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Evaluating E-Commerce User Satisfaction Using an Integrated PIECES and EUCS Framework

Retno Waluyo[1], Jeffri Prayitno Bangkit Saputra[2]

[1,2] Information System Study Program, Faculty of Computer Science, Universitas Amikom Purwokerto, Central Java, Indonesia

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Corresponding Author:
Author Name*:
Retno Waluyo
Email*:
waluyo@amikompurwokerto.ac.id

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Abstract: E-commerce in Indonesia is growing rapidly because of the increase in internet users and digital commerce activities. This study evaluates user satisfaction with e-commerce applications using a partial integration of the PIECES Framework and selected EUCS dimensions, including Performance, Information and Data, Economics, Control and Security, Efficiency, Service, Format, and Timeliness. Rather than implementing the complete EUCS model, this study incorporates only the selected dimensions considered most relevant to evaluating user satisfaction with e-commerce applications. A quantitative approach was employed using questionnaires distributed to 200 e-commerce users in Banyumas Regency through purposive sampling. The data were analyzed using SPSS, including validity and reliability tests, classical assumption tests, multiple linear regression, the coefficient of determination, and hypothesis testing. The regression model explained 56.4% of the variance in User Satisfaction (Adjusted R^2 = 0.564), indicating moderate explanatory power. The results show that Information and Data, Economics, Efficiency, Service, and Timeliness significantly influence user satisfaction, whereas Performance, Control and Security, and Format do not have significant effects. These findings provide practical guidance for e-commerce providers to prioritize improvements in information quality, transaction efficiency, customer service responsiveness, and system usability usability that are limited to respondents in Banyumas Regency.

Keywords: End-User Computing Satisfaction, E-Commerce Applications, Multiple Linear Regression, PIECES Framework, User Satisfaction.

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1. INTRODUCTION

The e-commerce industry is growing in many countries, including Indonesia, thanks to advancements in the internet and information technology. Many people are relying on e-commerce platforms to meet their daily needs due to easy internet access and the increasing use of mobile devices [1]. Increasingly fierce competition means that e-commerce platforms such as Shopee, Tokopedia, Lazada and Blibli are constantly striving to improve the quality of their systems and services to maintain customer satisfaction [2] [3]. E-commerce companies need to understand the factors that influence customer experience and satisfaction so that they can retain customer loyalty [4] [5].

Previous studies have shown that user satisfaction with e-commerce applications is influenced by system quality, information quality, service quality, and economic value. Studies on the Grab, Bibit, and Vidio applications consistently reported that Information and Data as well as Economics significantly affect user satisfaction [6] [5] [7]. According to research conducted on Shopee and Tokopedia, information quality, system efficiency, and service quality are the primary factors influencing customer experience during online transactions [8] [9] [10] [11]. These findings highlight the importance of evaluating user satisfaction to support continuous service improvement [1] [12] [13].

The PIECES Framework is widely used to evaluate system quality based on Performance, Information and Data, Economics, Control and Security, Efficiency, and Service [14] [15]. Meanwhile, EUCS evaluates user satisfaction through Content, Accuracy, Format, Ease of Use, and Timeliness [16] [10] [17]. The PIECES Framework and EUCS represent complementary perspectives for evaluating information systems because PIECES emphasizes operational quality, where as EUCS focuses on users' perceptions [18] [19] [20]. Their partial integration enables both technical quality and user satisfaction to be evaluated simultaneously [1] [12].

According to research published by [3], information quality, system efficiency, and service quality are the primary factors influencing user satisfaction on digital platforms. Another study published by [18] indicates that using more than one evaluation model can provide a more thorough analysis of user satisfaction than relying on a single method. According to [21] system quality, security, and information accuracy influence the user experience

of e-commerce applications. Most previous studies have still used the PIECES Framework or EUCS separately and have focused more on educational systems, government services, or specific applications [5] [13] [22]. Research utilizing the integration of the PIECES Framework and selected EUCS dimensions remains relatively limited, particularly in identifying both technical and non-technical influencing variables simultaneously regarding user satisfaction [23].

Although previous studies have evaluated user satisfaction using either the PIECES Framework or the EUCS model independently, limited empirical evidence explains how operational system quality and end-user computing satisfaction jointly influence user satisfaction with e-commerce applications. Moreover, existing studies generally focus on specific applications rather than users' primary e-commerce applications in Banyumas Regency. These limitations motivate this study to employ a partial integration of the PIECES Framework and selected EUCS dimensions.

The novelty of this study lies in the partial integration of the PIECES Framework with selected EUCS dimensions to explain user satisfaction with e-commerce applications. Unlike previous studies that employed these frameworks independently, this study combines operational quality and end-user evaluation within a single analytical model. In addition, empirical evidence is provided from respondents in Banyumas Regency who evaluated their primary e-commerce application. Rather than implementing the complete EUCS model, only the dimensions considered most relevant to e-commerce applications were included. Respondents evaluated only one e-commerce application that they used most frequently (Shopee, Tokopedia, Lazada, or Blibli). This approach minimized inconsistencies caused by differences among platforms and ensured that each response reflected individual experience with a primary application. Accordingly, the findings represent general user perceptions across major e-commerce applications in Banyumas Regency rather than direct comparisons among platforms.

This study aims to analyze user satisfaction with e-commerce applications using a partial integration of the PIECES Framework and selected EUCS dimensions. The analysis is conducted to identify the components that influence user satisfaction based on the dimensions of Performance, Information and Data, Economics, Control and Security, Efficiency, Service, Format, and Timeliness. The research results are expected to assist in

the development of high-quality e-commerce application services and systems that can continuously improve user experience and satisfaction.

This study employs a partial integration of the PIECES Framework and selected EUCS dimensions. The selected EUCS dimensions complement the operational evaluation provided by the PIECES Framework and enable technical system quality and user satisfaction to be analyzed simultaneously [24]. Accordingly, this study operationalizes the PIECES Framework using six dimensions, namely Performance, Information and Data, Economics, Control and Security, Efficiency, and Service, while EUCS is represented by the selected dimensions of Content, Accuracy, Format, Ease of Use, and Timeliness [25]. This operationalization ensures that both technical system quality and users' post-use evaluations are simultaneously represented within the proposed analytical model.

This study contributes to the information systems literature by demonstrating the applicability of a partial integration of the PIECES Framework and selected EUCS dimensions for evaluating user satisfaction with e-commerce applications. Practically, the findings provide guidance for e-commerce providers to prioritize improvements in information quality, transaction efficiency, service responsiveness, and other significant factors identified in this study. Because the respondents were limited to Banyumas Regency, the findings should be interpreted within this context and can be a reference for future studies employing integrated evaluation models.

2. METHODS

This study employs a quantitative approach to analyze the factors influencing user satisfaction with e-commerce applications by using a partial integration of the PIECES Framework and selected EUCS dimensions. The overall research procedure consists of seven sequential stages, as illustrated in Figure 1.

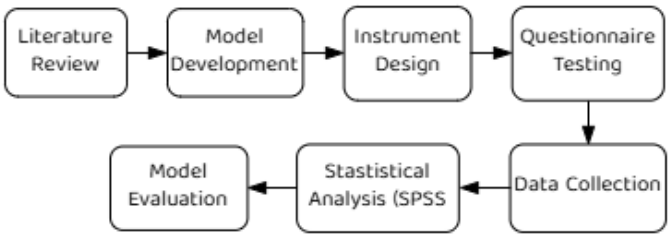

Figure 1. Research Flow

2.1 Literature Review

The research began with a systematic review of prior studies on the PIECES Framework, EUCS, and e-commerce user satisfaction. This stage aimed to identify theoretical foundations, map existing evaluation frameworks, and establish the research gap. It was found that most previous studies applied the PIECES Framework or EUCS independently and focused on educational systems, government services, or specific applications, while research integrating both frameworks in the context of e-commerce applications remains relatively limited [1] [22] [23]. In parallel, a total of 1,138 user reviews were collected from major e-commerce platforms (Shopee, Tokopedia, Lazada, and Blibli) to identify recurring user complaints, including unstable systems, slow transaction processes, login problems, and unresponsive customer service. These review data were analyzed descriptively during the preliminary stage to identify common user complaints and to support the formulation of questionnaire indicators. The review data was not included in the multiple linear regression analysis, which was conducted exclusively using questionnaire responses [21].

2.2 Model Development

Based on the literature review, a conceptual research model was developed to describe the relationships between the independent variables derived from the PIECES Framework and selected EUCS dimensions, and user satisfaction as the dependent variable. This study employs a partial integration of the PIECES Framework and selected EUCS dimensions rather than the complete EUCS model, as the selected dimensions were considered most relevant to evaluating user satisfaction with e-commerce applications [24] [25].

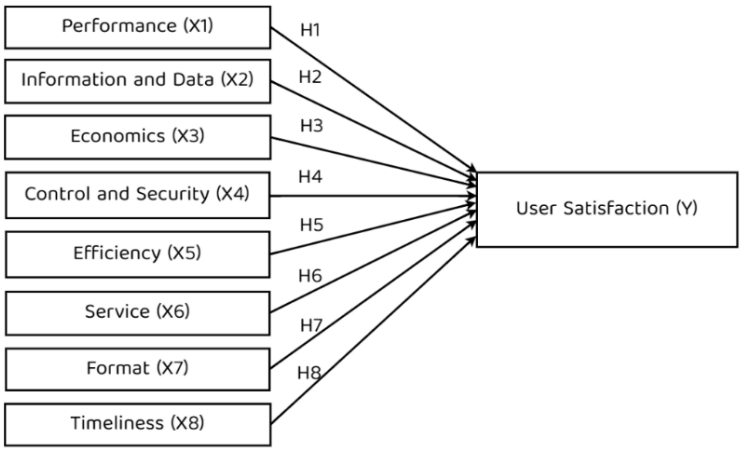

Figure 2. Research Model

In the figgure 2, The PIECES Framework was operationalized using six dimensions: Performance (X1), Information and Data (X2), Economics (X3), Control and Security (X4), Efficiency (X5), and Service (X6). Selected EUCS dimensions were represented by Format (X7) and Timeliness (X8), with User Satisfaction (Y) as the dependent variable. This operationalization ensures that both technical system quality and users' post-use evaluations are simultaneously represented within the proposed analytical model [18]. Based on this model, eight research hypotheses (H1-H8) were formulated to assess the impact of each independent variable on user satisfaction with e-commerce applications.

2.3 Instrument Design

A structured questionnaire was developed as the primary data collection instrument. The questionnaire items were adapted from previously validated PIECES Framework and EUCS instruments [16] [17] [21], with minor wording adjustments to suit the context of e-commerce applications while maintaining the original construct definitions. A five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was used to measure respondents' perceptions [22]. The complete questionnaire items, construct definitions, indicator codes (PE1-PE7, ID1-ID4, EC1-EC2, CS1-CS2, EF1-EF3, SE1-SE2, F1-F3, T1-T3, and Y1-Y2), and literature sources are provided in Appendix A to facilitate transparency and reproducibility. Before completing the questionnaire, respondents received an informed consent statement explaining the research objectives, voluntary participation, anonymity, and confidentiality of the collected data.

2.4 Questionnaire Testing

Prior to main data collection, validity and reliability tests were conducted to ensure measurement quality. Validity testing was performed using Pearson Correlation with a two-tailed significance test at a significance level of 0.05, using the formula df = n - 2. With df = 198, the critical r-table value was 0.116. All questionnaire items yielded Pearson Correlation values above 0.116, confirming that all items are valid [26] [27]. Reliability testing was conducted using Cronbach's Alpha (CA) with a threshold of CA > 0.60 [28]. The results show that all variables produced Cronbach's Alpha values above 0.60, indicating acceptable internal consistency. Although several variables yielded Alpha values below 0.70, they remain acceptable for exploratory research. All items were therefore retained for the main data collection stage.

2.5 Data Collection

The population consisted of e-commerce application users residing in Banyumas Regency. Respondents were recruited using a purposive sampling technique [26], with the following inclusion criteria: (1) having used at least one major e-commerce application (Shopee, Tokopedia, Lazada, or Blibli) within the previous six months; (2) being at least 17 years of age; and (3) having completed at least one online transaction using their most frequently used application. The minimum sample size was determined using the Lemeshow formula at a 95% confidence level and a 10% margin of error, resulting in a minimum requirement of 96 respondents [3]. To improve the reliability of the analysis, a total of 200 valid responses were collected through online questionnaire distribution. Each respondent evaluated only the e-commerce application they used most frequently. This approach minimized inconsistencies caused by differences among platforms and ensured that each response reflected individual experience with a specific primary application.

2.6 Statistical Analysis (SPSS)

The data collected were analyzed using SPSS software [6]. The analysis consisted of two phases. First, classical assumption tests were conducted to verify the prerequisites for multiple linear regression: (1) Normality Test using the Kolmogorov-Smirnov (K-S) test, where a significance value > 0.10 indicates normally distributed residuals (result: Asymp. Sig. = 0.200) [29] [30]; (2) Multicollinearity Test using Variance Inflation Factor (VIF), where VIF < 10 and Tolerance > 0.10 confirm the absence of multicollinearity (all variables passed this criterion) [31]; and (3) Heteroscedasticity Test, where a significance value > 0.10 for each independent variable indicates constant residual variance (all variables passed) [31]. Second, multiple linear regression analysis was conducted to determine the mathematical relationship, direction, and magnitude of the influence of each independent variable on user satisfaction (Y). The regression model produced unstandardized coefficients (B), standardized coefficients (Beta), t-statistics, p-values, and Adjusted R^2, which were interpreted to evaluate the contribution of each variable [32].

2.7 Model Evaluation

The final stage involved hypothesis testing and interpretation of the empirical findings. The t-test (partial test) was applied at a significance level of alpha = 0.05, where a hypothesis was accepted if p < 0.05 [33]. All hypothesis testing adopted a significance

level of 5% (alpha = 0.05). The F-test (simultaneous test) was also conducted to assess whether all independent variables jointly and significantly influence user satisfaction; the result showed F = 33.319 with p < 0.001, confirming statistical significance of the integrated model [31]. The coefficient of determination (Adjusted R-squared = 0.564) was interpreted to indicate that the model explains 56.4% of the variance in user satisfaction, reflecting moderate explanatory power. Based on hypothesis testing, Information and Data (X2), Economics (X3), Efficiency (X5), Service (X6), and Timeliness (X8) significantly influence user satisfaction (H2, H3, H5, H6, H8 accepted), while Performance (X1), Control and Security (X4), and Format (X7) do not significantly influence user satisfaction (H1, H4, H7 rejected). The findings were subsequently discussed in relation to prior literature and translated into practical recommendations for e-commerce providers and theoretical implications for the information systems field.

3. RESULTS AND DISCUSSION

3.1 Respondent Demographics

Based on the results of the questionnaire distributed to 200 respondents, most respondents were female, totaling 148 respondents (74%), while males numbered 52 respondents (26%). Most respondents were in the 18–25 age range [34].

Table 1. Gender and Age of Respondents

Gender	Age	Number of Respondents	Percent
Male	Under 18	2	1%
	18-25 years	39	19.5%
	26-35 years	7	3.5%
	Over 35 years	4	2%
Total		52	26%
Female	Under 18	5	2.5%
	18-25 years	114	57%
	26-35 years	16	8%
	Over 35 years	13	6.5%
Total		**148**	**74%**

Regarding the use of e-commerce apps, most respondents 132 people (66%) rarely use them; 39 people (19.5%) use them monthly, 23 people (11.5%) weekly, and only 6 people (3%) use them daily. The main purposes for using the apps were to search for product information 90 people (45%), to purchase products 63 people (31.5%), and to view discounts and offers for products from 63 people (31.5%).

3.2 Descriptive Statistics

Descriptive statistics were calculated to provide an overview of respondents' perceptions for each research variable. The analysis included the minimum score, maximum score, mean, and standard deviation for each variable. Overall, the mean scores indicate that respondents generally perceived the quality of e-commerce applications positively across most PIECES and EUCS dimensions. The descriptive statistics also show relatively low standard deviation values, indicating that respondents' perceptions were reasonably consistent. The complete descriptive statistics are presented in Table 2.

Table 2. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
X1	200	1	5	3.70	0.660
X2	200	1	5	3.94	0.694
X3	200	1	5	3.86	0.773
X4	200	1	5	3.86	0.739
X5	200	1	5	3.86	0.702
X6	200	1	5	3.85	0.689
X7	200	1	5	3.53	1.027
X8	200	1	5	3.91	0.702
Y	200	1	5	3.90	0.752

Descriptive statistical analysis was conducted to identify the distribution characteristics of each research variable. Table 2 presents the mean and standard deviation values of the variables used in this study, including the PIECES Framework dimensions and EUCS-related variables. The results show that X2 obtained the highest mean value (M = 3.94, SD = 0.694), followed by X8 with a mean value of (M = 3.91, SD = 0.702). This indicates that users generally perceived the information quality and response time of e-commerce

applications positively. Meanwhile, X7 obtained the lowest mean value (M = 3.53, SD = 1.027), suggesting that the interface presentation and information arrangement still require improvement to enhance user satisfaction. The overall Y variable obtained a mean value of 3.90 (SD = 0.752), indicating that respondents generally had a positive perception toward the e-commerce applications they used.

3.3 Validity and Reliability Testing

3.3.1 Validity Testing

Validity testing was conducted with 200 respondents. To obtain the r-table value, a two tailed significance test for the correlation coefficient was performed at a significance level of 0.5 using the formula df = n-2, where df represents the degrees of freedom used to determine the critical r-table value and n is the number of respondents [10]. Thus, df = 200–2, which is 198, resulting in a table r-value of 0.116. The SPSS calculation results, as seen in the Pearson Correlation row, are as follows [8].

Table 3. Validity Test Results

Variable	Code	Pearson Correlation	Description
X1	PE1	0.760	Valid
	PE2	0.716	Valid
	PE3	0.761	Valid
	PE4	0.660	Valid
	PE5	0.763	Valid
	PE6	0.775	Valid
	PE7	0.712	Valid
X2	ID1	0.793	Valid
	ID2	0.869	Valid
	ID3	0.800	Valid
	ID4	0.811	Valid
X3	EC1	0.868	Valid
	EC2	0.889	Valid
X4	CS1	0.888	Valid
	CS2	0.906	Valid
X5	EF1	0.763	Valid

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Variable	Code	Pearson Correlation	Description
	EF2	0.827	Valid
	EF3	0.736	Valid
X6	SE1	0.860	Valid
	SE2	0.889	Valid
X7	F1	0.899	Valid
	F2	0.933	Valid
	F3	0.909	Valid
X8	T1	0.833	Valid
	T2	0.879	Valid
	T3	0.864	Valid
Y	Y1	0.873	Valid
	Y2	0.847	Valid

The results of the test indicate that the validity test for each variable is valid. This conclusion is based on the calculated r-value being greater than the table r-value or the Sig. (2-tailed) value [26].

3.3.2 Reliability Testing

The test used a single-measure technique, namely Cronbach's Alpha (CA); a variable can be considered reliable if the CA value is > 0.60 [28]. Table 4 presents the reliability calculation results.

Table 4. Reliability Test Results

Variable	Number of Questions	CA Value	Description
X1	7	0.850	Reliable
X2	4	0.833	Reliable
X3	2	0.717	Reliable
X4	2	0.756	Reliable
X5	3	0.660	Reliable
X6	2	0.690	Reliable
X7	3	0.900	Reliable
X8	3	0.822	Reliable
Y	2	0.647	Reliable

The test results show that all items have a calculated r-value greater than the table r value, so they are deemed valid [27]. Based on the reliability test results, all variables have Cronbach's Alpha values above 0.60, indicating acceptable internal consistency according to the reliability threshold adopted in this study. Although several variables have Alpha values below 0.70, they remain acceptable for exploration research.

3.4 Classical Assumption Test

3.4.1 Normality Test

The normality test used the Kolmogorov-Smirnov (K-S) test [29]. In this case, the residual values are said to be normally distributed if the significance level is > 0.1 [30]. Table 5 shows the results of the Kolmogorov-Smirnov (K-S) normality test:

Table 5. One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		200
Normal Parameters[a,b]	Mean	0.0978607
	Std. Deviation	1.02265173
Most Extreme Differences	Absolute	0.058
	Positive	0.055
	Negative	-0.058
Test Statistic		0.058
Asymp. Sig. (2-tailed)		0.200[c]

Based on Table 5, the significance value (Asymp.Sig. (2-tailed)) is 0.200, which is greater than 0.1 [30]. Therefore, it is concluded that the residual values in this study are normally distributed.

3.4.2 Multicollinearity Test

In this study, the presence or absence of multicollinearity was determined by examining the Variance Inflation Factor (VIF), if the VIF value is < 10 and the Tolerance is > 0.1, then multicollinearity is deemed not to exist [31]. Table 6 shows the results of the multicollinearity test. Tolerance values for the X1-X8 are all greater than 0.1, and the VIF are all less than 10. What multicollinearity means in this regression model is normal.

Table 6. Results of the Multicollinearity Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.617	0.458		1.348	0.179		
	X1	0.025	0.026	0.077	0.973	0.332	0.336	2.975
	X2	-0.,082	0.041	-0.152	-2.007	0.046	0.370	2.705
	X3	0.178	0.065	0.183	2.723	0.007	0.470	2.126
	X4	0.103	0.074	0.101	1.398	0.164	0.405	2.471
	X5	0.176	0.060	0.247	2.931	0.004	0.299	3.347
	X6	0.201	0.089	0.184	2.248	0.026	0.316	3.162
	X7	-0.019	0.030	-0.039	-0.632	0.528	0.560	1.784
	X8	0.194	0.053	0.272	3.679	0.000	0.387	2.585

3.4.3 Heteroscedasticity Test

If the significance value of an independent variable is greater than 0.1, it is concluded that there is no heteroscedasticity issue in the regression model [31]. Table 7 shows the results of the heteroscedasticity test.

Table 7. Heteroscedasticity Test Results

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.935	0.327		2.859	0.005
	X1	0.007	0.017	0.046	0.372	0.710
	X2	-0.005	0.028	-0.19	-0.167	0.868
	X3	-0.053	0.041	-0.115	-1.296	0.196
	X4	0.011	0.050	0.026	0.228	0.820
	X5	0.063	0.041	0.203	1.546	0.124
	X6	-0.010	0.061	-0.021	-0.163	0.870
	X7	-0.017	0.030	-0.082	-0.862	0.390
	X8	0.033	0.035	0.105	-0.933	0.352

Based on Table 7, the values for the X1-X8 are all greater than 0.1. Therefore, it can be concluded that there is no heteroscedasticity issue, meaning the residual variance in this regression model is constant across the entire range of independent variables.

3.5 Multiple Linear Regression Analysis

Multiple linear regression analysis is used to determine the mathematical relationship, direction, and magnitude of the influence between two or more independent variables and one dependent variable. The regression equation is formulated using the values found in Unstandardized Coefficients (B).

Table 8. Multiple Linear Regression Analysis Results

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.681	0.466		1.463	0.145
	X1	0.029	0.026	0.089	1.105	0.271
	X2	-0.074	0.042	-0.137	-1.785	0.076
	X3	0.192	0.066	0.197	2.895	0.004
	X4	0.130	0.075	0.128	1.735	0.084
	X5	0.073	0.049	0.110	1.482	0.140
	X6	0.231	0.090	0.212	2.558	0.011
	X7	0.002	0.029	0.004	0.060	0.952
	X8	0.206	0.054	0.289	3.851	0.000

Dependent Variable: Y

Based on the regression equation, the constant is 0.681, which is the baseline value of Y when all independent variables are zero. Variables X1, X3, X4, X5, X6, X7, and X8 have positive coefficients, indicating a unidirectional relationship. For example, a 1-unit increase in X6 raises user satisfaction by 0.231 units, assuming other variables are constant. Conversely, X2 have a negative coefficient (-0.074), meaning a 1-unit increase in X2 decreases satisfaction by 0.074 units, although this effect is not statistically significant.

3.6 Hypothesis Testing

3.6.1 T-Test (Partial Test)

In the partial test using a significance level of 0.1 or 10%, if the calculated t-value is greater than the critical t-value at a significance level of less than 0.1, then H0 is rejected and H1 is accepted [9]. Conversely, if the calculated t-value is less than the critical t-value at a significance level of greater than 0.1, then H0 is accepted and H1 is rejected, using the formula df = n – k – 1, where df is the t-table value being sought, n is the number of respondents, and k is the number of independent variables; thus, df = 200 – 8 – 1, which is 191. The resulting t-table value from the two-tailed test is 1.65287. The following are the results of the T-test:

Table 9. Results of the T-Test

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.617	0.458		1.348	0.179
	X1	0.025	0.026	0.077	0.973	0.332
	X2	0.082	0.041	0.152	2.007	0.046
	X3	0.178	0.065	0.183	2.723	0.007
	X4	0.103	0.074	0.101	1.398	0.164
	X5	0.176	0.060	0.247	2.931	0.004
	X6	0.201	0.089	0.184	2.248	0.026
	X7	-0.019	0.030	-0.039	-0.632	0.528
	X8	0.194	0.053	0,272	3.679	0.000

Dependent Variable: Y

Based on the results of the T-test, the X1 obtained a calculated t-value of 0.973 with a significance value of 0.332, indicating that it does not have a significant effect on Y because the calculated t-value is smaller than the critical t-value (1.65287) and the significance is greater than 0.1 [5]. The X2 yielded a calculated t-value of 2.007 with a significance level of 0.046, indicating a significant effect on Y because the calculated t-value is greater than the critical t-value and the significance level is less than 0.1 [9]. The X3 also shows a significant effect on Y with a calculated t-value of 2.732 and a significance level of 0.007 [1].

The X4 yielded a calculated t-value of 1.398 with a significance level of 0.164, thus showing no significant effect on Y [35]. The X5 demonstrated a significant effect on Y with a calculated t-value of 2.931 and a significance level of 0.004 [36]. The X6 also has a significant effect on Y with a t-value of 2.248 and a significance level of 0.026 [11]. Meanwhile, the X7 yielded a t-value of -0.632 with a significance level of 0.528, indicating no significant effect on Y [37]. The X8 showed a significant effect on Y with a t-value of 3.679 and a significance level of 0.000 [26]. These results indicate that the X2, X3, X5, X6, and X8 variables have a significant effect on Y with e-commerce applications, whereas X1, X4, and X7 do not have a significant effect on Y.

3.6.2 F-Test (Simultaneous Test)

The F-test is used to determine whether all independent variables in the regression model simultaneously influence the dependent variable. The decision criteria are based on the significance value, where a significance value below 0.05 indicates that the regression model is statistically significant [31], as shown in Table 10.

Table 10. Results of the F-Test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	262.151	8	32.769	33.319	.000[b]
	Residual	187.849	191	0.984		
	Total	450.000	199			

a. Dependent Variable: Y

b. Predictors: (Constant), X8, X7, X3, X4, X2, X5, X1, X6

Based on Table 10, the F-test results show an F-value of 33.319 with a significance value of 0.000. Since the significance value is lower than 0.05, H0 is rejected and H1 is accepted. This indicates that X1, X2, X3, X4, X5, X6, X7, and X8 simultaneously have a significant effect on Y with e-commerce applications. Therefore, the regression model can be used to analyze the factors affecting user satisfaction.

3.6.3 Koefisien Determinasi (R^2)

To determine the coefficient of determination, we examine the Adjusted R-Square, which ranges from 0 to 1 [6]. The coefficient of determination indicates the contribution of the

independent variables to the dependent variable, expressed as a percentage (%). Table 11 presents the results of the coefficient of determination test.

Table 11. Coefficient of Determination Results (R^2)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.763[a]	0.582	0.564	0.993

a. Predictors: (Constant), X8, X7, X3, X4, X2, X1, X6, X5

Based on Table 11, the coefficient of determination analysis shows that the adjusted R^2 value of 0.564 indicates that the proposed model explains 56.4% of the variance in user satisfaction with e-commerce applications, while the remaining 43.6% be explained by factors outside the proposed model. This result indicates a moderate level of explanatory power, indicating that the partial integration of the PIECES Framework and selected EUCS dimensions provides a meaningful explanation of user satisfaction without accounting for all possible influencing factors.

3.6.4 Hypothesis Test

Based on the results of the hypothesis testing, the variables X2, X3, X5, X6, and X8 proved to have a significant effect on Y with e-commerce applications. The hypothesis testing results presented in Table 12 constitute the final basis for interpreting the empirical findings reported throughout the Abstract, Discussion, and Conclusion. Accordingly, all significant and non-significant relationships discussed in this study are consistently derived from the regression coefficients shown in Table 12. Overall, the regression results indicate that information quality, operational efficiency, economic value, service quality, and timeliness contribute more substantially to user satisfaction than technical system characteristics or interface presentation.

Tabel 12. Hypothesis Testing Results

Hypothesis	Standarized Coefficients	t	Influence Hypothesis	Conclusion
H1 (X1->Y)	0.046	0.372	Not Significant	Rejected
H2 (X2->Y)	-0.019	-0.167	Significant	Accepted
H3 (X3->Y)	-0.115	-1.296	Significant	Accepted
H4 (X4->Y)	0.026	0.228	Not Significant	Rejected

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Hypothesis	Standarized Coefficients	t	Influence Hypothesis	Conclusion
H5 (X5->Y)	0.203	1.546	Significant	Accepted
H6 (X6->Y)	-0.021	-0.163	Significant	Accepted
H7 (X7->Y)	-0.082	-0.862	Not Significant	Rejected
H8 (X8->Y)	-0.105	-0.933	Significant	Accepted

These results indicate that information and data, economics, efficiency, service, and timeliness are the primary factors influencing user satisfaction when using e-commerce applications [16]. Users tend to be satisfied when the application provides accurate, relevant, and easy-to-understand information, as well as fast and responsive service [33]. This finding indicates that users rely heavily on accurate, complete, and relevant information when making purchasing decisions. High-quality information reduces uncertainty and enhances confidence during online transactions. The economic aspect indicates that promotions, cost efficiency, and the benefits users receive are important considerations in enhancing user satisfactioan with e-commerce apps [38]. Economic value, including promotions, cashback programs, and transaction efficiency, increases users' perceived benefits and therefore strengthens satisfaction. Efficiency factors also influence user comfort in operating the app, particularly regarding ease of navigation, system speed, and the effectiveness of transaction processes [3] [7]. Efficient transaction processes minimize users' effort and time, resulting in a more convenient shopping experience. Responsive customer support and effective complaint handling strengthen users' confidence in e-commerce applications and contribute positively to satisfaction. The Timeliness variable also has a significant influence because users require information and services that can be accessed quickly and in real time [39]. Timely order updates, payment confirmations, and delivery notifications reduce uncertainty throughout the purchasing process. Overall, the regression analysis demonstrates that variables associated with information quality, operational efficiency, service quality, economic value, and timeliness contribute more substantially to user satisfaction than variables related to technical system performance or interface presentation.

The variables Performance, Control and Security, and Format do not significantly influence user satisfaction with e-commerce applications. These results indicate that users perceive system performance and application security to be at a sufficiently good

level, so they are no longer primary factors in determining [9]. The insignificant effect of Performance suggests that most respondents perceived the technical performance of major e-commerce applications as relatively similar. A similar situation applies to the format variable, where the application's interface design has not yet had a significant impact on user satisfaction levels [3]. Interface appearance alone no longer differentiates user satisfaction because contemporary e-commerce applications generally provide comparable visual designs. Users prioritize service quality, information access speed, and system efficiency over the application's visual aspects [22]. Security has become a basic expectation because respondents predominantly used well-established e-commerce applications implementing standardized security mechanisms. These findings align with previous studies indicating that information quality, system efficiency, and service quality significantly influence user satisfaction with information systems and digital applications. Research by [40] found that the variables information and data, efficiency, and service significantly influence user satisfaction with the SMKN 1 and SMKN 6 in Pekan baru City [22]. This finding indicates that users rely heavily on accurate, complete, and relevant information when making purchasing decisions. High-quality information reduces uncertainty and enhances confidence during online transactions. Research by [7] also states that the variables Efficiency and Service have a significant effect on user satisfaction with the Vidio application. Meanwhile, the variables Performance, Control and Security, and Format were found to have no significant effect in several previous studies because users already felt sufficiently comfortable and confident in the systems they used [33].

Approximately 66% of respondents reported relatively infrequent use of e-commerce applications. Consequently, their evaluations reflect general shopping experiences rather than detailed assessments of technical system characteristics. These findings should be interpreted within the context of respondents residing in Banyumas Regency and should not be generalized to all e-commerce users in Indonesia. From a managerial perspective, e-commerce providers should prioritize improving information quality, transaction efficiency, customer service responsiveness, and timely notifications because these factors demonstrated significant empirical effects. From a theoretical perspective, this study demonstrates that partially integrating the PIECES Framework with selected EUCS dimensions provides a broader explanation of user satisfaction than employing either framework independently.

4. CONCLUSION

The research results indicate that the following factors significantly influence user satisfaction with e-commerce applications ($p < 0.05$): Information and Data, Economics, Efficiency, Service, and Timeliness. Accordingly, hypotheses H2, H3, H5, H6, and H8 are accepted. Meanwhile, Performance, Control and Security, and Format do not significantly influence user satisfaction ($p > 0.05$), resulting in the rejection of hypotheses H1, H4, and H7. The F-test also confirms that the integrated model is statistically significant ($F = 33.319$, $p = 0.000$) in explaining user satisfaction with e-commerce applications. Additionally, the analysis yielded an Adjusted R^2 of 0.564, indicating that the integrated variables within this model account for 56.4% of the variance in user satisfaction. The findings indicate that improving information quality, economic benefits, service quality, system efficiency, and timely information delivery contributes more substantially to user satisfaction than improvements in system performance, interface format, or security features alone. This study contributes by integrating the PIECES Framework and several variables from the EUCS method to produce a more thorough evaluation of user satisfaction. More specifically, this study applies a partial integration of the PIECES Framework and selected EUCS dimensions to evaluate both system quality and user satisfaction within a single analytical model. This integration provides a broader perspective than applying either framework independently. This study has several limitations. First, the respondents were limited to e-commerce users residing in Banyumas Regency, which restricts the generalizability of the findings to other regions. Second, respondents evaluated the e-commerce application they used most frequently, and most respondents reported relatively infrequent use of e-commerce applications. Therefore, user perceptions differ from those of more active online shoppers. In addition, this study only incorporated selected EUCS dimensions rather than the complete EUCS model. This study is limited to respondents residing in Banyumas Regency, and most respondents reported relatively infrequent use of e-commerce applications. Therefore, the findings should be interpreted within this research context. Future studies are encouraged to employ the complete EUCS model, integrate other acceptance theories such as TAM or UTAUT, involve broader multi-region samples, and conduct platform-specific comparisons. Future research should include all EUCS variables, such as content, accuracy, and ease of use, and employ methods like TAM or UTAUT to yield more in-depth results. Future studies are also recommended to involve respondents from multiple

regions, compare different e-commerce platforms using larger datasets, and examine additional behavioral factors that nfluence user satisfaction and continued intention to use e-commerce applications.

REFERENCES

[1] S. K. Dewi, P. Dellia, W. O. Ananta, A. Ilma, R. A. Suhartanti, and M. D. Anwar, "Analisis Kepuasan Pengguna Terhadap Aplikasi Shopee Menggunakan Metode Pieces Framework," *JATI (Jurnal Mhs. Tek. Inform.*, vol. 8, no. 4, pp. 7293–7298, 2024, doi: 10.36040/jati.v8i4.10231.

[2] Herayati, E. Verawati, and I. B. Aji, "Penerapan Metode Pieces Framework sebagai Evaluasi Tingkat Kepuasan Pengguna Aplikasi Bukalapak," *Remik Ris. dan E-Jurnal Manaj. Inform. Komput.*, vol. 8, no. April, pp. 530–538, 2024, doi: 10.33395/remik.v8i2.13550.

[3] M. Z. Yang and J. I. Sihontang, "Analisis Kepuasan Pengguna Terhadap User Interface Aplikasi E-Commerce Shopee Menggunakan Metode EUCS di Jakarta Barat," *Informatics Digit. Expert*, vol. 4, no. 2, pp. 53–60, 2022, doi: 10.36423/index.v4i2.1110.

[4] R. E. Lina, Fitriani, F. T. Zahara, and E. D. Absharina, "Studi Literatur Review : Evaluasi Sistem Informasi E- Commerce Shopee Terhadap Kepuasan Pengguna," *J. Komputer, Informasi, dan Teknol.*, vol. 6, no. 1, pp. 1–16, 2026, doi: 10.53697/jkomitek.v6i1.4113.

[5] W. L. Ningrum and N. H. Gibran, "Analisis Tingkat Kepuasaan Pengguna Menggunakan Metode Pieces Terhadap Aplikasi E-Commerce (Shopee)," *Eksplor. Teknol. Enterp. dan Sist. Inf.*, vol. 1, no. 3, pp. 103–113, 2023, doi: 10.59039/ekstensi.v1i3.13.

[6] C. Wulandari, Elmayati, and Y. Citra, "Analisis Tingkat Kepuasan Pengguna Aplikasi Grab Kota Lubuklinggau Menggunakan Framework Pieces," *J. Teknol. Inf.*, vol. 12, no. 02, pp. 118–130, 2020, doi: 10.32767/JTI.V12I02.1042.

[7] N. Istiqomah and I. K. D. Nuryana, "Analisis Kepuasan Pengguna Pada Aplikasi Vidio Menggunakan Kombinasi Metode Technology Acceptance Model (TAM) and PIECES Framework," *(Journal Emerg. Inf. Syst. Bus. Intell.*, vol. 4, no. 4, pp. 200–207, 2023, doi: 10.26740/jeisbi.v4i4.57517.

[8] A. Anwarudin, A. Fadlil, and A. Yudhana, "User's Satisfaction Analysis of the Academic Information Systems Quality using the Modified Webqual 4.0 Method and Importance-Performance Analysis," *Ilk. J. Ilm.*, vol. 15, no. 1, pp. 132–143, 2023, doi: 10.33096/ilkom.v15i1.1531.132-143.

ISI Journal of Information Systems and Informatics
Published By Asosiasi Doktor Sistem Informasi Indonesia

[9] K. A. Pratiwi, I. G. A. P. D. Putri, and P. A. C. Dewi, "Analisis Tingkat Kepuasan Pengguna Xendit Dengan Metode Pieces (Studi Kasus Reseller Kutuskutus.Id)," *JRAK*, vol. 20, no. 2, pp. 102–115, 2024, doi: 10.21460/jrak.v20i2.58.

[10] H. G. Pratama and Y. Handrianto, "Evaluation of the Service Quality of the Jaticempaka Village Website, Bekasi City, Using the PIECES Method," *Inf. Technol. Syst.*, vol. 1, no. 1, pp. 1–11, 2023, doi: 10.58777/its.v1i1.92.

[11] R. M. D. Gugat, I. Ozali, and E. Saribanon, "Application of End User Computing Satisfaction Method to Analyze Customer Satisfaction in Using Mobile Application of National E-Commerce Travel Company," *J. Inf. dan Teknol.*, vol. 5, no. 4, pp. 272–278, 2024, doi: 10.60083/jidt.v5i4.452.

[12] M. Tania, A. Ishaq, and M. R. Firdaus, "Analisis Tingkat Kepuasan Pengguna Terhadap User Interface Aplikasi Shopee Menggunakan Metode EUCS," *J. Komput. Antart.*, vol. 2, no. 3, pp. 112–117, 2024, doi: 10.70052/jka.v2i3.503.

[13] M. Jannah, Y. Wicaksono, A. Ratnasari, and E. Setiawan, "Analisis Kepuasan Pengguna Aplikasi DPS-Denpasar Prama Sewaka Menggunakan Metode End User Computing Satisfaction (EUCS)," *JATI (Jurnal Mhs. Tek. Inform.*, vol. 9, no. 2, pp. 2391–2398, 2025, doi: 10.36040/jati.v9i2.13040.

[14] D. Septiani, S. Ruhama, and I. Astuti, "Implementasi Metode Pieces Untuk Menganalisis Tingkat Kepuasan Pengguna Aplikasi Peduli Lindungi," *JIKI (Jurnal Ilmu Komput. Informatika)*, vol. 4, no. 1, pp. 53–64, 2023, doi: 10.24127/jiki.v4i1.3996.

[15] W. J. Doll and G. Torkzadeh, "The Measurement of End-User Computing Satisfaction," *MIS Q.*, vol. 12, no. 2, pp. 259–274, 1988, doi: 10.2307/248851.

[16] K. Pratama and I. K. Nuryana, "Implementasi PIECES Framework Terhadap Kepuasan Pengguna Aplikasi Investasi Reksa Dana Bibit," *JEISBI J. Emerg. Inf. Syst. Bus. Intell.*, vol. 04, no. 01, pp. 82–90, 2023, doi: 10.26740/jeisbi.v4i1.51273.

[17] S. Anjani, M. Afdal, and M. Rahmawita, "Analisis Kepuasan Pengguna Aplikasi Muslim Pro menggunakan Metode PIECES," *Sist. J. Sist. Inf.*, vol. 14, no. 2, pp. 883–892, 2025, doi: 10.32520/stmsi.v14i2.5077.

[18] D. F. Cahyadi, W. K. Nofa, and D. A. P. Hapsari, "Perbandingan Efektivitas Metode PIECES dan EUCS dalam Analisis Kepuasan Pengguna MyXL," *ICIT J.*, vol. 10, no. 2, pp. 223–235, 2024, doi: 10.33050/icit.v10i2.3202.

[19] J. C. Wetherbe and N. P. Vitalari, *Systems Analysis and Design: Best Practices*, 4th, berilus ed. Pennsylvania State University: West Publishing Company, 1994.

[20] J. L. Whitten and L. D. Bentley, *System Analysis and Design Methods*, 7th ed., vol. 2019, no. 7. California: McGraw-Hill Educationin, 2007.

[21] M. A. Baha and P. N. Pasaribu, "Tipe Konsumen Marketplace Blibli.Com Menurut Teori Hausel," *J. Visionida*, vol. 9, no. 2, pp. 139–153, 2023, doi: 10.30997/jvs.v9i2.9472.

[22] M. Darwi, Islamiyah, and M. L. Jundillah, "Penerapan Metode PIECES Framework Sebagai Analisis Tingkat Kepuasan Mahasiswa Dalam Penggunaan Sistem Informasi Akademik," *Adopsi Teknol. dan Sist. Inf.*, vol. 2, no. 1, pp. 59–70, 2023, doi: 10.30872/atasi.v2i1.459.

[23] D. A. Putri, "Optimalisasi Pemutusan Hubungan Kerja Implementasi Personal Extreme Programming dan Evaluasi EUCS PIECES Optimizing Termination of Employment : Implementation of Personal Extreme Programming and Evaluation of EUCS PIECES," *Technomedia J.*, vol. 9, no. 3, pp. 296–308, 2025, doi: 10.33050/tmj.v9i3.2248.

[24] A. Al-Okaily, M. Al-Okaily, T. Ai Ping, H. Al-Mawali, and H. Zaidan, "An Empirical Investigation of Enterprise System User Satisfaction Antecedents in Jordanian Commercial Banks," *Cogent Bus. Manag.*, vol. 8, no. 1918847, pp. 1–16, 2021, doi: 10.1080/23311975.2021.1918847.

[25] M. R. Fadilah and Y. Handrianto, "Analysis of Employee Satisfaction with Helpdesk Websites using Service Quality in Construction Companies," *Inf. Technol. Syst.*, vol. 1, no. 1, pp. 12–25, 2023, doi: 10.58777/its.v1i1.91.

[26] S. Nurhalimah, A. Ratnasari, T. Rochmadi, and Y. Wicaksono, "Analyzing User Satisfaction of the SMP Negeri 1 Sungai Lilin Website Using the End User Computing Satisfaction (EUCS) Method," *Int. J. Softw. Eng. Comput. Sci.*, vol. 4, no. 2, pp. 850–859, 2024, doi: 10.35870/ijsecs.v4i2.2692.

[27] Sakinah and N. R. Oktadini, "Analisis Kepuasan Pengguna Terhadap Aplikasi Dana Menggunakan Metode End User Computing Satisfaction (EUCS)," *JTKSI (Jurnal Teknol. Komput. dan Sist. Informasi)*, vol. 6, no. 2, p. 185, 2023, doi: 10.56327/jtksi.v6i2.1487.

[28] L. A. T. Arakian, I. G. M. Darmawiguna, and I. G. A. A. D. Indradewi, "Evaluation of User Satisfaction Using the Pieces Framework in the Teman Bus Application," *J. Pilar Nusa Mandiri*, vol. 19, no. 1, pp. 11–18, 2023, doi: 10.33480/pilar.v19i1.3948.

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[29] P. Parwadi and M. Sofa, "Analysis of Shopee Driver Partner Satisfaction Service on the Shopeefood Driver Application with the End User Computing Satisfaction Method (EUCS)," *Inf. Technol. Syst.*, vol. 1, no. 2, pp. 73–81, 2024, doi: 10.58777/its.v1i2.199.

[30] S. S. M. Wara, A. F. Adziima, M. Nasrudin, and A. R. Pratama, "Evaluasi Kinerja Uji Normalitas pada Ragam Distribusi dan Ukuran Sampel," *J. Difer.*, vol. 7, no. 2, pp. 172–183, 2025, doi: 10.35508/jd.v7i2.24042.

[31] B. Difa, A. Triayudi, and E. T. E. Handayani, "Analysis of the Effect of User Satisfaction on the Quality of the Shopee Application with the End User Computing Satisfaction Method (Survey on Followers of the Shopee Indonesia Instagram Account)," *SaNa J. Blockchain, NFTs Metaverse Technol.*, vol. 2, no. 2, pp. 90–106, 2024, doi: 10.58905/sana.v2i2.269.

[32] K. Sahrudin, H. P. Faddil, and S. P. Faddila, "Pengaruh Ulasan Produk dan Rating Pengguna terhadap Keputusan Pembelian di Platform E-Commerce," *SENTRI J. Ris. Ilm.*, vol. 4, no. 8, pp. 1666–1674, 2025, doi: 10.55681/sentri.v4i8.4430.

[33] B. Nathanael and R. Andrew, "Ekspektansi Performa dan Ekspektansi Usaha Sebagai Prediktor Terhadap Niat Perilaku Konsumen Blibli Di Jakarta," *J. Ris. Multidisiplin Edukasi*, vol. 3, no. 1, pp. 175–193, 2026, doi: 10.71282/jurmie.v3i1.1520.

[34] M. A. Rozan, P. Dellia, Soleha, Hamdani, C. A. Puspita, and R. A. Zakariya, "Journal of Artificial Intelligence and Engineering Applications Analysis of User Satisfaction with The Implementation of The Shopee Application Using the TAM Method," *J. Artif. Intell. Eng. Appl.*, vol. 3, no. 3, pp. 829–833, 2024, doi: 10.59934/jaiea.v3i3.521.

[35] J. Jakaria and J. N. Utamajaya, "Analisis Kepuasan Pengguna Aplikasi Lazada Masyarakat Penajam Menggunakan Metode Pieces Framework," *JURIKOM (Jurnal Ris. Komputer)*, vol. 9, no. 2, pp. 464–471, 2022, doi: 10.30865/jurikom.v9i2.4091.

[36] A. Syakhila, R. Fitria, and D. Yulisda, "Evaluating the Effectiveness of the SIGNAL Digital Samsat Application Using the PIECES Framework and Technical Testing," *J. Appl. Informatics Comput.*, vol. 9, no. 5, pp. 2629–2639, 2025, doi: 10.30871/jaic.v9i5.10086.

[37] A. B. Pratomo, M. A. K. Harahap, T. Oswari, P. M. Akhirianto, and A. Widarman, "The Application of End User Computing Satisfaction (EUCS) to Analyze the Satisfaction of MyPertamina User," *J. Sistim Inf. dan Teknol.*, vol. 5, no. 1, pp. 78–83, 2023, doi: 10.37034/jsisfotek.v5i1.205.

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[38] R. Sabila, A. Pratama, and E. M. Safitri, "Evaluation Virtual Assistant Chatbot Acceptance with an Unified Technology Acceptance and Use of Technology-Based Model," *J. Inf. Syst. Informatics*, vol. 6, no. 2, pp. 919–936, 2024, doi: 10.51519/journalisi.v6i2.744.

[39] R. Wolniak, K. Stecuła, and B. Aydın, "Digital Transformation of Grocery In-Store Shopping-Scanners, Artificial Intelligence, Augmented Reality and Beyond: A Review," *Foods*, vol. 13, no. 18, pp. 1–34, 2024, doi: 10.3390/foods13182948.

[40] N. Febriyana, H. Indrawati, and Makhdalena, "The Influence of Emotional Intelligence, Industrial Work Practices, Soft Skills, and Self-Efficacy on Students Work Readiness," *J. Educ. Sci.*, vol. 9, no. 2, pp. 876–885, 2025, doi: 10.31258/jes.7.3.p.499-517.