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EUCS, IPA, AND CSI INTEGRATION TO DETECT UBSI ONLINE EXAM SYSTEM SATISFACTION

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Abstract: The online exam system is used to evaluate student learning, but it has some limitations. Therefore, it is necessary to research the user satisfaction of the system. This study aims to assess user satisfaction using the End User Computing Satisfaction (EUCS), Importance Performance Analysis (IPA), and Customer Satisfaction Index (CSI) methods. The results showed that three dimensions, namely, accuracy, ease of use, and timeliness significantly affected user satisfaction, while content and format did not have a significant effect. IPA analysis shows the majority of attributes (12 attributes) are in quadrant II, which indicates moderate satisfaction, 11 attributes in quadrant III, one attribute in quadrant I, and three attributes in quadrant IV. CSI concluded that the online exam system provides satisfactory service with a score of 77.54%.

Keywords: csi; eucs; ipa; online exam system; user satisfaction

Abstrak: Sistem ujian online digunakan untuk mengevaluasi pembelajaran mahasiswa, tetapi sistem ini memiliki beberapa keterbatasan. Karena itulah perlu penelitian kepuasan pengguna sistem tersebut. Penelitian ini bertujuan menilai kepuasan pengguna dengan menggunakan metode End User Computing Satisfaction (EUCS), Importance Performance Analisys (IPA), dan Customer Satisfaction Index (CSI). Hasil riset menunjukkan tiga dimensi yaitu, akurasi, kemudahan penggunaan, dan ketepatan waktu signifikan mempengaruhi kepuasan pengguna, sementara konten dan format tidak berpengaruh signifikan. Analisis IPA menunjukkan mayoritas atribut (12 atribut) berada di kuadran II, yang mengindikasikan kepuasan sedang, 11 atribut di kuadran III, satu atribut di kuadran I, dan tiga atribut di kuadran IV. CSI menyimpulkan sistem ujian online memberikan layanan yang memuaskan dengan skor 77,54%.

Kata kunci: csi; eucs; ipa; kepuasan pengguna; sistem ujian online

INTRODUCTION

Web-based studies have brought advancements in the field of education, including by utilizing online exams [1]. The online exam system not only facilitates the learning evaluation process, but also provides flexibility for users, both lecturers and students [2]. However, the successful implementation of the online exam system is highly dependent on the level of user satisfaction [3],[4]. Therefore, it is important to measure the level of user satisfaction with the online exam system to identify areas that need improvement.

User satisfaction can affect the acceptance and continued use of such systems [5]. To measure user satisfaction comprehensively, this study proposes the use of three methods, namely End User Computing Satisfaction (EUCS), Im-

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portance Performance Analysis (IPA), and Customer Satisfaction Index (CSI).

EUCS focuses on certain aspects of the system, such as content, accuracy, format, ease of use, and timeliness [6],[7]. The IPA method assesses user satisfaction by evaluating the significance and performance of different system attributes [8],[9]. CSI provides an overall satisfaction score based on aggregate user ratings [10],[11].

There are several studies that use more than one method to detect online system satisfaction. The research titled Sidawai Application User Satisfaction Analysis Using End User Computing Satisfaction (EUCS) and Importance Performance Analysis (IPA) concluded that the two methods complement each other in providing important information [12]. Other studies concluded that with these two studies they found the dimensions that had a significant effect on satisfaction, while at the same time being able to detect the indicators that had the best effect on that satisfaction [13].

METHOD

The research uses quantitative methods and surveys for data collection. The population of this research is UBSI students totaling 38,422 people.

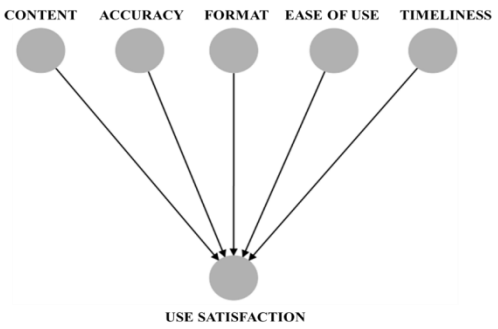

Image 1. Model End User Computing Satisfaction

Sampling techniques using a probability sampling model with simple random techniques sampling. The number of samples was determined using the Yamane formula as follows:

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

n = sample size
N = population size
e = margin of error, which in this study was 5%

Table 1. Indicators and Statements

No	Code	Attribute
1	C1	Complete information & easy to understand
2	C2	Materials according to learning objectives
3	C3	Easy-to-understand material
4	C4	Materials relevant to lecturers
5	C5	No double questions
6	A1	Accurate information
7	A2	No technical errors
8	A3	Consistent information
9	A4	Exam results are trustworthy
10	A5	User ID & password available
11	A6	Exam results as ordered
12	F1	Easy-to-read display
13	F2	Good color composition
14	F3	Structured & neat questions
15	F4	Consistent system format
16	F5	Information is displayed well
17	E1	Features are easy to find
18	E2	Easy navigation
19	E3	Adequate technical support
20	E4	Users quickly learn the system
21	E5	Help manual available
22	E6	Clear indication
23	T1	Quick response
24	T2	Timely information
25	T3	Results are available on time
26	T4	Exams on schedule
27	T5	Time alert mode

Using the Yamane formula through the 5% error rate approach, the number of selected samples was 396

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people. There are five hypotheses for testing EUCS, namely: H1: Accuracy has a significant effect on satisfaction, H2: Content has a significant effect on satisfaction, H3: Ease of use has a significant effect on satisfaction, H4: Format has a real effect on satisfaction, H5: Timeliness has a real effect on satisfaction.

The data analysis of each method is as follows:

Measurement with EUCS: The analysis uses the PLS-SEM approach with SmartPLS software version 4.0. **IPA Analysis:** IPA compare importance an attribute with performance that are perceived by users and the results are plotted in Cartesian diagram. **CSI Analysis:** CSI is calculated by the following formula:

$$CSI = \frac{\sum(\text{Wi} \times \text{Si})}{\sum \text{Wi}} X\ 100\% \qquad (2)$$

Note: Wi: Attribute importance weight,
Si: Attribute performance score.
CSI produces a quantitative satisfaction value, with the following interpretation: >80%: Very satisfied, 60-80%: Quite satisfied, <60% = Dissatisfied

RESULT AND DISCUSSION

In this study, 396 UBSI student respondents were netted as a sample. In Table 2, female respondents reached 72% (284 people) and male respondents 28% (112 people). The respondents were divided into several age groups, namely under 22 years old (64%), 22-27 years old 33%, 28-32 years old (2%), and over 32 years old (1%). Respondents from S1 students reached 97% (386 students) and the remaining 3% were D3 (10 people). The sample from the Faculty of Economics and Business was the largest, reaching 83% (330 people). The rest are from Engineering and Informatics as well as Communication and Language 14% (56 people) and 3% (10 people), respectively.

Table 2. Respondent Profile

		Sum	Number (%)
Gender	Man	112	28%
	Woman	284	72%
Age	<22	253	64%
	22-27	131	33%
	28-32	9	2%
	>32	3	1%
Strata	S1	386	97%
	D3	10	3%
Faculty	Economics & Business (FEB)	330	83%
	Engineering & Informatics (FTI)	56	14%
	Communication & Language (FKB)	10	3%

Source: Research data processing (2025)

EUCS Model Test

Test Measurement Model (Outer Model)

In the SEM PLS test, validity and reliability tests are required to ensure that the research instruments used are valid and reliable. The results of the validity test using convergent validity (outer loading and average variance extracted / AVE), as shown in Table 3, show that all questionnaire items (indicators) have a loading factor value above 0.70 and AVE above 0.70, indicating that the items are valid. The reliability test (reliability construction) using Cronbach's Alpha also showed that all variables had values above 0.70, which indicates that this research instrument is reliable.

The results of cross loading of all indicators showed that the *outer loading* value of the indicator in the construct was higher than the correlation with other variables (see Table 3). The validity value of discrimination of each indicator against the variable has been met.

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Table 3. Validity Indicators Data

Variable	Indicator	Outer Loading	CR	AVE	Output
Accuracy	A1	0.900	0.938	0.764	Valid
	A2	0.791			
	A3	0.904			
	A4	0.914			
	A5	0.851			
	A6	0.878			
Content	C1	0.883	0.939	0.804	Valid
	C2	0.928			
	C3	0.942			
	C4	0.876			
	C5	0.852			
Ease of Use	E1	0.908	0.956	0.82	Valid
	E2	0.928			
	E3	0.891			
	E4	0.893			
	E5	0.89			
	E6	0.923			
Format	F1	0.878	0.948	0.828	Valid
	F2	0.903			
	F3	0.930			
	F4	0.918			
	F5	0.921			
Timeliness	T1	0.902	0.953	0.842	Valid
	T2	0.938			
	T3	0.912			
	T4	0.918			
	T5	0.917			
User Satisfaction	U1	0.915	0.948	0.828	Valid
	U2	0.914			
	U3	0.917			
	U4	0.930			
	U5	0.873			

Source: Research data processing (2025), Ket: OL: outer loading, CR: Composite Reliability

Using the Fornell-Larcker criteria (Table 4), all variables met the data validity. The model has good discriminatory validity because the square root value of AVE of each construct is greater than the value of the correlation between constructs.

Table 4. Discriminant Validity - Fornell-Larcker

	Ac	Co	EU	Fo	Ti	US
Ac	0.874					
Co	0.839	0.897				
EU	0.799	0.753	0.906			
Fo	0.760	0.728	0.789	0.910		
Ti	0.745	0.713	0.809	0.713	0.917	
US	0.701	0.656	0.727	0.656	0.711	0.910

Source: Research data processing (2025), Ac: accuracy, Co: content, EU: ease of use, Fo: format, Ti: timeliness, US: user satisfaction

The Heterotrait-monotrait ratio discriminant validity test, as seen in Table 5, shows different variables in one model different from each other. This means that the variable represents a separate theoretical concept and is not very correlated.

Table 5. Discriminant Validity - Heterotrait-monotrait ratio – Matrix

	Ac	Co	EU	Fo	Ti	US
Ac						
Co	0.894					
EU	0.844	0.795				
Fo	0.807	0.771	0.828			
Ti	0.786	0.753	0.847	0.750		
US	0.739	0.694	0.763	0.690	0.747	

Source: Research data processing (2025), Ac: accuracy, Co: content, EU: ease of use, Fo: format, Ti: timeliness, US: user satisfaction

Especially the reliability of data construction can be seen from the values of Cronbach's Alpha and Composite Reliability [14]. As shown in Table 6, all variables can be relied on for further testing because the value exceeds 0.70 both in terms of Cronbach's Alpha and Composite Reliability.

Table 6. Construction Reliability Model

	Composite reliability (rho a)	Composite reliability (rho c)
Accuracy	0.941	0.951
Content	0.941	0.954
Ease of Use	0.956	0.965
Format	0.950	0.960
Timeliness	0.954	0.964
Use Satisfaction	0.949	0.960

Source: Research data processing (2025)

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Structural Model (Inner Model)

Some of the tests that are part of the structural model include the determination coefficient test, predictive relevance, effect size, and path coefficient test. In full, each stage is as follows:

Coefficient of Determination (R^2)

The coefficient of determination (R^2) is a number that is in the range of 0 to 1 and is useful for measuring how well statistical models are able to predict outcomes. Table 7 presents R-square data of 0.598, while the adjusted coefficient of determination shows a slightly lower figure of 0.592. The accuracy of coefficient of determination online exam user satisfaction shows significant results. The coefficient of determination value of 0.598 which indicates that user satisfaction is influenced by 59.8% by the variables studied, while 40.2% is influenced by other factors outside the model.

Table 7. Determination Coefficient (R^2) of the EUCS Model

	R^2	R^2 adjusted
Use Satisfaction	0.598	0.592

Source: Data processing results (2025)

Predictive Relevance (Q^2)

Based on the data presented in Table 8, the Q^2 value reached 0.577 which means it is greater than 0.0. This means that all variables or models in the study are able to predict the results well.

Table 8. Predictive Relevance (Q2)

	Q^2 predict	RMSE	MAE
Use Satisfaction	0.577	0.654	0.423

Source: Data processing results (2025)

Effect Size (f^2)

Referring to Table 9, the effect size of significant variables on user satisfaction of the online exam system is accuracy, ease of use, and timeliness. Each has a value of 0.02; 0,036; and 0.055 which means the effect is small.

Table 9. Effect Size (f^2) Exogenous Variables on Endogenous

	f-square
Accuracy -> Use Satisfaction	0.020
Content -> Use Satisfaction	0.002
Ease of Use -> Use Satisfaction	0.036
Format -> Use Satisfaction	0.005
Timeliness -> Use Satisfaction	0.055

Source: Data processing results (2025)

EUCS Hypothesis Test

In Table 10, three research variables show significant results, namely accuracy, ease of use, and timeliness. The other two variables, namely content and format, do not have a real effect on user satisfaction of the online exam system.

Table 10. Hypothesis Test Results

	P values	Result
Accuracy -> Use Satisfaction	0.020	Significant (accepted)
Content -> Use Satisfaction	0.453	Insignificant (not accepted)
Ease of Use -> Use Satisfaction	0.003	Significant (accepted)
Format -> Use Satisfaction	0.230	Insignificant (not accepted)
Timeliness -> Use Satisfaction	0.000	Significant (accepted)

Source: Data processing results (2025)

Hypothesis 1 (H1): Accuracy has a significant effect on user which is indicated by a P-value lower than 0.05 which means H1 is accepted. Users tend to feel satisfied if the information they get is accurate, relevant, and reliable. Hypothesis 2 (H2): The content has no significant effect on the satisfaction indicated by a P-value lower than 0.05, which means

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that H2 is rejected. The content does not have a positive influence allegedly because the system user has a perception that the content provided by the online exam system is adequate.

Hypothesis 3 (H3): Ease of use showed a significant influence on user satisfaction of the online exam system which was indicated by a P-value of less than 0.05, which means that H3 was accepted. Hypothesis 4 (H4): The format after going through the testing process showed results that did not significantly affect the user satisfaction of the online exam system with an indication of a P-value above 0.05, which means that H4 was rejected. Hypothesis 5 (H5): Timeliness has a significant effect on the satisfaction of users of the online exam system after passing the test path coefficient, which means that H5 is accepted, because the P-value of this variable is lower than 0.05.

Test IPA Model

Table 11 can help to understand the results of the IPA. Based on the data contained in Table 11, it can be seen that the format is the dimension or variable that has the smallest gap because the average level of conformity is the largest (97.88). The next variables followed were ease of use (96.73), accuracy (96.08), content (95.65), and timeliness (94.19).

Table 11. IPA Conformity Level

No	Code	Importance	Performance	Conformity	Average Conformance
1	C1	4.08	3.92	96.04	
2	C2	4.12	3.91	94.98	
3	C3	4.03	3.86	95.74	95.65
4	C4	4.11	3.9	94.96	
5	C5	3.86	3.73	96.54	
6	A1	3.96	3.85	97.26	96.08
7	A2	3.86	3.49	90.26	
8	A3	3.99	3.81	95.63	
9	A4	4.02	3.87	96.48	
10	A5	4.07	4	98.32	
11	A6	4.03	3.97	98.56	
12	F1	3.97	3.88	97.71	
13	F2	3.91	3.88	99.35	
14	F3	4.04	3.93	97.25	97.88
15	F4	4.03	3.94	97.93	
16	F5	4.07	3.95	97.14	
17	E1	4.02	3.89	96.73	
18	E2	4.04	3.91	96.75	
19	E3	4.02	3.85	95.85	96.73
20	E4	3.98	3.95	99.18	
21	E5	3.98	3.81	95.81	
22	E6	4.09	3.93	96.05	
23	T1	4.02	3.76	93.58	
24	T2	4.09	3.85	94.26	
25	T3	4.18	3.95	94.68	94.19
26	T4	4.19	3.96	94.34	
27	T5	4.14	3.89	94.08	

Source: Research data processing (2025)

The approach to detecting satisfaction with the IPA method will be more perfect when looking at the Cartesian Diagram (Image 2). It appears that quadrant II is filled with more attributes than the other quadrants out of a total of 27 attributes. It was recorded that 12 attributes were included in quadrant II. In second place is quadrant III which is filled with 11 attributes. The rest are quadrant IV (3 attributes) and quadrant I (1 attribute).

Quadrant II means maintaining achievement because in this position comes a high level of importance and high performance. This means that the attributes in quadrant II have high importance and already have good performance, so they need to be maintained. Quadrant III accommodates the attributes C4, C5, A1, A2, A3, A6, F1, E1, E3, E5, and T1. In quadrant IV there are attributes A6, F2, and E4. Quadrant I contains

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only one attribute, namely timely information.

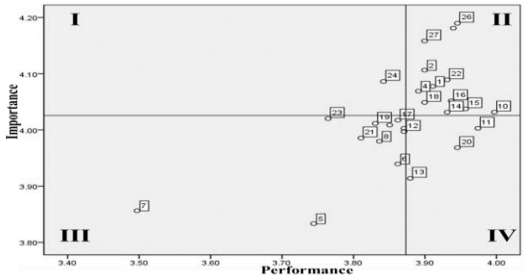

Image 2. IPA Cartesian Diagram

CSI Model Test

Based on the results of the calculation as seen in Table 12, the user satisfaction level of the online exam system reached 77.54%. This means that users as a whole show a good level of satisfaction with the online exam system. This score of 77.54% means that there are still 22.46% of users of the online exam system who have not felt satisfied.

Table 12. Level of Interest and Satisfaction

Dimension (Variable)	Level of Importance		Performance Level	
	MIS	WF	MPS	WS
Content	4.04	0.20	3.86	0.77
Accuracy	3.99	0.20	3.83	0.76
Format	4.00	0.20	3.92	0.78
Ease of Use	4.02	0.20	3.89	0.78
Timeliness	4.12	0.20	3.88	0.79
WSC	20.18	1.00	19.38	3.88
CSI				77.54

Source: Primary data processing (2025), WSC: Total Weight Score, MIS: Mean Im-portance Score, WF: Weight Factors, MPS: Mean Performance Score, WS: Weight Score

This score also shows the meaning that the online exam system provider has met the expectations of customers in general but has not exceeded their expectations. This is a signal that companies need to continuously monitor and improve the quality of their products or services to achieve higher levels of satisfaction. This result is in line with the EUCS method which shows that there are only three variables that have a significant effect on user satisfaction of the online exam system, namely 1) accuracy, 2) ease of use, and 3) timeliness. The other two, namely content and format, do not have a significant effect on user satisfaction with the online exam system. This means that the online exam system is not perfect because there are still two important factors that are not optimal. The impact, of course, is on user satisfaction which does not reach the highest number.

CONCLUSION

The study concludes that the online exam system, evaluated using the EUCS method, is not entirely satisfactory due to three key dimensions—accuracy, ease of use, and timeliness—significantly impacting user satisfaction. The influence of these dimensions is categorized as small. The analysis through the IPA reveals that most satisfaction indicators fall into quadrant II, indicating areas of improvement. The CSI model indicates that the online exam system achieves a satisfactory service level, reflected in a score of 77.54%. Other research can be developed using the TAM, Delone and McLean IS Success Model, UTAUT, SERVQUAL Model, ECM, Net Promoter Score (NPS), or Cognitive Absorption.

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