
Integrating User Perception and Technical Assessment for Comparative Software Quality Evaluation of Shopee and Tokopedia Based on ISO/IEC 25010

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Abstract

This study evaluates and compares the software quality of Shopee and Tokopedia based on four ISO/IEC 25010 characteristics, namely usability, performance efficiency, reliability, and portability. A quantitative evaluative-comparative approach was employed using data from 56 respondents and the USE Questionnaire for usability assessment. Technical evaluation was conducted using GTMetrix for performance efficiency, Apache JMeter for reliability, and cross-platform testing on Google Chrome, Mozilla Firefox, Android, and iOS for portability. The results show that Shopee achieved a usability score of 79.74%, while Tokopedia obtained 79.07%, with both classified as Good. For performance efficiency, Tokopedia achieved a Performance Score of 63%, whereas Shopee obtained 26%, which was classified as Bad. Reliability testing showed comparable results, with both applications achieving a 100% success rate and 0% error rate. The average response time was 1,522 ms for Shopee and 1,550 ms for Tokopedia. In terms of portability, Shopee achieved an overall success rate of 92.5%, while Tokopedia achieved 85%, both classified as Very Good. Overall, Shopee demonstrated better usability and portability, while Tokopedia demonstrated better performance efficiency. The reliability results were considered comparable under the applied 100-user baseline testing scenario. These findings demonstrate that software quality comparison should consider multiple ISO/IEC 25010 characteristics rather than relying on a single quality dimension.

1. Introduction

The rapid growth of e-commerce has transformed the way consumers interact with digital marketplace applications. In Indonesia, Shopee and Tokopedia consistently rank among the most widely used marketplace platforms, serving millions of users every day [1]. As the number of transactions continues to increase,

maintaining software quality becomes increasingly important to ensure reliable system performance and positive user experience.

Despite their popularity, marketplace applications frequently experience problems related to page loading speed, service availability during high traffic, inconsistent functionality across platforms, and user interface usability [2]. These issues may reduce user satisfaction and influence purchasing behaviour. Consequently, systematic software quality evaluation is required to identify strengths and weaknesses of marketplace applications from both technical and user perspectives.

Several previous studies have examined software quality and user experience in marketplace and digital applications using different evaluation approaches. User satisfaction with the Shopee application has been evaluated through the Importance Performance Analysis (IPA) method [3], whereas the ISO/IEC 9126 model has been adopted to assess software quality in the DANA application [4]. Other studies have focused on user perception, such as the evaluation of Tokopedia's usability using the System Usability Scale (SUS) [5] and the assessment of the same application using both SUS and the User Experience Questionnaire (UEQ) [6]. Meanwhile, the ISO/IEC 25010 model has been implemented to evaluate a financial information system, although the evaluation was limited to functionality and usability aspects [7]. Similarly, an interactive programming learning platform has been evaluated using the ISO/IEC 25010 standard, demonstrating the application of software quality characteristics to assess user satisfaction and efficiency [8]. That study further indicates the relevance of ISO/IEC 25010 for evaluating software quality from both user-oriented and technical perspectives.

Beyond the Indonesian context, comparable usability assessments of e-commerce platforms have also been conducted internationally; for instance, interface design elements have been shown to shape user experience across several Pakistani e-commerce websites [9], while usability barriers specific to mobile commerce applications have also been evaluated [10]. These findings reinforce the observation that usability remains a recurring concern across marketplace platforms regardless of geographic context, yet integrated technical evaluation is still comparatively rare. Collectively, previous studies demonstrate that software quality has been evaluated using diverse methods and standards across different application domains. Nevertheless, most studies either focused on a single marketplace application, relied mainly on subjective user evaluations, or assessed only a limited number of ISO/IEC 25010 quality characteristics. As a result, comprehensive comparative evaluations that integrate both user perception and technical assessment within a unified software quality framework remain limited.

Accordingly, this study contributes to the existing literature in three aspects. First, it integrates subjective user perception and objective technical assessment within a single ISO/IEC 25010 evaluation framework. Second, it evaluates four software quality characteristics simultaneously, namely usability, performance efficiency, reliability, and portability. Third, it provides a comparative empirical evaluation of the two leading Indonesian marketplace applications using identical evaluation procedures. Unlike previous studies that primarily relied on either user perception or technical testing, this study integrates both evaluation approaches within a single software quality assessment framework. By combining subjective assessments collected through the USE questionnaire with objective measurements obtained from GTMetrix, Apache JMeter, and cross-platform compatibility testing, this research provides a broader perspective on software quality evaluation based on ISO/IEC 25010.

2. Research Method

2.1 Research Design

The implementation of software quality assurance involves comprehensive software testing, the application of quality metrics, and continuous monitoring of software performance to ensure compliance with predefined quality standards [11]. The ISO/IEC 25010 standard is intended to support software testing, development, and quality evaluation [12]. Recent applications of the standard further demonstrate its adaptability across domains, ranging from B2C e-commerce platforms [13] to healthcare-oriented mobile applications [14],

indicating that the ISO/IEC 25010 framework provides a sufficiently generalizable structure for comparative marketplace evaluation. This study employed a quantitative evaluative-comparative approach to compare the software quality of Shopee and Tokopedia based on the ISO/IEC 25010 quality model. Four software quality characteristics were evaluated, namely usability, performance efficiency, reliability, and portability. These four characteristics were selected because they represent the software quality attributes most directly perceived by users and technically measurable for web-based marketplace applications, while remaining feasible within the scope of this comparative study. The evaluation combined subjective user assessment through questionnaires with objective technical testing using software testing tools. The research process consisted of problem identification, data collection, software quality evaluation, data analysis, and interpretation of the findings.

2.2 Research Procedure

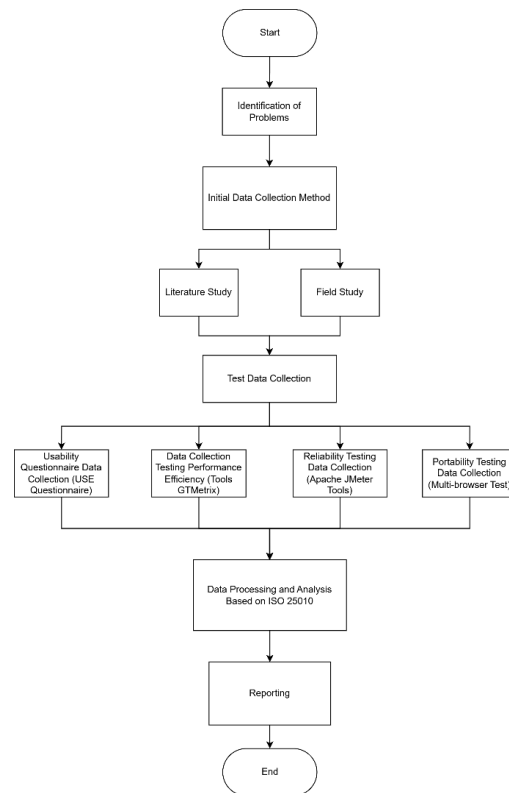


Figure 1. Research Flow Diagram

The research procedure is presented in Figure 1. The study began with identifying software quality issues in marketplace applications based on the ISO/IEC 25010 quality model. Subsequently, data were collected through literature review, questionnaires, and technical testing. The collected data were then processed and analysed to compare the software quality of Shopee and Tokopedia before drawing the research conclusions. Each evaluation stage was conducted independently using its corresponding assessment method before the results were integrated for comparative analysis based on the ISO/IEC 25010 quality model.

This study focuses on four ISO/IEC 25010 quality characteristics, namely usability, performance efficiency, reliability, and portability, because these characteristics are directly relevant to the evaluation objectives and can be assessed using the available user-based and technical testing methods. Functional suitability, compatibility, security, and maintainability were not included due to the scope of the study, available resources, and limitations in accessing certain technical aspects of the applications. The exclusion of these characteristics

does not imply that they are less important; rather, they were beyond the defined research scope. Future studies may incorporate the remaining ISO/IEC 25010 characteristics to provide a more comprehensive quality assessment.

2.3 Data Collection

2.3.1 Usability Data Collection (USE Questionnaire)

The usability evaluation was conducted to measure the ease with which users interact with the applications. The recommended number of respondents for this type of evaluation ranges from 30 to 100 [15]. Accordingly, this study involved 56 respondents. A purposive sampling technique was employed, with the selection criteria requiring participants to be active users of both Shopee and Tokopedia who had completed at least one transaction. These criteria were established to ensure that respondents possessed sufficient experience with both marketplace applications, enabling them to provide informed usability assessments.

The evaluation instrument consisted of 15 questionnaire items covering four usability dimensions: usefulness, ease of use, ease of learning, and satisfaction [16]. The questionnaire items were adapted from previous studies employing the USE Questionnaire framework to evaluate software usability. The questionnaire was distributed to the 56 selected respondents, representing various backgrounds, including students, employees, entrepreneurs, and other user groups.

The collected questionnaire responses were subjected to validity and reliability testing to assess the suitability and consistency of the measurement instrument. The validity test was conducted using the Pearson Product Moment correlation by correlating each questionnaire item score with the total score. With 56 respondents, the test resulted in 54 degrees of freedom ($df = n - 2$). At a 5% significance level, the critical correlation value (r -table) was 0.2632. An item was considered valid when its r -count value exceeded the r -table value.

Reliability testing was subsequently conducted using Cronbach's Alpha to determine the internal consistency of the questionnaire items. The test was performed separately for the Shopee and Tokopedia questionnaires, each consisting of 15 items. The validity and reliability results were used to confirm that the questionnaire items were suitable for subsequent usability analysis.

After the validity and reliability testing, the responses were analyzed using a five-point Likert scale. The Likert scale serves as a measurement instrument for processing questionnaire data collected from respondents [17]. In this study, a five-point Likert scale was adopted, as presented in Table 1.

Table 1. Likert Scale

Score	Category	Scale
1	Strongly Disagree	SD
2	Disagree	D
3	Neutral	N
4	Agree	A
5	Strongly Agree	SA

(Source: [18])

The Likert Scale score is calculated as follows [19]:

$$S = T \times Pn \quad (1)$$

Description:

S = Likert Scale

T = Total Number of Respondents

Pn = Likert Scale Option

After calculating the Likert scale scores, the next step was to determine the feasibility percentage for each questionnaire item using the following formula:

$$\text{Eligibility Percentage} = \frac{S}{Y} \times 100 \quad (2)$$

Description:

S = Likert Scale

Y = Highest Weight x Number of Respondents x Number of Questions

2.3.2 Performance Efficiency Testing (Tools GTMetrix)

This characteristic evaluates the system's performance in relation to the amount of resources consumed, including response time, memory utilization, and CPU usage [20].

Performance efficiency was evaluated using GTMetrix to assess the operational performance of the web versions of Shopee and Tokopedia. The evaluation was conducted using Google Chrome (version 142.0.0.0) with Lighthouse 12.6.1 through the GTMetrix test server located in Seattle, Washington, USA. Each application was tested three times using the same testing configuration to obtain more representative performance results. To maintain a consistent comparison, both applications were evaluated using the same browser version, test server location, and GTMetrix evaluation settings.

The evaluation focused on Performance Score and Structure Score as the main GTMetrix indicators. In addition, several performance sub-metrics were recorded, including First Contentful Paint (FCP), Largest Contentful Paint (LCP), Speed Index, Total Blocking Time (TBT), Cumulative Layout Shift (CLS), and Time to Interactive (TTI). Fully Loaded Time, Total Page Size, and the number of HTTP Requests were also recorded to provide additional information regarding page loading and resource usage. The results from the three tests were then calculated using the mean and standard deviation for each indicator and compared to evaluate the performance efficiency of Shopee and Tokopedia.

2.3.3 Reliability Testing (Apache JMeter)

Reliability refers to the capability of a software system to perform its specified functions consistently under defined operating conditions for a specified period of time [2]. Apache JMeter was used in this study because it can generate concurrent requests and provide response-time and error-rate measurements that can be used to evaluate system behavior under load [20].

Reliability testing was conducted using Apache JMeter with the same configuration for Shopee and Tokopedia. The test simulated 100 virtual users with a ramp-up period of 5 seconds, a continuous loop count (Forever), and a test duration of 180 seconds. The evaluation considered average response time, error rate, and success rate as the main indicators. Using the same configuration for both applications was intended to maintain comparable testing conditions.

The 100-user configuration was treated as a baseline load scenario rather than a high-stress capacity test. Therefore, the results primarily describe the behavior of the two applications under the applied test conditions and should not be interpreted as evidence of performance under very high concurrent workloads. The comparison focused on whether requests could be completed successfully and on the observed difference in response time between the two applications.

2.3.4 Portability Testing (Multi-browser Test)

This characteristic evaluates the ability of a software system to adapt and operate across different hardware and software environments. The portability test was conducted to determine whether the Shopee and Tokopedia applications could operate consistently across different browsers and mobile platforms [16].

The portability evaluation was conducted on the web versions of Shopee and Tokopedia using Google Chrome and Mozilla Firefox. The mobile versions were evaluated on Android and iOS. The same set of application features was tested on each platform to identify differences in feature availability and application operation across the evaluated environments.

A total of 20 application features were selected for the evaluation. These features represent commonly used functions and were grouped into functional categories, including authentication, product browsing, purchasing, payment, communication, account management, and system operation. Each feature was assessed using a binary criterion, namely Accepted when the feature could be used on the tested platform and Rejected when the feature was unavailable or could not operate as expected. The detailed results of the 20 feature tests are presented in Table X.

Numerical research data can be transformed into a measurement scale using the Guttman scale calculation formula, as presented below [21]

$$P = \frac{f}{N} \times 100\% \quad (3)$$

Description

P = Percentage of feasibility

f = Number of data collected

N = Total number of tests

2.4 Data Analysis

The data processing and analysis stage based on the ISO/IEC 25010 quality model was conducted to analyze all data obtained from the previous testing and data collection processes. The usability data were collected through questionnaire responses, while the performance efficiency and reliability data were obtained using the designated testing tools. In addition, portability data were derived from the compatibility testing performed by the researcher. The collected data were systematically processed to generate evaluation scores and indicators for each quality characteristic, which were subsequently interpreted to determine the software quality level of each application. The analysis results served as the basis for drawing conclusions and formulating recommendations for improving the software quality of the Shopee and Tokopedia marketplace applications. The test results were classified based on the criteria presented in the table below [16]:

Table 2. Classification of Test Results

No	Percentage	Category
1	0% - 20%	Very Bad
2	21% - 40%	Bad
3	41% - 60%	Fair
4	61% - 80%	Good
5	81% - 100%	Very Good

The results obtained from each evaluation method were interpreted independently according to their respective assessment criteria before being comparatively analyzed to identify the relative strengths and weaknesses of each application across the evaluated ISO/IEC 25010 quality characteristics.

3. Result and Discussions

3.1 Respondent Profile

A total of 56 respondents participated in this study after meeting the predefined selection criteria. Most respondents were male (66.07%), aged between 21 and 30 years (73.21%), and worked as students (42.86%). In terms of marketplace usage, most respondents reported using marketplace applications quite often (30.63%), indicating that they had sufficient experience to evaluate the usability of Shopee and Tokopedia objectively.

The respondent profile should also be considered when interpreting the usability findings. The sample was concentrated among users aged 21–30 years and included a relatively high proportion of students. Although all respondents met the predefined criteria and had experience using both marketplace applications, this demographic concentration may limit the generalizability of the usability findings to other age groups, occupations, or user populations. Therefore, the usability results primarily represent the perception of the respondents included in this study and should not be generalized to the entire Indonesian marketplace user population.

3.2 Usability Evaluation

The validity test was conducted to determine whether each item in the USE questionnaire was able to measure the intended usability construct. The test was performed using the Pearson Product Moment correlation with 56 respondents. With 54 degrees of freedom ($df = n - 2$), the critical value (r -table) at a 5% significance level was 0.2632. As presented in Table 3, all 15 questionnaire items for both applications obtained r -count values greater than the r -table value. For Shopee, the r -count values ranged from 0.313 to 0.815, while the values for Tokopedia ranged from 0.635 to 0.874. Therefore, all questionnaire items were considered valid and retained for the subsequent usability analysis.

Table 3. Validity Test Results of USE Questionnaire

Item	Shopee r-count	Tokopedia r-count	r-table	Result
1	0,582	0,821	0,2632	Valid
2	0,619	0,812	0,2632	Valid
3	0,313	0,635	0,2632	Valid
4	0,609	0,859	0,2632	Valid
5	0,707	0,85	0,2632	Valid
6	0,815	0,853	0,2632	Valid
7	0,814	0,874	0,2632	Valid
8	0,744	0,869	0,2632	Valid
9	0,684	0,775	0,2632	Valid
10	0,627	0,867	0,2632	Valid
11	0,703	0,803	0,2632	Valid
12	0,696	0,783	0,2632	Valid
13	0,683	0,848	0,2632	Valid
14	0,553	0,705	0,2632	Valid
15	0,695	0,837	0,2632	Valid

The reliability test was subsequently conducted using Cronbach's Alpha to evaluate the internal consistency of the questionnaire items. The results showed a Cronbach's Alpha coefficient of 0.905 for Shopee and 0.961 for Tokopedia. Both coefficients exceeded the minimum reliability criterion of 0.60, indicating high internal consistency among the questionnaire items. Thus, all 15 items for each application were retained and considered consistent for the usability assessment. Overall, the validity and reliability results confirm that the USE Questionnaire was appropriate for measuring the usability of both marketplace applications.

Table 4. Reliability Test Results of USE Questionnaire

Application	Number of Items	Cronbach's Alpha	Result
Shopee	15	0.905	Reliable
Tokopedia	15	0.961	Reliable

Table 5. Comparison of Usability Evaluation Results

Application	Respondents	Usability Score (%)	Category
Shopee	56	79.74	Good
Tokopedia	56	79.07	Good

Table 5 shows that both Shopee and Tokopedia achieved usability scores within the Good category. Shopee obtained a usability score of 79.74%, while Tokopedia obtained 79.07%. The difference between the two applications was 0.67 percentage points, with Shopee obtaining the slightly higher score. These results indicate that, based on the respondents' perceptions, both applications provide a generally favorable level of usability.

The relatively small difference between the two scores indicates that the perceived usability of Shopee and Tokopedia was broadly comparable among the respondents. The slightly higher score for Shopee suggests a marginally more favorable user perception in this study. However, the difference of 0.67 percentage points should not be interpreted as a substantial gap in usability between the two applications. Instead, the results show that both applications were perceived positively by the respondents in terms of usefulness, ease of use, ease of learning, and satisfaction.

These findings are consistent with previous studies highlighting usability as an important factor in evaluating user experience in marketplace applications [3], [6]. Previous research has also reported that usability contributes to users' perceptions of convenience, satisfaction, and continued interaction with marketplace platforms [9], [10]. However, the findings of the present study provide a direct comparison between Shopee and Tokopedia using the same usability instrument and respondent group, allowing the perceived usability of both applications to be evaluated under the same measurement conditions.

Overall, the usability evaluation indicates that both Shopee and Tokopedia achieved a Good classification, with Shopee obtaining a slightly higher score than Tokopedia. The validity and reliability results further support the use of the questionnaire data, as all questionnaire items were valid and both instruments demonstrated high internal consistency. Therefore, the usability findings provide a reliable basis for the comparative analysis of the two marketplace applications in this study.

3.3 Performance Efficiency Evaluation

Table 6. Comparison of Performance Efficiency Evaluation Results

Indicator	Shopee	Tokopedia
Performance Score (%)	26.00 ± 0.00	63.00 ± 4.00
Structure Score (%)	95.33 ± 1.15	84.33 ± 1.53
First Contentful Paint (s)	4.93 ± 0.31	0.817 ± 0.033
Largest Contentful Paint (s)	7.00 ± 0.62	0.817 ± 0.033
Speed Index (s)	7.97 ± 0.49	11.53 ± 1.00
Total Blocking Time (s)	1.53 ± 0.06	2.87 ± 2.07

Indicator	Shopee	Tokopedia
Cumulative Layout Shift	0.00 ± 0.00	0.00 ± 0.00
Time to Interactive (s)	8.00 ± 0.30	9.17 ± 2.89
Fully Loaded Time (s)	12.27 ± 6.01	25.23 ± 7.56
Total Page Size (MB)	2.06 ± 0.20	5.04 ± 0.40
HTTP Requests	110.67 ± 11.59	167.33 ± 8.08

Table 6 presents the performance efficiency results based on three GTMetrix tests for each application. Shopee obtained a mean Performance Score of $26.00 \pm 0.00\%$, while Tokopedia obtained $63.00 \pm 4.00\%$. Based on the GTMetrix classification, Shopee's Performance Score was categorized as Bad, whereas Tokopedia achieved a higher score. Shopee recorded a mean Structure Score of $95.33 \pm 1.15\%$, FCP of 4.93 ± 0.31 s, LCP of 7.00 ± 0.62 s, Speed Index of 7.97 ± 0.49 s, TBT of 1.53 ± 0.06 s, and TTI of 8.00 ± 0.30 s. Meanwhile, Tokopedia recorded a Structure Score of $84.33 \pm 1.53\%$, FCP of 0.817 ± 0.033 s, LCP of 0.817 ± 0.033 s, Speed Index of 11.53 ± 1.00 s, TBT of 2.87 ± 2.07 s, and TTI of 9.17 ± 2.89 s. The CLS value for both applications was 0.00 ± 0.00 . These results show that Tokopedia achieved a higher overall Performance Score, although some of its loading and interaction metrics remained relatively high.

The GTMetrix audit provides further insight into Shopee's low Performance Score. Although Shopee achieved a higher Structure Score, its rendering and interaction metrics were relatively high, particularly FCP, LCP, TBT, and TTI. The audit also identified prolonged JavaScript execution and long main-thread tasks. In one of the tests, JavaScript execution reached 6.1 seconds, with 20 long main-thread tasks and a main-thread busy time of 7.4 seconds. Third-party code also blocked the main thread for approximately 4.4 seconds. These findings indicate that JavaScript processing and main-thread activity were among the factors associated with Shopee's low Performance Score.

Tokopedia showed better overall performance based on its Performance Score, although the results also indicated several areas for improvement. Its page size reached more than 5 MB in the second and third tests, with a relatively high number of HTTP requests and substantial JavaScript resources. Overall, the results indicate that Tokopedia demonstrated better performance efficiency than Shopee under the applied testing conditions, particularly based on the Performance Score and faster FCP and LCP values. However, the comparison also shows that neither application was free from performance issues, as each exhibited different areas requiring optimization.

From a technical perspective, the performance differences between Shopee and Tokopedia can be associated with the efficiency of resource loading and browser-side processing. The lower Performance Score obtained by Shopee indicates that the page requires more optimization in terms of loading resources and executing web processes. Indicators such as First Contentful Paint (FCP), Largest Contentful Paint (LCP), Total Blocking Time (TBT), and Time to Interactive (TTI) provide an indication of how quickly content is displayed and how responsive the page becomes during loading. Higher blocking time and longer loading processes may be influenced by JavaScript execution, third-party resources, and main-thread activities. In comparison, Tokopedia achieved a higher Performance Score, indicating relatively better overall web performance under the testing conditions. However, this does not necessarily mean that Tokopedia performed better on every individual metric, as each indicator measures a different aspect of the page loading and responsiveness process.

3.4 Reliability Evaluation

Table 7. Comparison of Reliability Evaluation Results

Indicator	Shopee	Tokopedia
Average Response Time (ms)	1,522 ms	1,550 ms
Error Rate (%)	0	0
Success Rate (%)	100	100

Table 7 presents the reliability evaluation results obtained using Apache JMeter. Both applications were tested under the same baseline scenario of 100 virtual users, a 5-second ramp-up period, and a testing duration of 180 seconds. Shopee recorded an average response time of 1,522 ms, while Tokopedia recorded 1,550 ms. Both applications produced an error rate of 0% and a success rate of 100%, indicating that all requests generated during the test were completed successfully. The response time difference between the two applications was 28 ms, with Shopee recording the lower average value. However, the difference was relatively small compared with the overall response time of both applications. Therefore, this difference should be interpreted as an observed performance advantage under the tested scenario rather than as conclusive evidence that Shopee has substantially better reliability. The identical 100% success rate and 0% error rate provide stronger evidence that both applications were able to process the tested requests without failures during the evaluation period.

From the perspective of ISO/IEC 25010, the results indicate that both applications demonstrated reliable behavior under the applied testing conditions. The 100-user scenario provides a baseline comparison but has limited discriminatory power for assessing behavior under substantially higher concurrent workloads. Consequently, the reliability findings should be understood within the scope of the tested workload, while evaluation under higher concurrent loads remains an opportunity for future research.

3.5 Portability Evaluation

Table 8 presents the detailed portability testing of 20 application features across Google Chrome, Mozilla Firefox, Android, and iOS. The tested features cover authentication, navigation, product browsing, purchasing, payment, communication, account management, and system operation. For Shopee, 17 of 20 features were accepted on Google Chrome and Mozilla Firefox, while all 20 features were accepted on Android and iOS. Tokopedia recorded 17 accepted features on each of the four evaluated platforms. These results provide the basis for the portability percentages presented in Table 9.

In Table 8, the platform sequence C/F/A/iOS represents Google Chrome, Mozilla Firefox, Android, and iOS, respectively, while A indicates Accepted and R indicates Rejected.

Table 8. Detailed Portability Testing Results

No.	Functional Category	Feature	Shopee (C/F/A/iOS)	Tokopedia (C/F/A/iOS)
1	Authentication	Login	A/A/A/A	A/A/A/A
2	Navigation	Homepage	A/A/A/A	A/A/A/A
3	Product Browsing	Product Search	A/A/A/A	A/A/A/A
4	Product Browsing	Product Detail	A/A/A/A	A/A/A/A
5	Purchasing	Add to Cart	A/A/A/A	A/A/A/A
6	Purchasing	Checkout/Payment	A/A/A/A	A/A/A/A
7	Payment	Payment Method	A/A/A/A	A/A/A/A
8	Account	Notification	A/A/A/A	A/A/A/A
9	Communication	Chat with Seller	A/A/A/A	A/A/A/A
10	Product Browsing	Product Image	A/A/A/A	A/A/A/A
11	Product Browsing	Filter and Category	A/A/A/A	A/A/A/A

No.	Functional Category	Feature	Shopee (C/F/A/iOS)	Tokopedia (C/F/A/iOS)
12	Account	Wishlist/Favorite	A/A/A/A	A/A/A/A
13	Account	Transaction History	A/A/A/A	A/A/A/A
14	Purchasing	Shipment Tracking	A/A/A/A	A/A/A/A
15	Communication	Review and Rating	A/A/A/A	A/A/A/A
16	Purchasing	Promotion and Voucher	A/A/A/A	A/A/A/A
17	Communication	Live Shopping/Streaming	R/R/A/A	R/R/R/R
18	Product Browsing	Voice Search	R/R/A/A	R/R/R/R
19	Authentication	Logout	A/A/A/A	A/A/A/A
20	System Operation	Error/Crash-Free Operation	R/R/A/A	R/R/R/R

Table 9. Comparison of Portability Evaluation Results

Platform	Shopee (%)	Tokopedia (%)	Category
Google Chrome	85	85	Very Good
Mozilla Firefox	85	85	Very Good
Android	100	85	Very Good
iOS	100	85	Very Good
Overall	92,5	85	Very Good

Based on Table 9, the portability evaluation shows that Shopee achieved a score of 92.5%, while Tokopedia obtained 85%. Based on the classification criteria, both applications are categorized as Very Good, indicating that they demonstrated good portability across the tested platforms. Shopee obtained a higher score than Tokopedia, indicating better consistency in feature acceptance across the tested browsers and mobile platforms.

The detailed results show that Live Shopping/Streaming and Voice Search were not available on the Shopee web platforms but were available on Android and iOS. For Tokopedia, these two features and the error/crash-free operation criterion were rejected on all tested platforms. These findings indicate that several marketplace functions are implemented differently between web and mobile environments. Overall, both applications achieved the portability category specified by the assessment criteria, with Shopee obtaining a higher overall score than Tokopedia under the tested conditions.

3.6 Comparative Analysis of Software Quality

Table 10. Overall Comparison Discussion

ISO 25010 Characteristic	Shopee	Tokopedia	Better Application
Usability	79.74% (Good)	79.07% (Good)	Shopee
Performance Efficiency	26% (Performance Score)	63% (Performance Score)	Tokopedia
Reliability	1,522 ms (100% Success Rate)	1,550 ms (100% Success Rate)	Comparable
Portability	92,5% (Very Good)	85% (Very Good)	Shopee

Table 10 summarizes the comparative evaluation of Shopee and Tokopedia based on four ISO/IEC 25010 quality characteristics. The results indicate that neither application consistently outperformed the other across all evaluated aspects. Shopee achieved a slightly higher usability score and portability score, whereas Tokopedia obtained a higher Performance Score. In terms of reliability, both applications achieved a 100% success rate and 0% error rate, while the difference in average response time was relatively small.

These findings suggest that software quality should be assessed using multiple quality characteristics rather than relying on a single evaluation metric. An application may achieve superior performance in one characteristic while demonstrating relatively lower performance in another. Therefore, a comprehensive evaluation provides a more balanced representation of software quality. This observation is consistent with the multi-dimensional nature of ISO/IEC 25010 and supports the use of multiple evaluation criteria when comparing marketplace applications [14], [22].

Compared with previous studies, the findings of this study show differences in both usability and performance results. A previous study reported a usability score of 67.58% for Tokopedia using the System Usability Scale (SUS) [5], whereas the present study obtained a higher usability score of 79.07% using the USE Questionnaire. Another study reported a SUS score of 54 for Tokopedia, categorized as marginal high with a Grade D and an "OK" rating, while its UEQ results indicated weaknesses in several aspects, including efficiency, comfort, and clarity [6]. An evaluation of Shopee involving 127 respondents reported an overall positive GAP evaluation, with three attributes requiring improvement, nine attributes recommended for maintenance, and one attribute identified as a lower priority [3]. In terms of performance, Shopee was previously reported to achieve a GTMetrix Performance Score of 30% with a load time of 19.3 seconds, while Tokopedia achieved 77% with a load time of 11.9 seconds [23]. In contrast, the present study obtained a Performance Score of 26% for Shopee and 63% for Tokopedia based on GTMetrix measurements. These differences may be attributed to variations in evaluation instruments, testing conditions, network environments, measurement periods, and research contexts. Therefore, direct numerical comparisons should be interpreted with caution, while the present study provides a broader assessment by combining user perception with technical evaluation within the ISO/IEC 25010 framework.

From a practical perspective, the findings indicate that Shopee shows strengths in usability and cross-platform portability, while Tokopedia demonstrates better performance efficiency based on the GTMetrix Performance Score. The reliability results show comparable behavior between the two applications, as both achieved a 100% success rate and 0% error rate. Although Shopee recorded a slightly lower average response time than Tokopedia, the 28 ms difference observed under the 100-user baseline scenario does not provide sufficient evidence to establish a substantial reliability advantage.

The comparative results demonstrate that software quality cannot be adequately represented by a single quality characteristic. Applications exhibiting superior performance in one characteristic may perform differently in others due to differences in system architecture, interface design, and optimization strategies. Therefore, integrating multiple ISO/IEC 25010 characteristics provides a more comprehensive evaluation of software quality than relying on a single assessment criterion.

4. Conclusions and Future Works

4.1 Conclusions

This study compared the software quality of Shopee and Tokopedia based on four ISO/IEC 25010 characteristics: usability, performance efficiency, reliability, and portability. The results show that Shopee achieved a usability score of 79.74%, slightly higher than Tokopedia's 79.07%, with both classified as Good. For performance efficiency, Tokopedia achieved a Performance Score of 63%, while Shopee obtained 26%, which was classified as Bad. Reliability testing showed comparable results, with both applications achieving a 100% success rate and 0% error rate. The average response time was 1,522 ms for Shopee and 1,550 ms for Tokopedia; therefore, the 28 ms difference was not considered sufficient to establish a substantial reliability

advantage. For portability, Shopee achieved 92.5%, while Tokopedia achieved 85%, with both classified as Very Good.

Overall, Shopee demonstrated advantages in usability and portability, whereas Tokopedia demonstrated better performance efficiency. The reliability results were comparable under the applied testing conditions. These findings indicate that software quality cannot be represented by a single characteristic and should instead be evaluated using multiple dimensions within a comprehensive quality framework.

4.2 Future Works

This study was limited to four ISO/IEC 25010 quality characteristics: usability, performance efficiency, reliability, and portability. Future studies may extend the evaluation by incorporating additional characteristics, such as functional suitability, security, maintainability, and compatibility, to provide a more comprehensive assessment of software quality. Future research may also involve a larger and more diverse group of respondents to improve the representativeness of user perception data. Technical evaluations could be conducted using different testing scenarios, including higher concurrent workloads or longer testing durations, to provide a broader understanding of application performance under varying operational conditions. Furthermore, comparative studies involving additional marketplace applications and different evaluation frameworks could provide broader insight into software quality across Indonesian e-commerce platforms.

5. Declaration

Author Contributions

Rizky Ramadhan Dimas Prasetya: Conceptualization, methodology, data collection, data analysis, and writing original draft. Achmad Zakki Falani: supervision, methodology review, and writing review and editing. Eman Setiawan: supervision, validation, and writing review and editing. All authors have read and approved the final version of the manuscript.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to applicable privacy and confidentiality considerations.

Use of Artificial Intelligence (AI)

Artificial intelligence (AI) tools were used to assist with language editing, grammar checking, and manuscript formatting. AI tools were not used to generate, analyze, or interpret the research data and results. The authors remain fully responsible for the content, accuracy, analysis, and conclusions of this manuscript.

Ethical Clearance

Ethical clearance was not obtained for this study. The research involved voluntary participation through a questionnaire, and respondents were informed about the purpose of the study and the use of the collected data. No personally identifiable information was disclosed in the reporting of the results.

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