifying discrepancies between anticipated and actual service quality. The interpretation of performance scores was based on SERVQUAL and ISO/IEC 25010, classifying website quality into five categories, as detailed in Table 2 [7].

Table 2. Quality score interpretation

Eligibility Criteria	Score Percentage (%)
Very Inadequate	0% - 20%
Inadequate	21% - 40%
Sufficient	41% - 60%
Adequate	61% - 80%
Very Adequate	81% - 100%

The study involved a sample of 650 respondents obtained through survey distribution. To analyze the collected data, Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed to identify key dimensions affecting website quality. By integrating ISO/IEC 25010 and SERVQUAL, along with gap analysis and PLS-SEM, this research provides a comprehensive evaluation framework that serves as a basis for further website quality improvement and development.

Results and Discussions

Results

After distributing the questionnaire, the collected responses were processed for analysis. This process includes analysis of respondents' answers based on a predetermined assessment scale. Previously, in the questionnaire there were 5 answer choices, namely Strongly Agree (SS), Agree (S), Neutral (KS), Disagree (TS), and Strongly Disagree (STS). These answer choices are designed to measure the respondent's level of agreement or perception of each indicator related to the question in each dimension studied [8].

The next step is to analyze the respondent's profile which contributes to their perception of the system under study. This respondent profile is important for understanding the demographic context that may influence assessment results. Table 3 shows the profile of respondents based on age and profession, which shows that the majority of respondents came from school and college students.

Table 3. Respondent profile

Information	Frequency	%
Age		
15-19	237	36
20-25	199	30
26-40	214	32
Profession		
High school student	237	36
College student	199	30
Lecturer/Teacher	214	32

This demographic context is important in interpreting how perceptions of website quality may vary based on age and educational background. Using ISO/IEC 25010 dimensions combined with SERVQUAL, the average actual scores and expectations were measured. The gap score (difference between actual and expected) indicates the performance shortfall [9].

Table 4. Matrix assessment

Dimensions	Current Score (ISO/IEC 25010)	Expectation Score	Gap	Eligibility Criteria
Functional Suitability	4.07	5	0.93	Very Adequate
Usability	4.09	5	0.91	Very Adequate
Reliability	4.08	5	0.92	Very Adequate
Responsiveness	4.13	5	0.87	Very Adequate
Security	4.06	5	0.94	Very Adequate
Tangibles	4.04	5	0.96	Adequate
Empathy	4.09	5	0.91	Very Adequate
User Experience	4.07	5	0.93	Very Adequate

All dimensions achieved actual scores above 4.00, with responsiveness scoring the highest (4.13) and tangibles scoring the lowest (4.04). Despite the gaps, most dimensions fall into the "Very Adequate" category (≥81%), except for Tangibles, which is classified as "Adequate" (80%).

To confirm the validity of the instrument, convergent and discriminant validity tests were performed.

a. Convergent Validity: All indicators had a loading factor > 0.50. For example, E1 (0.742), F1 (0.770), and R1 (0.694).
b. Discriminant Validity: Each indicator correlated higher with its construct than with other constructs, satisfying the discriminant validity criteria.

Table 5. Reliability test

Construct	Cronbach's Alpha	Composite Reliability
F	0.532	0.755
R	0.471	0.733
S	0.629	0.780
UE	0.588	0.755

The results of the reliability test show that most of the constructs have a Cronbach's Alpha value greater than 0.50, although there are several constructs that are close to the minimum limit, such as the R construct (0.471). However, Composite Reliability for all constructs is above 0.70, which indicates good reliability, with the examples of constructs F and UE each having a Composite Reliability value of 0.755.

To evaluate the extent to which the independent variables in the model are able to explain the dependent variable, an R-Square analysis was carried out. The results of this analysis are

presented in Table 6, which provides an overview of the strength of the relationship between variables in the research model.

Table 6. R-Square results

Dependent Variable	R^2 Value
Satisfaction (S)	0.660
Intention (IN)	0.544
User Experience (UE)	0.880

The R-Square value for the variables S (0.660), IN (0.544), and UE (0.880) shows that this model can explain the variance of the dependent variable quite well. The UE variable has the highest R-Square value, namely 0.880, which shows that the independent variables in this model greatly influence the user experience.

After knowing the extent to which the independent variable is able to explain the dependent variable through the R-Square value, the next step is to test the causal relationship between the variables in the model. Hypothesis testing is carried out to identify the significant influence of each independent variable on the dependent variable, as summarized in the following results [10]:

Table 7. Hypothesis testing

Relationship	Coefficient	T-Statistic	P-Value	Significance
F → Usability	0.759	15.983	0.000	Strong positive effect
R → Satisfaction	0.813	55.784	0.000	Strong positive effect
U → User Experience	0.870	29.802	0.000	Very strong positive effect
T → User Experience	0.157	4.687	0.000	Moderate positive effect

Based on the results of hypothesis testing in Table 7, most of the relationships between variables show significance, with a p-value <0.05. Significant relationships include F → U (T = 15.983, P = 0.000), which indicates that functional suitability has a strong influence on ease of use, as well as U → UE (T = 29.802, P = 0.000), which indicates that usability has a large influence on user experience. In addition, the variable R → S (T = 55.784, P = 0.000) shows that reliability significantly influences user satisfaction, while RS → UE (T = 3.799, P = 0.000) and T → UE (T = 4.687, P = 0.000) also has a significant impact on user experience. However, some relationships were not significant, such as F → UE (T = 0.856, P = 0.392) and T → U (T = 0.550, P = 0.583), indicating that functional suitability and physical appearance do not directly influence user experience or convenience. This confirms that usability, reliability and satisfaction factors are more dominant in influencing user experience.

Discussions

The results of the study reveal that most of the dimensions evaluated using the ISO/IEC 25010 model were considered as "Very Adequate," with a significant gap between the actual and expected scores for certain dimensions, particularly Tangibles. The findings show that respondents perceive the system as reliable and usable [11]. However, there is a notable need for improvements in areas related to the tangible elements of the system, such as the interface design and aesthetics. This aligns with the findings from Priya and Khalil (2020), who emphasized the importance of software interface design in ensuring the overall quality of a web-based portal. Their study, which used the ISO/IEC 25010 model, also highlighted the significant role of user

perception in determining the adequacy of system elements such as functionality and usability [12].

Moreover, the reliability analysis, which shows satisfactory Cronbach's Alpha and Composite Reliability values, supports the reliability of the constructs being measured. However, some constructs, such as "Reliability" and "Responsiveness," had lower Cronbach's Alpha values, indicating slight inconsistencies in the internal consistency. Nevertheless, their high Composite Reliability values suggest that these constructs remain reliable. This finding corroborates Laurence and Candiwan's (2020) research, which demonstrated that while internal consistency might vary, the overall reliability of constructs could still be considered robust when Composite Reliability scores exceed the threshold of 0.70 [13].

The R-Square analysis, particularly the high value for User Experience (UE) (0.880), suggests that the independent variables in the study usability, reliability, and responsiveness have a strong impact on user experience, further supported by hypothesis testing results. These results align with previous research by Gelgel et al. (2024), which found that the user experience significantly influences the perceived quality of tourism communication platforms, similar to the way usability and responsiveness affect the user experience in software systems. Their study, which focused on local wisdom-based communication, reinforced the idea that the quality of interaction directly influences user satisfaction [14].

Overall, the study's findings highlight that while the software quality dimensions of functionality, usability, and reliability were perceived as very adequate, tangible elements, such as the interface design, require significant improvement to meet user expectations. This suggests a need for further enhancements in design aesthetics and system responsiveness to improve overall user satisfaction, as emphasized by Priya and Khalil (2020) and Laurence and Candiwan (2020) [15].

The implications of this study extend to both theory and practice. For theory, the findings contribute to understanding the role of ISO/IEC 25010 in assessing software quality from a user perspective. For practice, developers should prioritize improving the design and tangible elements of software systems, as these factors significantly impact user satisfaction. Future research could explore how specific design improvements, such as the implementation of more intuitive user interfaces, might reduce the gap between expected and actual user perceptions.

This study also contributes to the development of software quality models by integrating user experience insights and providing empirical evidence on the importance of specific dimensions, such as usability and reliability, in driving user satisfaction and system acceptance.

Conclusion

This research succeeded in developing a hybrid model based on ISO/IEC 25010 and SERVQUAL to evaluate website quality holistically by combining technical dimensions and user perception. The analysis results show that most of the website quality dimensions, such as Functional Suitability, Usability, Reliability, Responsiveness, and Security are in the "Very Adequate" category, with a relatively small gap between actual and expected scores. Construct validity and reliability have also been tested, showing sufficient results to support further analysis. The results of hypothesis testing reveal that the variables usability, reliability, and satisfaction have a significant influence on user experience, whereas functional suitability and physical appearance do not directly influence it.

This model provides a theoretical contribution by enriching the website quality evaluation literature and providing a practical contribution by guiding website managers to improve service quality based on identifying gaps between actual performance and user expectations. Therefore, it is recommended that website developers prioritize improving usability and reliability aspects that significantly affect user experience. Website managers should also conduct regular assessments using the hybrid model to monitor performance gaps over time. For future researchers, it is advisable to apply this model in various domains or platforms to validate its flexibility and scalability across different website types. Thus, this hybrid approach can be an effective framework for designing a more focused and efficient website quality improvement strategy.

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