

User Satisfaction with the E-BRAY Digital Library: An Integrated EUCS and TAM Analysis Using PLS-SEM

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Article Info

Article history:

Received: 22 December 2025
Revised: 24 December 2025
Accepted: 30 December 2025
Published: 31 December 2025

Keywords:

*Digital Library
User Satisfaction
EUCS
TAM
PLS-SEM*

ABSTRAK

Purpose: This study aims to evaluate user satisfaction with the E-BRAY digital library by integrating the End-User Computing Satisfaction (EUCS) model and the Technology Acceptance Model (TAM), with a particular focus on identifying key determinants of end-user satisfaction in a regional digital library context.

Methods/Study design/approach: Data were collected through an online survey involving 106 active users of the E-BRAY digital library system. The relationships between system quality dimensions (accuracy, content, security), perceived usefulness, perceived ease of use, and user satisfaction were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM).

Result/Findings: The results indicate that perceived usefulness has the strongest and statistically significant effect on user satisfaction ($\beta \approx 0.712$, $p < 0.01$), supporting the central assumption of the TAM framework. Perceived ease of use shows a positive but weaker and statistically insignificant influence on satisfaction, while other system quality dimensions—accuracy, content, and security—exhibit negligible direct effects. These findings confirm that perceived usefulness plays a critical mediating role between system quality and end-user satisfaction in the digital library environment.

Novelty/Originality/Value: This study contributes theoretically by empirically validating perceived usefulness as a key mediating construct linking EUCS system quality dimensions to user satisfaction within a regional digital library setting—an area that remains underexplored in prior research. Practically, the findings provide actionable insights for digital library managers, emphasizing the importance of enhancing system usefulness through improved search functionality, metadata completeness, and research-support features, alongside strengthening security mechanisms to foster long-term user trust

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1. INTRODUCTION

Rapid advancements in information technology have significantly transformed the way information is created, stored, and disseminated, including within library services [1]. Conventional libraries are increasingly required to evolve into digital libraries that provide electronic resources and online services accessible beyond

physical and temporal constraints [2]. In this context, the Regional Research and Innovation Agency (BRIDA) of Southeast Sulawesi Province developed the E-BRAY Digital Library as an integrated information system to support digital collection management and research dissemination.

E-BRAY is designed to improve the efficiency of managing regional research outputs by offering structured data recording, faster information retrieval, and enhanced data security. Modern digital libraries are no longer viewed merely as electronic document repositories, but rather as digital knowledge ecosystems that facilitate scholarly collaboration, preserve local intellectual assets, and strengthen inter-regional research networks [3].

Table 1. Visitors during 2020-2024

Year	Total of Visitor
2020	135
2021	227
2022	292
2023	416
2024	542

Table 1 shows the number of BRIDA library visitors during the period 2020–2024. Based on this data, there is a very significant increase in the number of visitors each year, from only 135 visitors in 2020 to 542 visitors in 2024. This increase reflects the growing interest and awareness of the community, especially researchers and students, in utilizing the BRIDA library as a source of scientific reference.

In the context of digital libraries, user satisfaction becomes a key factor determining the success of technology implementation. User satisfaction can be defined as the extent to which users feel that the system or service meets their needs and expectations [4]. User satisfaction becomes an indicator of success that not only represents the technical quality of the system but also describes how far the system is able to provide additional informational value to the user. A high level of satisfaction indicates that the system successfully presents an effective, efficient, and relevant information access experience to user needs [5].

Several previous studies have shown that user satisfaction has a positive correlation with user retention and continuance intention in information system use [6]. This indicates that satisfaction plays a reinforcing role in the cycle of continued use, where satisfied users will tend to recommend the platform to colleagues, creating network externalities.

Furthermore, measuring user satisfaction of digital libraries requires a structured theoretical approach to provide a conceptual basis for managerial decision-making. The most frequently used approaches are the End-User Computing Satisfaction (EUCS) and Technology Acceptance Model (TAM), as both can comprehensively capture technical, perceptual, and behavioral aspects of users [7].

The EUCS model focuses on the quality of the system usage experience, while TAM focuses on cognitive perceptions of usefulness and ease of use. Integrating these two models allows for a more holistic analysis to understand the factors that influence satisfaction and continued usage intention in the context of modern digital libraries.

In this regard, a combined method of EUCS (End User Computing Satisfaction) and TAM (Technology Acceptance Model) is used to gain a more comprehensive understanding of user technology acceptance and use. EUCS measures user satisfaction with the technology system used, while TAM focuses more on internal factors influencing user attitudes towards technology. In combination, this combined method can provide a more complete view of technology use and the factors influencing it, thus aiding in the design and implementation of more effective technology systems [8].

Thus, this research aims to fill a gap in the literature, which still rarely discusses user satisfaction with digital libraries, particularly in the context of disseminating regional research results. Through the integration of the EUCS and TAM models and structural analysis using SmartPLS, this study aims to identify the most determining factors of user satisfaction with the E-BRAY system. The results will not only enrich academic studies related to technology acceptance in the digital library field but also provide practical recommendations for BRIDA managers so that E-BRAY services can be more responsive to the needs of researchers and research students in the region.

2. METODE

This study used the Purposive Sampling method, a sampling technique deliberately based on certain criteria set by the researchers. Respondent criteria in this study included active users of the E-BRAY system, both students and staff who have used the service in academic activities. This method was chosen so that the data obtained truly represent the user experience relevant to the research objectives. The data collection process was conducted through a Google Form-based questionnaire distributed online to E-BRAY system users. The questionnaire was compiled based on the EUCS and TAM models, covering several variables such as Ease of Use, Usefulness, Content, Accuracy, Security, and End-User Satisfaction. From the distribution of the questionnaire, 106 respondents were obtained who met the purposive sampling criteria and provided valid responses for further analysis. The research instrument was developed based on indicators from the EUCS and

TAM models modified for the digital library context. The research process started from the planning stage to the data processing stage, carried out systematically according to PLS-SEM procedures. The research flow is comprehensively described in Figure 1, which shows the research stages from planning to analysis..

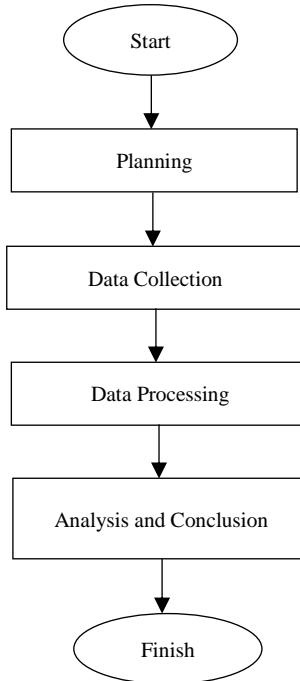


Figure 1. Research Process of E-Bray System

The Planning Stage is the initial step in the research process. At this stage, researchers identified problems occurring in the use of the E-BRAY system. After the problems were identified, literature and field studies were conducted to gain a deeper understanding of the E-BRAY system and user needs in utilizing the available services. This study uses the EUCS and TAM approaches as the basis of the research method. Subsequently, there are six hypotheses used in this study, which can be seen in Table 2.

Table 2. Research Hypothesis

Hypothesis	Description
H1	Ease of Use significantly affects User Satisfaction
H2	Usefulness significantly affects User Satisfaction
H3	Content affects User Satisfaction significantly
H4	Accuracy significantly affects User Satisfaction
H5	Security significantly affects User Satisfaction

At the Data Collection stage, researchers conducted a data collection process aimed at obtaining information related to user satisfaction and acceptance of the E-BRAY system. Data were collected through a Google Form-based questionnaire distributed to E-BRAY system users, namely students and staff who actively use the service. This questionnaire contains 27 statements compiled based on eight research variables referring to the EUCS and TAM models, including variables for Ease of Use, Usefulness, Content, Accuracy, Security, and End-User Satisfaction. The data collected at this stage is primary data, used to analyze the level of user satisfaction and acceptance of the E-BRAY system. This data was then prepared for the next stage, namely data processing and analysis, to test the previously formulated hypotheses. To measure constructs in the research model, each variable was broken down into several indicators adapted from EUCS and TAM theories and adjusted to the context of the E-BRAY digital library system. Details of variables along with measurement indicators and questionnaire statements used in this study are presented in Table 3.

Table 3. Indicator Variables and Questionnaire Statements

Variable	Code	Indicator	Statement
Ease of Use	E1	Ease of learning system	I find it easy to learn how to use E-BRAY
	E2	Interface clarity	The E-BRAY interface is clear and easy to understand
	E3	Ease of navigation	The menus and features in E-BRAY are easy to access and not confusing
Usefulness	U1	Search speed	The search results loaded quickly
	U2	Learning/work effectiveness	Using E-BRAY increases my effectiveness in learning or research
	U3	Support for academic features	The features in E-BRAY are useful for supporting my academic needs
	U4	Ease of obtaining information	E-BRAY helps me obtain information that is not easy to find elsewhere
Content	C1	Content relevance	The content in E-BRAY is relevant to my needs
	C2	Collection completeness	The digital library collection in E-BRAY is complete and adequate
	C3	Information timeliness	The content in E-BRAY is updated periodically so it remains current
	C4	Presentation clarity	Library materials in E-BRAY are presented in a clear and easy-to-understand way
	C5	Field coverage	The collection in E-BRAY covers various fields according to user needs
Accuracy	A1	Data accuracy	Bibliographic data (title, author, year) in E-BRAY is accurate
	A2	Search result accuracy	Search results in E-BRAY match the keywords entered
	A3	Collection status accuracy	Information on library availability status (available/borrowed) in E-BRAY is accurate and reliable
	A4	Minimization of information errors	The E-BRAY system rarely displays incorrect or erroneous information
	A5	Trust in information	I trust that the information displayed in E-BRAY is correct
(Security)	S1	Personal data security	I feel my personal data is safe when using E-BRAY
	S2	Account protection	The E-BRAY system protects my account from unauthorized access
	S3	Login security	The login and authentication mechanism in E-BRAY makes me confident that the system is secure
	S4	Information confidentiality	I trust E-BRAY maintains the confidentiality of my personal information
	S5	Sense of security in use	I feel comfortable using E-BRAY without worrying about my data security being compromised
End-User Satisfaction	EU1	Sufficiency	The E-BRAY system helps me meet my work/activity needs
	EU2	Convenience	The E-BRAY system makes my work easier
	EU3	Effectiveness	The E-BRAY system is effective when used
	EU4	Efficiency	The E-BRAY system works efficiently when used
	EU5	User Satisfaction	I am satisfied with the performance of the E-BRAY system

Assessment of the questionnaire was conducted to measure user behavior and perceptions of the E-BRAY system. User responses were assessed using a Likert scale, used to determine the level of respondent agreement with each statement in the questionnaire. Details of the assessment scale are presented in Table 4..

Table 4. Likert Scale

Point	Response
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

Before Data Processing was carried out, data from the questionnaire results were analyzed preliminarily to ensure the completeness and consistency of respondent answers. Subsequently, the data processing process was carried out with the help of SMART PLS 4 and Microsoft Excel 2021 software. Both applications were used to test the validity and reliability of the research instrument, as well as to test the previously formulated hypotheses. Analysis was conducted using t-tests (partial), f-tests (simultaneous), and R-Square values to measure the level of influence between variables in the research model. Based on the analysis results, researchers compiled recommendations and solutions to problems found in the use of the E-BRAY system. These recommendations are expected to form the basis for the development and improvement of the quality of the E-BRAY system in the future.

Data analysis was conducted through stages: (1) convergent and discriminant validity tests using outer loading, AVE, and HTMT ratio; (2) reliability tests with composite reliability (CR) and Cronbach's Alpha; (3) structural model testing through R-square values and bootstrapping with 5000 subsamples. The selection of

the PLS-SEM method was considered because it can handle complex models with limited sample sizes and non-normally distributed latent indicators. The structure of relationships between variables in the empirical model of this study is visualized in Figure 2, which shows the data model in SmartPLS..

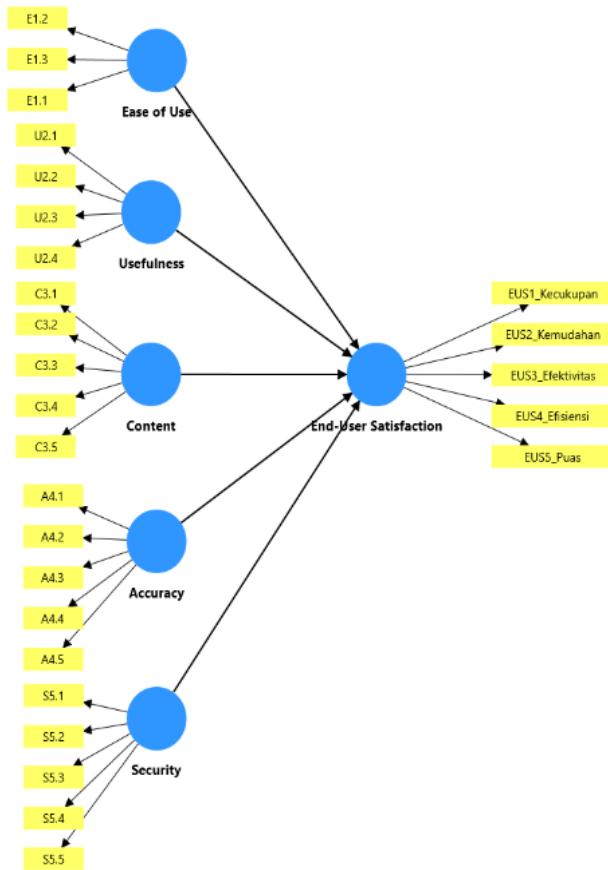


Figure 2 Data Model in SmartPLS

3. RESULTS AND DISCUSSION

3.1 Results

a. Respondent Data Description

The data analyzed came from an online questionnaire via Google Form. After the screening process, the number of valid respondents = 106. A summary of descriptive statistics for constructs (mean and standard deviation, combined from construct items) can be seen in Table 5.

Tabel 5. Descriptive Statistics of Constructs

Construct	N items	Mean (scale 1–5)	SD
Ease of Use	3	4.145	0.925
Usefulness	4	3.684	1.031
Content	5	3.685	0.975
Accuracy	5	3.817	0.998
Security	5	3.528	1.042
End-User Satisfaction	5	3.800	0.939

Brief interpretation: the average scores indicate that users rate Ease of Use relatively high (4.15), while Security received the lowest score (≈ 3.53). Overall, user perceptions of E-BRAY are in the fair to good range.

b. Validity and Reliability Test (Measurement Model)

Analysis of construct reliability and convergent/divergent validity was conducted according to PLS-SEM practices (loading factor, Cronbach's alpha, Composite reliability, rho_A, AVE, HTMT). This measurement model testing involves two important aspects: Reliability and Convergent Validity.

1. Construct Reliability Test

Reliability was measured through three metrics: Cronbach's α , Composite Reliability (ρ_c), and rho_A (ρ_A). The standard criterion used in PLS-SEM is that the value must be greater than 0.70 (> 0.70). The Composite Reliability (ρ_c) for all constructs was above the threshold of 0.70 (ranging from 0.896 to 0.941). Similarly, the Cronbach's α and ρ_A values for all constructs showed values exceeding 0.70. The ρ_A value is often considered a stricter and more consistent measure of reliability for PLS models. Reliability Conclusion: Based on these three indicators, it can be concluded that all constructs in the model have a very good level of internal consistency and are declared reliable.

2. Convergent Validity Test

Convergent validity was tested using the Average Variance Extracted (AVE) value. The criterion that must be met is that the AVE value must be greater than 0.50 (> 0.50), indicating that the construct explains more than half of the variance of its indicators. : The AVE value for all constructs is in a very good range, namely between 0.634 (Accuracy) and 0.796 (Ease of Use). All AVE values clearly exceed 0.50. Convergent Validity Conclusion: These high AVE values confirm that convergent validity is met for all constructs in the model, meaning that these indicators adequately measure the same construct.

Validity and reliability test was conducted to ensure that each indicator in the construct meets good measurement criteria. Convergent validity is seen from the Average Variance Extracted (AVE) value which must be greater than 0.5, while reliability is evaluated through Composite Reliability (CR) and Cronbach's Alpha values above 0.7. The results of the validity and reliability tests for each construct are presented in Table 6.

Table 6. Validity and Reliability

Construct	Cronbach's α	Composite reliability (rho_A)	ρ_c	AVE
Accuracy	0.856	0.871	0.896	0.634
Content	0.874	0.887	0.908	0.666
Ease of Use	0.872	0.873	0.921	0.796
End-User Satisfaction	0.921	0.923	0.941	0.761
Security	0.912	0.927	0.934	0.739
Usefulness	0.912	0.915	0.939	0.793

The results of the discriminant validity test using the Heterotrait-Monotrait (HTMT) criterion show that some construct pairs, particularly content--accuracy and usefulness--satisfaction, have HTMT values approaching or slightly exceeding the threshold of 1.0. This indicates the potential for conceptual overlap between dimensions. Theoretically, this phenomenon can be explained because user perceptions of content completeness are often directly related to assessments of information accuracy (accuracy), while perceptions of usefulness have a close relationship with satisfaction with the system usage experience (satisfaction). Nevertheless, this overlap is still empirically acceptable if the model meets overall convergent validity and reliability [9]. For further research, instrument adjustments need to be made by emphasizing the semantic differences between statement items so that dimensions remain conceptually distinct..

c. Outer Loadings

Based on the PLS Algorithm analysis results, convergent validity testing at the indicator level was conducted by examining the Outer Loadings values (correlation coefficients between the indicator and its construct). All indicators in this model showed Outer Loadings values above the recommended minimum threshold (≥ 0.708), confirming that these indicators adequately represent their respective latent constructs. The following is a summary of representative Outer Loadings values for each construct, which can be seen in Table 7.

Table 7. Outer Loading

Construct	Indicator	Outer Loading	Interpretation & Notes
Accuracy	A4.1	0.824	Adequate
	A4.2	0.704	Adequate (slightly above of 0.70)
	A4.3	0.785	Adequate
	A4.4	0.842	Adequate
	A4.5	0.818	Adequate
Content	C3.1	0.790	Adequate

	C3.2	0.836	Adequate
	C3.3	0.891	Adequate
	C3.4	0.715	Adequate
	C3.5	0.838	Adequate
Ease of Use	E1.1	0.888	Very Good
	E1.2	0.889	Very Good
	E1.3	0.900	Very Good
Usefulness	U2.1	0.854	Very Good
	U2.2	0.925	Very Good
	U2.3	0.903	Very Good
	U2.4	0.877	Very Good
Security	S5.1	0.770	Adequate
	S5.2	0.816	Adequate
	S5.3	0.770	Adequate
	S5.4	0.875	Very Good
	S5.5	0.890	Very Good
End-User Satisfaction	EUS1–EUS5	> 0.70 (Average)	Adequate

Based on the Outer Loading ≥ 0.70 criterion, all indicators show strong convergent validity with their respective latent constructs.

d. Discriminant Validity Fornell-Larcker

Furthermore, discriminant validity Fornell-Larcker was assessed for each construct by comparing the square root of the Average Variance Extracted (AVE) with the inter-construct correlations. As presented in Table 4, the square roots of the AVE values (highlighted in bold) exceed the corresponding correlation coefficients with other constructs, indicating that the model satisfies the criteria for adequate discriminant validity [10].

Table 8. Discriminant validity Fornell-Larcker

	AC	CO	PEU	EUCS	SC	PU
AC	0.882					
CO	0.796	0.816				
PEU	0.637	0.669	0.892			
EUCS	0.740	0.770	0.813	0.953		
SC	0.778	0.745	0.648	0.698	0.860	
PU	0.680	0.726	0.685	0.872	0.604	0.890

e. Structural Model Evaluation (Inner Model) & Inter-Variable Influence

After the measurement model meets validity and reliability criteria, the next step is to test the structural model (inner model) to determine the strength and direction of relationships between latent variables. Estimation was performed using a bootstrapping procedure with 5000 subsamples as recommended by Hair et al.[11]. The estimation results of path coefficients showing relationships between variables are displayed in Table 8.

Table 8. Path Coefficients

Path	β (Path Coefficient)
Accuracy → End-User Satisfaction	0.0515
Content → End-User Satisfaction	-0.0219
Ease of Use → End-User Satisfaction	0.2571
Security → End-User Satisfaction	0.0773
Usefulness → End-User Satisfaction	0.7116

Usefulness → End-User Satisfaction has the largest coefficient ($\beta = 0.712$), meaning the perceived usefulness of E-BRAY is the main factor explaining user satisfaction. Practically, the more users feel E-BRAY is useful for academic tasks/searches, then their satisfaction is higher. Ease of Use provides a moderate positive contribution ($\beta = 0.257$), indicating usability is also important but its effect is much smaller compared to usefulness. Meanwhile, Accuracy, Content, and Security show small or even negligible influence which is Content shows a small negative β .

Furthermore, Bootstrapping/T statistics show Usefulness → End-User Satisfaction is significant ($t > 1.96$; $t \sim 5.38$ in the file), meaning this relationship is statistically significant ($p < 0.01$). Other paths (Ease of Use, Accuracy, Content, Security) do not show strong evidence of significance in bootstrapping ($t < 1.96$). Only Usefulness was proven statistically to significantly influence end-user satisfaction in this sample.

Effect sizes (f^2), each predictor is relatively small (e.g., Accuracy $f^2 \approx 0.013$ etc.) → partial contribution to R^2 is small². R^2 (for End-User Satisfaction) and Predictive relevance (Q^2) are in the SmartPLS report; in summary, the main predictive model is motivated by Usefulness (largest contribution).

Conceptually, these path coefficient test results support global findings in technology acceptance and information systems research. The significant positive relationship between perceived usefulness and user satisfaction aligns with Davis's study [12] on continuance intention, which shows that perceived benefit plays a major role in driving continued intention to use a system. Thus, increasing user satisfaction can imply the formation of behavioral loyalty towards the digital library system. Additionally, the correlation between trust and usefulness also shows the relevance of trust mediation theory, which has been widely studied in the context of e-government and e-learning. This confirms that security and metadata integrity are not just technical aspects but also psychological ones that influence technology acceptance at the user level.

3.2 Discussion of Findings

The researchers argue that the results of this structural model analysis offer a comprehensive understanding of the mechanism of user satisfaction formation in the E-BRAY Digital Library. Our interpretation emphasizes identifying the key role of Perceived Usefulness as the main mediator, consistent with the TAM theoretical framework, while highlighting that system quality dimensions (EUCS) actually play a less significant role than initial expectations when linked to previous studies.

Usefulness as the main determinant of satisfaction, consistent with TAM: perceived usefulness is often a strong predictor of acceptance and satisfaction. This result aligns with Gumelar's study [13] which found system usefulness strongly correlates with user satisfaction.

Ease of use (Ease of Use) has a positive but smaller influence. This matches general findings: usability supports perceived usefulness but its direct influence on satisfaction is often lower when usefulness is already very dominant.

Content & Accuracy have good reliability/AVE, but their structural influence on satisfaction in this model is small or insignificant. Users view content/accuracy aspects as basic prerequisites (hygiene factors): when good, they do not significantly increase satisfaction; when poor, they can decrease satisfaction.

Security has the lowest average value and small structural influence but is practically important because security perception can affect long-term trust. A more tangible security feature and communication strategy is needed (e.g., encryption, account protection).

Based on the PLS-SEM analysis results, the Usefulness construct has the most dominant influence on User Satisfaction with a path coefficient value of 0.712 ($p < 0.01$). This result confirms that the higher the perception of system usefulness, the higher the level of user satisfaction. Meanwhile, Ease of Use shows a positive but insignificant influence ($\beta = 0.257$; $p > 0.05$), indicating that although the system is relatively easy to use, that aspect is no longer a main differentiating factor for satisfaction. This result is consistent with previous research [14] which confirms that system usefulness is the main determinant in information technology adoption. Practically, these results recommend that E-BRAY developers focus on increasing content relevance, expanding literature search features, and strengthening security layers to increase user trust.

This study provides significant theoretical and practical contributions. Theoretically, this study strengthens the integration of the EUCS-TAM model in the context of a regional digital library (E-BRAY), by showing that although various EUCS dimensions such as content, accuracy, and security have important relevance to system evaluation, the factor perceived usefulness plays a key role as a mediator connecting system quality with user satisfaction levels. Practically, these findings produce recommendations to prioritize strengthening features that directly increase usefulness, such as refining more precise search features, providing more complete metadata, and developing research support features. Furthermore, the security aspect needs to be improved and communicated more clearly to increase user trust in the E-BRAY system.

4. CONCLUSION

This study uses an integrated EUCS-TAM model to measure user satisfaction with the E-BRAY digital library system. PLS-SEM results show that perceived usefulness is significantly the dominant factor influencing user satisfaction (path coefficient $\beta \approx 0.712$; $p < 0.01$), while ease of use provides a positive but much smaller and statistically insignificant effect. Other system quality dimensions (accuracy, content, security) have very small or insignificant structural influence. Overall, users rate E-BRAY in the fair--good range, but there are aspects that require special attention. For example, system security has the lowest average score and needs to be improved to increase user trust. These findings confirm that in the digital library context, system usefulness is a key mediator between system quality (EUCS) and user satisfaction.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

First author: Generate research ideas, development conceptual framework, writing of methodology
Second: Collection of the data, **Third author** Software utilization and conducting the data processing, **Third author:** writing the introduction and literature review sections **Fourth author:** Involved in validating results and writing discussion sections, **Fifth Author:** Writing conclusion and references, **Sixth Author:** technical supervision, and ensuring publication quality.

DECLARATION OF COMPETING INTERESTS

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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