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Analysis of E-Commerce Applications Using the System Usability Scale (SUS) Approach

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Abstract
This study aims to measure the level of satisfaction and effectiveness of the application, as well as the obstacles encountered, using the System Usability Scale (SUS) approach. The research employs a quantitative method with a questionnaire based on the System Usability Scale (SUS) to assess application usability. The population consists of Generation Z, with a sample of 411 respondents selected using cluster disproportionate random sampling. Data were analyzed to calculate the SUS score (0–100) and interpreted using the adjective scale. This study compares the usability of three e-commerce applications: Shopee, Tokopedia, and Lazada. The results indicate that the usability scores of the three e-commerce applications are relatively close: Shopee (90.06), Tokopedia (91.98), and Lazada (88.42). Based on gender, females prefer Shopee, while males favor Tokopedia and Lazada. In terms of age, the 20–24 age group is more dominant than the 15–19 age group. Meanwhile, based on occupation, students tend to use Lazada, whereas private employees prefer Shopee and Tokopedia. Shopee and Tokopedia demonstrate optimal performance, while Lazada has development potential, particularly for private employees and users aged 15–19. Further research is recommended to deepen the analysis of Lazada and include other regions and age groups for broader results.
Keywords: System Usability Scale (SUS); E-commerce Usability; User Satisfaction; Generation Z;

1. INTRODUCING

Advances in information technology have changed the way society conducts buying and selling transactions. E-commerce is becoming increasingly popular, especially among young people[1]–[4], who are largely Generation Z. Growing up with the development of digital technology has a significant impact, influencing lifestyles. With the abundance of technology that makes life easier in various aspects, we tend to rely more on devices like laptops, tablets, mobile phones, computers, and others. This transformation has made transactions faster, more convenient, and often cheaper than traditional methods [3], [5], [6].

In Indonesia, several leading e-commerce platforms, such as Tokopedia, Shopee, and Lazada, have become the top choices for users. According to Q2 2022 data from the iPrice Group website, the three aforementioned e-commerce platforms have the highest number of monthly visitors. The reason for the large number of visitors lies in the positive user experience aspect and the user-friendly and familiar interface, which are important factors in increasing user satisfaction and loyalty toward the platform used. [7] Consequently, the research involved testing the usability of the e-commerce application interface by measuring user effectiveness, efficiency, and satisfaction.

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	Toko Online	Pengunjung Web Bulanan	Ranking AppStore	Ranking PlayStore	Twitter	Instagram	Facebook	Jumlah Karyawan
1	Tokopedia	158,346,667	#2	#5	1,000,000	5,263,104	6,517,950	7,976
2	Shopee	131,296,667	#1	#1	842,900	8,727,742	25,778,184	6,781
3	Lazada	26,640,000	#3	#2	475,900	3,156,231	32,137,440	1,506
4	Bukalapak	21,303,333	#7	#6	252,500	2,110,525	2,505,675	2,962
5	Blibli	19,736,667	#5	#3	613,700	2,258,064	8,689,266	2,952
6	Orami	16,176,667	#NA	#NA	5,685	20,085	350,042	251
7	Ralali	10,830,000	#24	#NA	3,736	50,778	90,396	204
8	Zalora	2,990,000	#4	#9	69,400	772,558	8,021,418	258
9	Klik Indomaret	2,846,667	#8	#8	NA	443,893	79,369	NA
10	JD ID	2,343,333	#9	#7	62,100	649,824	1,036,192	1,566

Figure 1. Monthly Web Visitor Data (Q2 2022)

As e-commerce grows, so does the trend toward mobile commerce, also known as m-commerce. M-commerce provides the convenience of shopping through mobile devices and allows users to access shopping services anytime, anywhere [8]. With the increasing use of online devices, e-commerce platforms are now expanding their reach and moving toward developing m-commerce applications optimized for mobile users and adapting to user needs regarding more convenient, easy, and appealing accessibility.

The growth of m-commerce in Indonesia has increased significantly, but there are still various challenges related to the usability and convenience of applications. Based on various user reviews and surveys, some m-commerce applications in Indonesia still face issues with non-intuitive user interfaces, complex navigation, slow loading times, and other technical problems that affect the user experience. This problem can reduce user satisfaction and ultimately cause users to switch to other applications that are more convenient to use [9]. This usability issue needs to be addressed, especially for Generation Z, who have high expectations for fast and efficient user experiences.

Research on the usability of m-commerce applications shows that it has a significant impact on user satisfaction and loyalty to the platform. According to [10], usability has five main components: learnability, efficiency, memorability, low error rate, and satisfaction, which are measured based on elements. These five components hold significant importance in the context of m-commerce, as mobile users anticipate a seamless and swift experience. The literature suggests that enhancing the usefulness of m-commerce applications can boost user satisfaction and loyalty. The purpose of this study is to evaluate the usefulness of major m-commerce applications in Indonesia (Tokopedia, Shopee, and Lazada).

2. METHODOLOGY

This research will be conducted using a quantitative method, namely by distributing questionnaires. The sample collection method used is disproportionate cluster random sampling. The selected research population is Generation Z, with a sample size of 400.

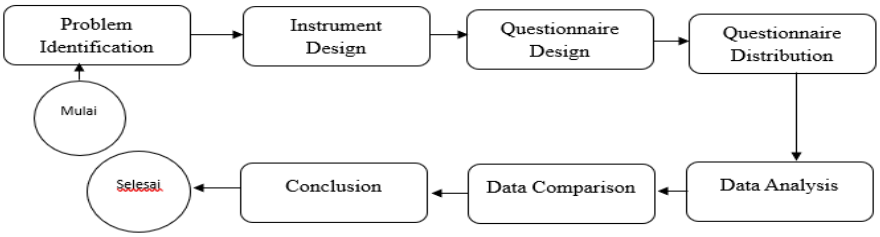

Figure 2. Research flowchart

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The research will commence with the identification of the problem under study. Once the material to be studied is known, the next step is to design the instruments that will be used to conduct the research, starting with the research method, data collection method, and data analysis method and comparing the results. This step will then be followed by designing the questionnaire that will be distributed. Once the questionnaire design is suitable for the research, the questionnaire will be distributed. The collected data will be analyzed using the predetermined data analysis method. The analyzed data will be presented in an easy-to-understand format, and data comparison will be performed between the applications. Based on the results of the data comparison, conclusions will be drawn from the research that has been conducted.

The questionnaire used for the research was designed by adapting the System Usability Scale (SUS) questionnaire. The SUS has 10 question items divided into 5 odd questions (questions 1, 3, 5, 7, and 9) and 5 even questions (questions 2, 4, 6, 8, and 10). The odd questions will ask about the usability of the application, while the even questions will ask about its ability to learn. The questions on the questionnaire are presented in the form of a Likert scale from 1 (strongly disagree) to 5 (strongly agree) [11]. Data entry instructions will be prepared so that users filling in the data are not confused. The questionnaire, which has been designed using SUS, will then be compiled into a Google form and distributed through social media.

Table 1. SUS Questionnaire List

NO	QUESTION
1	I think I'll be using this app a lot.
2	I found the system to be complex.
3	I think this application is easy to use.
4	I think I need technical support to be able to use this application.
5	I think the various application features within the app are well integrated with each other.
6	I think there's too much inconsistency in this application.
7	I can imagine that there will be many people who will learn to use this application quickly.
8	I think this application is very complicated to use.
9	I feel very confident when using this application.
10	I need to learn a lot of things first before I can start using this application.

Table 1 is the questionnaire that will be used and distributed for this study. All 10 questions above are the result of applying the SUS, which is a translation of the original 10 questions from a questionnaire developed by John Brooke in 1986. The translation of those 10 questions has been done and researched by [12]. We will transfer the data from the Google form distribution to a spreadsheet. Within the spreadsheet, the data will be calculated using the SUS score calculation. The weight of the answers to odd-numbered questions that are positive will be reduced by 1, starting from a scale of 1 to 5, so the score will change to 0 to 4. The weight of the answers to even-numbered negative questions, indicating disagreement with the question, is a good thing, so we should give a high score when there are disagreeing answers. The weight of the answers to even-numbered questions will be calculated by subtracting 5 from the weight of the even-numbered questions, so the score will change from 4 to 0, the opposite of the odd-numbered questions. The results of the calculations for odd and even questions will be summed and then multiplied by 2.5 to produce the overall usefulness value of the system [13][14]. Based on the SUS score calculation, it can be said that the minimum value is 0 and the maximum value is 100.

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This study will analyze the data and interpret the results of the SUS score calculation. There are various ways to interpret the results of the SUS calculation, such as percentiles, grades, adjectives, acceptability, and NPS, as shown in Figures 4 and 5. For this study, the measurement categories from the adjective scale will be used to interpret the results of the SUS calculation [15] [16]. By determining the measurement category of the adjective scale, data comparisons can be made between Shopee, Tokopedia, and Lazada.

3. RESULT AND DISCUSSIONS

In the context of Analysis of E-Commerce Applications Using the System Usability Scale (SUS) Approach, Table 2 illustrates the demographic profile and usage patterns of respondents, which serve as the basis for assessing the usability level of e-commerce applications. The respondent composition is dominated by users aged 20–24 with educational backgrounds of high school/Vocational School and undergraduate degrees, as well as a relatively balanced gender proportion. In terms of occupation, respondents consist of students and private sector employees in nearly equal numbers. The high frequency of daily use and usage duration of more than three years for most respondents indicates intensive and continuous interaction experience, so the SUS data generated can more accurately and reliably represent perceptions of the usefulness, ease, and convenience of e-commerce applications.

Table 2. Results of Respondent Characteristics

CATEGORY	CARACTERISTICS	NUMBER OF RESPONDENTS	PERCENTAGE
Gander	Male	231	56,2%
	Woman	180	43,8%
Age	20-24 year old	308	74,9%
	15-19 year old	103	25,1%
Education	High School/Vocational School/Equivalent	303	73,7%
	Bachelor's degree (S1)	108	26,3%
Work	Students	208	50,6%
	Private sector employe	203	49,4%
Frequency of use	Every day	278	67,6%
	Every week	130	31,6%
	Every month	2	0,5%
Duration of use	>3 years	298	72,5%
	2-3 years	112	27,3%
	1-2 years	1	0,2%

Based on the data analysis results from the questionnaire completed by 411 respondents, the majority of respondents are male, with a percentage of 56.2%, while females account for 43.8%. In terms of age, the 20-24 age group dominates with 74.9%, while the 15-19 age group contributes 25.1%. Looking at the highest level of education, most respondents are high school graduates or equivalent, with a percentage of 73.7%, while respondents with a bachelor's degree background account for 26.3%. All respondents (100%) are in line with the location that is the focus of this research. In terms of occupation, the majority of respondents are students, accounting for 50.6%, while respondents working as private employees number 49.4%. Regarding the frequency of e-

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commerce application usage, most respondents (67.6%) access the application daily, followed by 31.6% who access it weekly, and 0.5% who access it monthly.

The duration of e-commerce application usage shows that 72.5% of respondents have used the application for more than 3 years, 27.3% use it for 2-3 years, and only 0.2% have used it for 1-2 years. These results illustrate the characteristics of the respondents' e-commerce application usage.

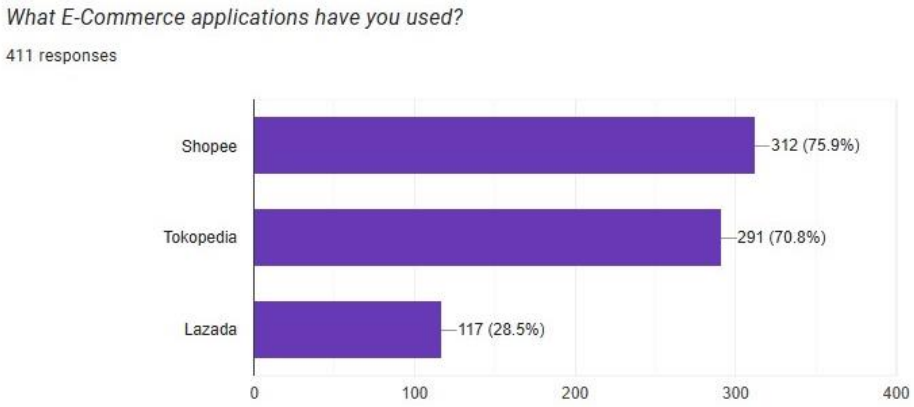

Figure 3. Respondent Characteristics Results

From a survey of 411 respondents, 75.9% had used Shopee, followed by 70.8% who used Tokopedia and 28.5% who used Lazada. The majority of respondents (80.5%) stated they used more than one e-commerce application, while only 10.5% used Shopee exclusively, and 9% used Lazada exclusively. A total of 28.7% of respondents used all three major applications (Shopee, Tokopedia, and Lazada) simultaneously, while the remaining 71.3% used only one or two applications. Among the combinations of two applications, 54.5% of respondents chose Shopee and Tokopedia, followed by 19.7% who chose Shopee and Lazada, and 17.5% who chose Tokopedia and Lazada. In conclusion, the majority of respondents utilize more than one application, with Shopee and Tokopedia being the primary combination of choice.

Table 3. Results of Respondent Characteristics

E-commerce Application	Average SUS Raw Score (before multiplying by 2.5)	Average SUS Final Score (after multiplying by 2.5)
Shopee	36,02	90,06
Tokopedia	36,79	91,98
Lazada	35,37	88,42

The table above shows that the raw SUS score for Shopee is 36.02, which means its final SUS score is 90.06. The raw SUS score for Tokopedia is 36.79, which means its final SUS score is 91.98. The raw SUS score for Lazada is 35.37, which means its final SUS score is 88.42. The obtained values will then be interpreted using an adjective scale.

Table 4. Results of Respondent Characteristics

E-commerce Application	SUS Final Score	SUS Score	Adjective Scale
Shopee	90,06	84,1-100	Best Imaginable
Tokopedia	91,98	84,1-100	Best Imaginable
Lazada	88,42	80,8-84,0	Excellent

The table above shows that the final SUS score for Shopee is 90.06, which falls within the range of 84.1 to 100. This means the score is at the best imaginable point, resulting

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in a very positive outcome. The final SUS score for Tokopedia is 91.98, which falls within the range of 84.1 to 100. This level of excellence means the score is at the best imaginable point, resulting in a very positive outcome. The final SUS score for Lazada is 88.42, which falls within the range of 80.8 to 84.0. This means the score indicates that the application is excellent and can still be further improved.

Figure 4. Comparison of Average SUS Scores Between Applications

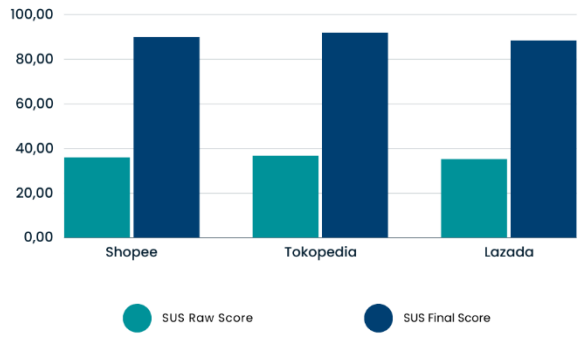

Figure 4. Comparison of Average SUS Scores Between Applications

Figure 4 above shows a comparison graph of average SUS scores across applications, displaying the raw SUS scores on the left and the final SUS scores on the right. The raw SUS score for Shopee is 36.02 and the final SUS score is 90.06. The raw SUS score for Tokopedia is 36.79, and the final SUS score is 91.98. The raw SUS score for Lazada is 35.37, and the final SUS score is 88.42. The graph above shows that there is a very slight difference between the scores of one application and another.

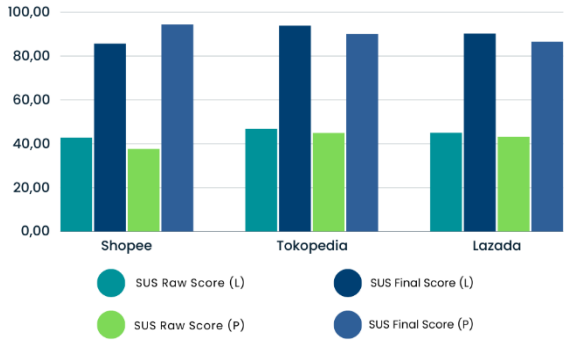

Figure 5. Comparison of SUS scores by gender

Figure 5 above shows a comparison graph of SUS scores by gender, displaying the raw SUS scores for men, the final SUS scores for men, the raw SUS scores for women, and the final SUS scores for women. The raw SUS score for men on Shopee is 42.86, the final SUS score for men on Shopee is 85.72, the raw SUS score for women on Shopee is 37.76, and the final SUS score for women on Shopee is 94.40. The raw SUS score for men on Tokopedia is 46.94, the final SUS score for men on Tokopedia is 93.87, the raw SUS score for women on Tokopedia is 45.05, and the final SUS score for women on Tokopedia is 90.09. The raw SUS score for men on Lazada is 45.13, the final SUS score for men on Lazada is 90.26, the raw SUS score for women on Lazada is 43.29, and the final SUS score for women on Lazada is 86.58. In addition to Tokopedia and Lazada, Shopee shows a preference difference, indicating that women prefer using Shopee more than men do.

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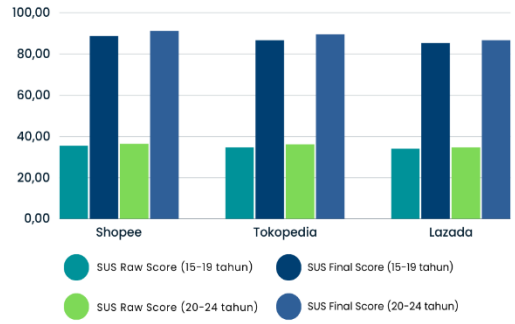

Figure 6. Comparison of SUS Scores by Age

Figure 6 above shows a comparison graph of SUS scores by age, displaying the raw SUS scores for the 15-19 age group, the final SUS scores for the 15-19 age group, the raw SUS scores for the 20-24 age group, and the final SUS scores for the 20-24 age group. The raw SUS score for the 15-19 age group on Shopee is 35.50, the final SUS score for the 15-19 age group on Shopee is 88.76, the raw SUS score for the 20-24 age group on Shopee is 36.49, and the final SUS score for the 20-24 age group on Shopee is 91.23. The raw SUS score for the 15-19 age group on Tokopedia is 34.71, the final SUS score for the 15-19 age group on Tokopedia is 86.77, the raw SUS score for the 20-24 age group on Tokopedia is 36.23, and the final SUS score for the 20-24 age group on Tokopedia is 89.55. The raw SUS score for the 15-19 age group on Lazada is The graph above shows that there is only a slight difference in value between one application and another.

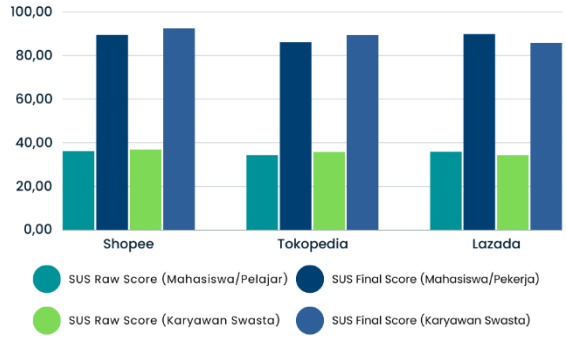

Figure 7. Comparison of SUS Scores by Occupation

Figure 7 above shows a comparison graph of SUS scores based on occupation, displaying the raw SUS scores of students, the final SUS scores of students, the raw SUS scores of private employees, and the final SUS scores of private employees. The raw SUS score for Shopee students is 36.22, the final SUS score for Shopee students is 89.55, the raw SUS score for Shopee private employees is 36.98, and the final SUS score for Shopee private employees is 92.46. The raw SUS score for Tokopedia students is 34.45, the final SUS score for Tokopedia students is 86.12, the raw SUS score for Tokopedia private employees is 35.80, and the final SUS score for Tokopedia private employees is 89.49. The raw SUS score for Lazada students is 35.96, the final SUS score for Lazada students is 89.89, the raw SUS score for Lazada private employees is 34.35, and the final SUS score for Lazada private employees is 85.88. Besides Shopee and Tokopedia, Lazada has a different value proposition, stating that students prefer using Lazada more than private employees.

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4. CONCLUSION

Based on the data obtained and analyzed, the three applications have very slight differences in value from each other. The Shopee score is 90.06, the Tokopedia score is 91.98, and the Lazada score is 88.42. A comparison between applications based on gender shows that women prefer to use Shopee, while men prefer to use Tokopedia and Lazada. A comparison between applications based on age shows that there is not much difference in value and users across the three applications, and the number of users in the 20-24 age range is slightly more significant than in the 15-19 age range. A comparison between applications based on occupation shows that students prefer to use Lazada, while private employees prefer to use Shopee and Tokopedia. Shopee and Tokopedia are at the peak of imaginable results, so they need to maintain that performance, while Lazada can be considered superior and still has room for improvement. These results were obtained with 312 Shopee users (75.9%), followed by 291 Tokopedia users (70.8%), and 117 Lazada users (28.5%). There is a very significant difference in the number of users between Lazada and Shopee and Tokopedia.

Based on the results obtained, it can be seen that there is still room for improvement for Lazada, and this improvement can be achieved by focusing development efforts on private employees and users aged 15 to 19. Even though Shopee and Tokopedia are at their peak, we need to maintain their performance by taking into account the student population aged 15 to 19. Further in-depth research can be conducted on Lazada with more data to gain a deeper understanding of the development direction that can be applied to the application. Further research can be done in other regions and across different age groups to gain an even broader context.

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