



Evaluation of the Tangibles Dimension of Digital Quality and Occupational Health and Safety Application Service Quality in XYZ Construction Company

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Abstract

This study evaluates the service quality of a Digital Quality and Occupational Health and Safety (OHS) application based on the Tangibles dimension of the SERVQUAL model, focusing on user interface design, ease of navigation, and the availability of supporting facilities in construction projects at Company XYZ. The application supports quality control and OHS management, making its usability essential for improving operational effectiveness. A quantitative evaluative approach was employed, involving 109 application users selected through purposive sampling. Data were collected using questionnaires and analyzed through SERVQUAL gap analysis to assess discrepancies between user expectations and perceived performance. One-way ANOVA was also conducted to identify differences in perceptions across user groups. The findings revealed negative SERVQUAL gap scores across the Tangibles dimension, indicating that the application's perceived performance had not fully met user expectations. The largest gap concerned the availability of supporting facilities, followed by ease of navigation. Furthermore, ANOVA results demonstrated significant differences in perceived performance among user groups, while their expectations showed no statistically significant differences. These findings highlight the need for improvements in the application's tangible service attributes, particularly user interface design, navigation simplicity, and the availability of comprehensive user guides and supporting resources. The study provides practical recommendations for Company XYZ to enhance user experience, improve application accessibility, and strengthen the effectiveness of digital quality and OHS management implementation in construction projects.

Introduction

The construction industry is characterized by a high level of complexity due to the involvement of diverse field activities, human resources, and stringent requirements for quality and occupational health and safety (OHS) management. Conventional manual approaches to quality and safety management often result in delayed reporting, difficulties in data traceability, rework, and increased project costs (Kannimuthu, 2025; Abdullah et al., 2025; Ghosh & Karmakar, 2025). These challenges highlight the need for information systems capable of supporting inspection, documentation, and reporting processes more efficiently (Luo et al., 2022; Zhu & Hwang, 2025; Sudrajat et al., 2024; Qatawneh, 2023; Sutrisno et al., 2023; Angus et al., 2025).

The rapid advancement of digital technology has encouraged many construction companies to implement digital applications to support quality and OHS management (Trask & Linderoth, 2023; Purushothaman et al., 2026; Daniel et al., 2024; Nowobilski et al., 2026; Ghansah & Edwards, 2024; Hossain et al., 2025). Such applications can accelerate documentation processes, improve data accuracy, and facilitate communication and coordination among project personnel. However, these benefits largely depend on the service quality perceived by users. One of the most critical determinants of application success is the Tangibles dimension, which refers to the physical characteristics of the service represented by the user interface design, ease of navigation, clarity of displayed information, and the availability of user guidance and supporting facilities (Hussamadin et al., 2023; Yoon & Kim, 2023; He et al., 2025; Ayada & Hammad, 2023; Li et al., 2022; Ali et al., 2026).

In the context of digital applications, the Tangibles dimension extends beyond visual appearance to encompass users' initial interaction with the system. A well-designed interface, intuitive navigation, and comprehensive user guidance can enhance work efficiency and promote consistent application usage in construction projects (Mehmedova et al., 2026; Roofigari-Esfahan & Morshedzadeh, 2025). Conversely, poor interface design and inadequate supporting facilities may reduce user satisfaction, increase the likelihood of operational errors, and hinder the effective utilization of digital applications for quality and OHS management (Cusumano et al., 2025; Mohamed et al., 2026; Almusaed et al., 2024; Vetrivel et al., 2024; Zhu & Liu, 2025).

Company XYZ has implemented a Digital Quality and OHS application since 2024 to support quality inspections, documentation of inspection findings, and reporting of construction activities. Although the application has been deployed across multiple projects, internal evaluations have revealed recurring quality issues and delays in follow-up actions after inspections. These findings suggest that the effectiveness of digital application implementation is influenced not only by technological adoption but also by the service quality perceived by users, particularly the Tangibles dimension, which directly affects application usability (Company XYZ Internal Report, 2023).

Previous studies on digital application service quality have generally evaluated all SERVQUAL dimensions simultaneously. While this approach provides a comprehensive overview of service quality, it offers limited insight into the contribution of individual dimensions. The Tangibles dimension, however, plays a crucial role in shaping users' initial perceptions of service quality and influences both technology acceptance and the sustained use of digital systems. Therefore, a more focused evaluation of the Tangibles dimension is needed to generate more targeted recommendations for service improvement.

Based on this background, this study aims to evaluate the service quality of the Digital Quality and OHS application at Company XYZ by focusing on the Tangibles dimension through the measurement of the gap between users' expectations and perceptions using the SERVQUAL approach. In addition, the study examines differences in perceptions among user groups to provide a broader understanding of service quality across different user characteristics. The findings are expected to serve as a basis for improving the application's user interface, navigation, and supporting facilities, thereby enhancing the effectiveness of digital application implementation in supporting quality and occupational health and safety management in construction projects.

Methods

Research Design

This study employed a quantitative approach with a descriptive–evaluative research design to assess the service quality of the Digital Quality and Occupational Health and Safety (OHS)

application used in construction projects at Company XYZ, focusing on the Tangibles dimension. A quantitative approach was adopted because the research data were collected in numerical form through structured questionnaires distributed to application users and subsequently analyzed using descriptive and comparative statistical methods. The evaluative design was selected because the study aimed to measure the degree of conformity between users' expectations and their perceived service performance without examining causal relationships among variables.

The service quality evaluation was conducted by adopting the Tangibles dimension of the SERVQUAL model developed by Parasuraman et al. This dimension was selected because it represents the physical aspects of service that directly influence users' experiences when interacting with the application, including user interface design, ease of navigation, clarity of information, and the availability of supporting facilities and user guidance. Service quality within this dimension was evaluated using SERVQUAL gap analysis by comparing users' perceived performance with their expectations. The resulting gap values were used to identify service attributes that require improvement.

In addition to the gap analysis, a one-way Analysis of Variance (ANOVA) was performed to determine whether significant differences existed in users' perceptions and expectations regarding the Tangibles dimension across different user groups. The findings are expected to provide insights into the Tangibles attributes that should be prioritized for application improvement, thereby enhancing user experience and supporting the more effective implementation of digital applications in construction projects.

Research Location and Object

This study was conducted on construction projects managed by Company XYZ, which has implemented a Digital Quality and Occupational Health and Safety (OHS) application since 2024. The application is used to support quality inspection processes, documentation of field findings, non-conformance reporting, occupational health and safety control, and monitoring of follow-up actions resulting from project inspections.

The object of the study was the service quality of the digital application in the Tangibles dimension, which includes user interface design, ease of navigation, clarity of information presentation, and the availability of supporting facilities for application use. The evaluation was carried out to measure the gap between users' expectations and perceptions of these aspects as a basis for identifying service improvement needs.

The research subjects consisted of all active users of the application who were directly involved in project operations, including Project Managers, QA/QC Engineers, QSHSE personnel, Site Engineer Managers, Site Operational Managers, Site Supervisors, and other project personnel who use the application in their daily activities.

Population and Sample

The population comprised all active users of the Digital Quality and OHS application in Company XYZ's construction projects, totaling 150 users. The sampling technique employed was purposive sampling, in which respondents were selected based on specific criteria to ensure that they had sufficient experience in using the application. The respondent criteria were as follows: 1) Active users of the Digital Quality and OHS application; 2) Users who utilize the application in project operational activities; 3) Users with a minimum of three months of experience using the application; 4) Personnel from the Quality or OHS departments.

The sample size was determined using the Slovin formula with a 5% margin of error. Based on the calculation, the minimum required sample size was 109 respondents.

Research Variable

This study employed a single evaluative variable, namely the service quality of the digital application as measured by the Tangibles dimension of the SERVQUAL model. The Tangibles dimension was used to assess the physical aspects of the service that directly influence users' experiences when interacting with the application, including user interface design, ease of navigation, clarity of information, and the availability of supporting facilities for application use.

The variable was operationalized into five measurement indicators representing the Tangibles dimension: 1) The application's user interface is visually appealing and easy to understand (TAN-1); 2) The application menus and features are clearly organized, making them easy to use. (TAN-2); 3) The information presented in the application is systematic, clear, and easy to read. (TAN-3); 4) The application provides intuitive navigation, enabling users to move easily between menus and access the required features. (TAN-4); 5) Supporting facilities and resources are available to assist users in utilizing the application effectively. (TAN-5)

These five indicators were measured using a five-point Likert scale to assess both users' expectations and perceptions of the application's service quality within the Tangibles dimension.

Data Collection

Data were collected using a structured questionnaire based on a five-point Likert scale with two measurement constructs: Expectation (Importance), which represents the level of service importance perceived by users, and Perception (Performance), which reflects the level of service performance experienced by users. The questionnaire was developed based on the indicators of the SERVQUAL model and adapted to the characteristics of digital application usage in construction project environments.

The research instrument was specifically adapted from the Tangibles dimension of the SERVQUAL model to reflect the context of digital applications used in construction projects. The measurement indicators included user interface design, ease of navigation, clarity of information, and the availability of user guidance and supporting facilities. Prior to data collection, the instrument was subjected to validity and reliability testing to ensure that each indicator consistently and accurately measured the service quality of the Tangibles dimension.

Data Analysis

The data analysis was conducted in several stages. First, descriptive statistical analysis was performed to summarize the characteristics of the respondents and the distribution of responses for each indicator within the Tangibles dimension. Descriptive statistics included the calculation of means, frequencies, percentages, minimum values, and maximum values for both expectation and perception scores.

Subsequently, a SERVQUAL gap analysis was conducted to evaluate the service quality of the Tangibles dimension. The service quality gap was calculated using the following equation:

$$\text{Gap} = P - E$$

with:

(P) = users' perception (performance) score;

(E) = users' expectation score.

The gap values were interpreted as follows:

(Gap < 0): the perceived service performance does not meet users' expectations;

(Gap = 0): the perceived service performance meets users' expectations;

(Gap > 0): the perceived service performance exceeds users' expectations.

Gap analysis was performed for each indicator of the Tangibles dimension to identify service attributes requiring improvement. Indicators with the largest negative gap values were considered the highest priorities for service quality enhancement.

In addition, differences in users' evaluations across different user groups were examined using a one-way Analysis of Variance (ANOVA) at a significance level of 5%. The analysis was conducted to determine whether significant differences existed in users' expectation and perception scores regarding the Tangibles dimension.

Before performing ANOVA, the assumption of homogeneity of variances was assessed using Levene's test. When the homogeneity assumption was violated, Welch's ANOVA was employed as a more robust alternative that is less sensitive to unequal variances across groups.

Results and Discussion

Respondent Demographic Characteristics

The demographic characteristics of the respondents were analyzed to provide a general profile of the users of the Digital Quality and Occupational Health and Safety (OHS) application included in this study. The characteristics examined comprised gender, age, educational level, project assignment, job position, years of experience in the construction industry, duration of application use, and frequency of application use. This information was used to ensure that the respondents possessed sufficient experience and familiarity with the application, thereby enabling a more accurate evaluation of its service quality.

Table 1. Demographic Characteristics of the Respondents

Characteristic	Category	Frequency	Percentage
Gender	Laki-laki	102	93,6
	Perempuan	7	6,4
Age	<25 tahun	2	1,8
	25–34 tahun	33	30,3
	35–44 tahun	62	56,9
	45–54 tahun	9	8,3
	≥55 tahun	3	2,8
Highest Education Level	SMA/SMK	5	4,6
	D3	5	4,6
	S1	88	80,7
	S2	11	10,1
Position	Site Supervisor	18	16,5
	Project Manager/Deputy Project Manager	18	16,5
	QHSSE/OHS Officer	18	16,5
	Quality Control (QC) Engineer	19	17,4
	Site Engineer Manager (SEM)	18	16,5
	Site Operational Manager (SOM)	18	16,5
Work Experience	<1 year	3	2,8
	1–3 years	4	3,7
	4–6 years	8	7,3
	7–10 years	46	42,2
	>10 years	48	44,0
Duration Application Use	<3 months	11	10,1

	3–6 months	13	11,9
	7–12 months	15	13,8
	>12 months	70	64,2
Application Usage Frequency	Rarely	11	10,1
	1–2 times/week	15	13,8
	3–5 times/week	19	17,4
	Daily	64	58,7

Based on Table 1, the majority of respondents were male (93.6%) and were aged 35–44 years (56.9%). Most respondents held a bachelor's degree (80.7%) and occupied various key positions in construction projects, with the largest proportion serving as Quality Control (QC) Engineers (17.4%). In terms of professional experience, the majority of respondents had worked in the construction industry for more than seven years (86.2%), indicating that they possessed substantial experience and a thorough understanding of construction project operations. Furthermore, most respondents had been using the Digital Quality and Occupational Health and Safety (OHS) application for more than 12 months (64.2%) and reported using the application daily (58.7%). These findings suggest that the respondents had extensive exposure to and experience with the application, supporting the representativeness of their evaluations of the application's service quality within the construction project environment at Company XYZ.

Users' Expectation and Perception Assessment

A descriptive analysis of users' expectation and perception ratings was conducted to provide an initial overview of the expected and perceived service quality of the Tangibles dimension of the Digital Quality and Occupational Health and Safety (OHS) application. The analysis focused on the five Tangibles indicators representing user interface design, ease of navigation, clarity of information, and the availability of supporting facilities for application use.

The descriptive statistics included the minimum, maximum, mean, and standard deviation for each Tangibles indicator under both expectation and perception assessments. These statistics provide an overview of respondents' evaluations of the application's service quality and serve as the basis for the subsequent gap analysis, which identifies the service attributes requiring improvement.

Tabel 2. Descriptive Statistics of Users' Expectation and Perception Ratings for the Tangibles Dimension

Tangibles Indicators	(Expectation)				(Perception)			
	Minimum	Maximum	Mean	Std. Deviasi	Minimum	Maximum	Mean	Std. Deviasi
TAN 1	1,00	5,00	4.62	0.691	2,00	5,00	4.31	0.690
TAN 2	2,00	5,00	4.42	0.820	2,00	5,00	4.28	0.783
TAN 3	1,00	5,00	4.46	0.776	2,00	5,00	4.18	0.747
TAN 4	1,00	5,00	4.53	0.800	2,00	5,00	4.14	0.751
TAN 5	1,00	5,00	4.49	0.753	1,00	5,00	4.05	0.843
Jumlah Rata-rata	-	-	4,504	-	-	-	4,192	-

Based on Table 2, all indicators within the Tangibles dimension exhibited high expectation scores, ranging from 4.42 to 4.62, with an overall mean of 4.504. These findings indicate that users have very high expectations regarding the application's physical and visual service

attributes. The highest expectation score was observed for the user interface design (mean = 4.62), followed by the ease of application navigation (mean = 4.53), while the organization of menus and features received the lowest expectation score (mean = 4.42). Overall, these results suggest that users expect an application with an attractive and user-friendly interface that effectively supports operational activities in construction projects.

Regarding perception scores, all Tangibles indicators achieved mean values ranging from 4.05 to 4.31, with an overall mean of 4.192, indicating that the application's service quality in the Tangibles dimension was generally perceived positively by users. The highest perception score (4.31) was obtained for the user interface design, suggesting that the application's visual appearance provides a satisfactory user experience. In contrast, the lowest perception score (4.05) was associated with the availability of supporting resources, such as user guides, tutorials, and other assistance materials that facilitate effective application use.

Although all indicators received relatively high perception scores, their values remained consistently lower than the corresponding expectation scores. This finding indicates the existence of service quality gaps across all indicators of the Tangibles dimension. The observed gaps suggest that the application's user interface, navigation, information presentation, and supporting facilities have not yet fully met users' expectations.

Overall, the descriptive analysis indicates that the service quality of the Digital Quality and Occupational Health and Safety (OHS) application in the Tangibles dimension can be considered satisfactory. Nevertheless, there remains considerable room for improvement to better align the application's performance with users' expectations. These findings provide the basis for the subsequent SERVQUAL gap analysis, which identifies the Tangibles attributes that should be prioritized for service quality improvement

Validity and Reliability Test Results

Before conducting the SERVQUAL gap analysis for the Tangibles dimension and the one-way Analysis of Variance (ANOVA), the quality of the research instrument was evaluated through validity and reliability testing. The validity test was performed to determine the ability of each questionnaire item to accurately measure the service quality of the Tangibles dimension, whereas the reliability test was conducted to assess the internal consistency of the instrument in producing stable and dependable measurements.

The validity and reliability tests were carried out using responses from 109 participants for both the expectation and perception questionnaires covering the five indicators of the Tangibles dimension. The validity of each item was assessed using the Corrected Item–Total Correlation, where an item was considered valid if its correlation coefficient exceeded the critical r-value at the 5% significance level. Instrument reliability was evaluated using Cronbach's alpha coefficient, with a value greater than 0.70 indicating acceptable internal consistency and demonstrating that the instrument was reliable for measuring the service quality of the Tangibles dimension.

Validity Test Results

The validity of the research instrument was assessed using the Pearson Product–Moment correlation. Each questionnaire item was considered valid if its calculated correlation coefficient (r calculated) was greater than the critical correlation coefficient (r critical) of 0.188 at the 5% significance level. The results of the instrument validity test are presented in Table 3.

Table 3. Instrument Validity Test Results

Variabel	Number of Items	Calculated r	Critical r	Remarks
E.TAN.1	5	0.914	0,188	Valid

E.TAN.2	5	0.825	0,188	Valid
E.TAN.3	5	0.954	0,188	Valid
E.TAN.4	5	0.928	0,188	Valid
E.TAN.5	5	0.856	0,188	Valid
P.TAN.1	5	0.885	0,188	Valid
P.TAN.2	5	0.879	0,188	Valid
P.TAN.3	5	0.908	0,188	Valid
P.TAN.4	5	0.932	0,188	Valid
P.TAN.5	5	0.915	0,188	Valid

Based on Table 3, all questionnaire items for both the expectation and perception assessments had calculated correlation coefficients (r calculated) greater than the critical value (r critical = 0.188), indicating that all items were valid. The r calculated values for the expectation items ranged from 0.825 to 0.954, whereas those for the perception items ranged from 0.879 to 0.932. These relatively high correlation coefficients indicate that each item was strongly correlated with the total score of the construct being measured.

The validity test results demonstrate that the five indicators of the Tangibles dimension adequately represent the service quality construct of the digital application. Therefore, all questionnaire items were considered valid and suitable for measuring users' expectations and perceptions of the service quality of the Digital Quality and Occupational Health and Safety (OHS) application within the Tangibles dimension.

Reliability Test Results

After all questionnaire items were confirmed to be valid, the reliability of the research instrument was evaluated using Cronbach's alpha coefficient. An instrument was considered reliable if its Cronbach's alpha value exceeded 0.70, indicating acceptable internal consistency. The results of the reliability analysis are presented in Table 4.

Table 4. Instrument Reliability Test Results for the Tangibles Dimension

Variabel	Cronbach's Alpha	Criteria	Information
Tangibles (Harapan)	0,937	0,700	Reliabel
Tangibles (Persepsi)	0,943	0,700	Reliabel

Based on Table 4, the research instrument for the Tangibles dimension demonstrated Cronbach's alpha values of 0.937 for the expectation scale and 0.943 for the perception scale. Both values exceed the recommended threshold of 0.70, indicating excellent internal consistency of the instrument.

The high Cronbach's alpha coefficients suggest that all indicators within the Tangibles dimension consistently measure the same underlying construct, thereby producing stable and reliable data. Accordingly, the research instrument was considered reliable and suitable for subsequent analyses, including descriptive statistics, SERVQUAL gap analysis, and one-way Analysis of Variance (ANOVA) to evaluate the service quality of the Digital Quality and Occupational Health and Safety (OHS) application based on the Tangibles dimension.

Gap Analysis Results for the Tangibles Dimension

A gap analysis was conducted to assess the degree of alignment between users' expectations and perceptions of the service quality of the Digital Quality and Occupational Health and Safety (OHS) application with respect to the Tangibles dimension. The analysis aimed to determine the extent to which the application's service performance met users' expectations and to identify the service attributes requiring improvement.

The gap value for each indicator and for the overall Tangibles dimension was calculated as the difference between the perception (performance) score and the expectation score using the following equation:

$$\text{Gap} = \text{Performance} - \text{Expectation}$$

A smaller gap value indicates a closer alignment between the perceived service quality and users' expectations. Conversely, a more negative gap value indicates that the perceived service quality falls further below users' expectations, highlighting areas that should be prioritized for improvement.

Gap Analysis of the Tangibles Dimension at the Indicator Level

The gap analysis at the indicator level was conducted to identify the service attributes with the largest gaps between users' expectations and perceptions, thereby determining the priority areas for service quality improvement. The results of the indicator-level gap analysis are presented in Table 5.

Table 5. Gap Analysis Results for the Tangibles Dimension at the Indicator Level

Indikator	Importance	Performance	Gap
TAN.1	4,624	4,312	-0,312
TAN.2	4,422	4,284	-0,138
TAN.3	4,459	4,183	-0,275
TAN.4	4,532	4,138	-0,394
TAN.5	4,486	4,046	-0,440
Mean	4,505	4,193	-0,312

Based on Table 5, all indicators within the Tangibles dimension exhibited negative gap values, indicating that the service quality of the Digital Quality and Occupational Health and Safety (OHS) application, as perceived by users, has not yet fully met their expectations. The overall mean gap of -0.312 suggests that a discrepancy remains between users' expected and perceived service quality with respect to the Tangibles dimension.

The largest gap (-0.440) was observed for the availability of supporting resources, including user guides, tutorials, and other assistance materials. This finding indicates that the supporting facilities provided for application use do not adequately satisfy users' expectations and should therefore be considered the highest priority for improvement.

The second-largest gap (-0.394) was identified for the ease of application navigation. This result suggests that the application's navigation system should be improved to enable users to access features more easily, quickly, and efficiently.

Furthermore, the user interface design exhibited a gap value of -0.312 , while the clarity of information presentation showed a gap of -0.275 . Although both aspects received relatively favorable evaluations from users, the negative gap values indicate that their current performance still falls short of users' expectations, highlighting the need for further refinement.

In contrast, the organization of menus and features recorded the smallest gap (-0.138), indicating that this aspect most closely met users' expectations compared with the other Tangibles indicators. Overall, the gap analysis demonstrates that the availability of supporting resources and the ease of application navigation are the two highest-priority areas for improving the application's service quality. Enhancing these aspects is expected to improve the overall user experience while reducing the gap between users' expectations and perceptions of the Digital Quality and Occupational Health and Safety (OHS) application.

One-Way ANOVA Results

Prior to the hypothesis testing, a one-way Analysis of Variance (ANOVA) was conducted to examine whether there were significant differences in the mean expectation and perception scores for the Tangibles dimension between respondents at different organizational levels within the construction projects. Respondents were classified into two groups: Manager and Officer. This classification was intended to determine whether users' evaluations of the service quality of the Digital Quality and Occupational Health and Safety (OHS) application differed according to their organizational roles.

Before performing the ANOVA, descriptive statistics for each respondent group were examined to provide an overview of the mean expectation and perception scores for the Tangibles dimension. The results of the descriptive analysis are presented in Table 8.

Table 8. Descriptive Statistics of Expectation and Perception Scores by Job Position Group

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
						Lower Bound	Upper Bound		
AV.E.TAN	Manager	54	4.4519	.74143	.10090	4.2495	4.6542	1.20	5.00
	Officer	55	4.5564	.63209	.08523	4.3855	4.7272	2.00	5.00
	Total	109	4.5046	.68724	.06583	4.3741	4.6351	1.20	5.00
AV.P.TAN	Manager	54	4.0556	.63414	.08630	3.8825	4.2286	2.00	5.00
	Officer	55	4.3273	.72046	.09715	4.1325	4.5220	2.80	5.00
	Total	109	4.1927	.68957	.06605	4.0617	4.3236	2.00	5.00

Based on Table 8, differences were observed in the mean expectation and perception scores for the Tangibles dimension between the Manager and Officer groups.

For the expectation assessment, the Officer group reported a higher mean score (4.556) than the Manager group (4.452). This finding suggests that officers have slightly higher expectations regarding the application's user interface design, ease of navigation, clarity of information, and availability of supporting resources. However, the difference between the two groups was relatively small, indicating that both managers and officers shared similarly high expectations for the service quality of the Tangibles dimension.

For the perception assessment, the Officer group also reported a higher mean score (4.327) than the Manager group (4.056). This result indicates that officers perceived the service quality of the application in the Tangibles dimension more favorably than managers. The observed difference suggests that users' experiences with the application's interface and usability may vary according to their organizational roles. Overall, the mean scores for all respondents were 4.505 for expectation and 4.193 for perception. The lower perception score relative to the expectation score indicates that the service quality of the application in the Tangibles dimension has not yet fully met users' expectations. These descriptive statistics provide preliminary evidence of differences between the Manager and Officer groups, which were subsequently examined using Levene's test for homogeneity of variances and one-way Analysis of Variance (ANOVA) to determine whether the observed differences were statistically significant.

Table 9. Results of Levene's Test for Homogeneity of Variances for Expectation and Perception Scores in the Tangibles Dimension

		Levene Statistic	df1	df2	Sig.
AV.E.TAN	Based on Mean	.287	1	107	.593
	Based on Median	.242	1	107	.624

	Based on Median and with adjusted df	.242	1	106.963	.624
	Based on trimmed mean	.406	1	107	.526
AV.P.TAN	Based on Mean	4.564	1	107	.035
	Based on Median	3.895	1	107	.051
	Based on Median and with adjusted df	3.895	1	104.748	.051
	Based on trimmed mean	4.112	1	107	.045

Based on Table 9, the results of Levene's test for homogeneity of variances indicate that the expectation scores yielded a significance value of 0.593 ($p > 0.05$). This result suggests that the variances between the Manager and Officer groups are homogeneous, indicating that the assumption of homogeneity of variances is satisfied. Therefore, differences in the mean expectation scores between the two groups can be appropriately examined using one-way Analysis of Variance (ANOVA).

In contrast, the perception scores produced a significance value of 0.035 ($p < 0.05$), indicating that the variances between the Manager and Officer groups are not homogeneous. Consequently, the assumption of homogeneity of variances is violated. To address this issue, differences in the mean perception scores were analyzed using Welch's ANOVA, which is more robust when the homogeneity assumption is not met.

The results of the homogeneity test provided the basis for selecting the appropriate statistical procedures to examine differences in users' evaluations of the service quality of the Digital Quality and Occupational Health and Safety (OHS) application in the Tangibles dimension according to job position.

Table 10. One-Way ANOVA Results for Expectation Scores and Welch's ANOVA Results for Perception Scores in the Tangibles Dimension

		Sum of Squares	df	Mean Square	F	Sig.
AV.E.TAN	Between Groups	.298	1	.298	.628	.430
	Within Groups	50.710	107	.474		
	Total	51.008	108			
AV.P.TAN						
	Statistic^a		df1	df2		Sig.
Welch	4.373		1	105.754		.039
a. Asymptotically F distributed.						

Based on Table 10, the results of the one-way Analysis of Variance (ANOVA) showed that the expectation scores for the Tangibles dimension yielded a significance value of 0.430 ($p > 0.05$). This result indicates that there was no statistically significant difference in the mean expectation scores between the Manager and Officer groups. Therefore, both groups shared comparable expectations regarding the application's user interface design, ease of navigation, clarity of information, and availability of supporting resources.

In contrast, the Welch's ANOVA results for the perception scores revealed a significance value of 0.039 ($p < 0.05$), indicating a statistically significant difference in perceived service quality between the Manager and Officer groups within the Tangibles dimension. Welch's ANOVA was employed because the homogeneity of variances assumption was violated, as indicated by Levene's test ($p < 0.05$). Since Welch's ANOVA is more robust to unequal variances, it was considered the appropriate statistical procedure. Accordingly, the hypothesis

stating that users' perceptions of the Tangibles dimension differ according to job position was supported.

Overall, the findings indicate that although managers and officers have similarly high expectations regarding the service quality of the Tangibles dimension, their actual experiences with the application differ significantly. This suggests that perceptions of the application's user interface, navigation, information presentation, and supporting resources vary according to organizational role. Therefore, future application development should consider the specific characteristics and needs of different user groups to ensure that improvements in the Tangibles dimension are experienced consistently across all organizational levels.

Gap Between Users' Expectations and Perceptions of the Tangibles Dimension in the Digital Quality and Occupational Health and Safety (OHS) Application at Company XYZ

The gap analysis revealed that the Tangibles dimension achieved a mean expectation score of 4.505 and a mean perception score of 4.193, resulting in an overall gap of -0.312 . This negative gap indicates that the service quality of the Digital Quality and Occupational Health and Safety (OHS) application, as perceived by users, has not yet fully met their expectations. Although the perception score reflects a generally satisfactory level of service quality, the remaining gap suggests that improvements are still required in the application's tangible attributes

At the indicator level, the largest gap (-0.440) was associated with the availability of supporting resources, including user manuals, tutorials, and other assistance materials. This finding suggests that users continue to experience difficulties in obtaining adequate guidance or support when encountering problems while using the application. The second-largest gap (-0.394) was observed for the ease of application navigation, indicating that the navigation structure and workflow are not yet sufficiently intuitive for users working in the dynamic environment of construction projects. In contrast, the organization of menus and features recorded the smallest gap (-0.138), suggesting that this aspect of the application most closely meets users' expectations.

These findings indicate that users evaluate the application not only in terms of its functionality but also through the quality of the overall user experience (UX). In construction project environments, where operational activities are often fast-paced and complex, digital applications should provide an intuitive interface, straightforward navigation, and adequate supporting resources to facilitate inspection, reporting, and documentation tasks. When these aspects are insufficient, users may experience operational difficulties that reduce the efficiency and effectiveness of project execution.

The findings are consistent with those reported by Cai et al. (2024) and Palamidovska-Sterjadovska et al. (2025), who emphasized that interface quality, ease of navigation, and the availability of supporting resources are key determinants of users' perceptions of digital service quality. Similarly, Sumi and Kabir (2021) argued that well-designed interfaces and ease of use positively influence user satisfaction and the continued use of digital applications. From the SERVQUAL perspective, Parasuraman et al. proposed that the Tangibles dimension in digital services is reflected in the quality of the user interface, clarity of information presentation, ease of navigation, and the availability of supporting facilities that enhance the overall user experience. Overall, the findings suggest that improvements to the Tangibles dimension should prioritize enhancing the application's navigation system, providing more comprehensive user guides, developing clear and accessible tutorials, and strengthening user support resources. Addressing these aspects is expected to reduce the gap between users' expectations and perceptions, improve usability, and support the more effective

implementation of the Digital Quality and Occupational Health and Safety (OHS) application in quality and safety management across construction projects at Company XYZ.

Differences in Expectation and Perception Scores by Job Position Group in the Tangibles Dimension

The hypothesis testing results indicated no statistically significant difference in expectation scores between the Manager and Officer groups for the Tangibles dimension, as evidenced by a significance value of 0.430 ($p > 0.05$). This finding suggests that both groups share similar expectations regarding the application's user interface design, ease of navigation, clarity of information, and availability of supporting resources. In other words, users' expectations of the application's service quality in the Tangibles dimension appear to be consistent regardless of their organizational role.

In contrast, the perception analysis yielded a significance value of 0.039 ($p < 0.05$), indicating a statistically significant difference between the Manager and Officer groups. According to the descriptive statistics, the Officer group reported higher perception scores than the Manager group. This finding suggests that although both groups have comparable expectations regarding the application's service quality, their actual experiences differ according to job position. The observed difference in perception may be explained by variations in job responsibilities and application usage patterns. Officers typically use the application directly in day-to-day operational activities, such as field inspections, reporting, and documentation, making them more familiar with the application's interface and workflow. In contrast, managers primarily use the application for monitoring, evaluation, and decision-making purposes. As a result, they may have higher expectations regarding information accessibility, navigation efficiency, and data presentation, leading them to evaluate the application's Tangibles dimension more critically. These findings suggest that future application development should not only focus on improving the overall quality of the user interface and supporting resources but should also consider the specific needs of users based on their organizational roles and usage patterns. Enhancing the navigation system, providing more comprehensive user guidance, and improving the accessibility and presentation of information are expected to deliver a more consistent user experience for both Manager and Officer groups, thereby improving the overall service quality of the application.

Conclusion

This study demonstrates that the service quality of the Digital Quality and Occupational Health and Safety (OHS) application in the Tangibles dimension at Company XYZ is generally satisfactory. However, a gap remains between users' expectations and perceptions of the application's service quality. The mean expectation score of 4.505 and the mean perception score of 4.193 resulted in an overall gap of -0.312 , indicating that the application's current performance has not yet fully met users' expectations.

At the indicator level, the largest gap was associated with the availability of supporting resources, including user guides, tutorials, and other assistance materials, followed by the ease of application navigation. In contrast, the organization of menus and features exhibited the smallest gap, suggesting that this aspect most closely met users' expectations. These findings indicate that improvements in the Tangibles dimension should primarily focus on enhancing the user experience (UX) by improving application usability and providing more comprehensive user support resources.

The comparative analysis further revealed that there was no statistically significant difference in expectation scores between the Manager and Officer groups, indicating that both groups share similar expectations regarding the application's service quality. However, a significant difference was observed in perception scores, suggesting that users' experiences with the

application vary according to their organizational roles. Therefore, future application development should consider the characteristics and requirements of different user groups to ensure a more consistent service experience across organizational levels.

Future research is recommended to include a larger number of construction projects and companies to enhance the generalizability of the findings. In addition, service quality evaluation could be extended by combining the Tangibles dimension with the other SERVQUAL dimensions or by integrating complementary approaches, such as the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), or qualitative methods including interviews and focus group discussions (FGDs). Such approaches would provide a more comprehensive understanding of the factors influencing the service quality of digital applications in the construction industry.

From a practical perspective, Company XYZ should prioritize improving the application's navigation system, providing more comprehensive user guides, developing clear and accessible tutorials, and strengthening user support resources. These improvements are expected to enhance the overall user experience, reduce the gap between users' expectations and perceptions, and support the more effective implementation of the Digital Quality and Occupational Health and Safety (OHS) application in quality management and occupational health and safety practices across construction projects.

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