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RESEARCH ARTICLE

The Impact of Visual Quality and User Interface Responsiveness on Student Satisfaction in Academic Information Systems (AIS)

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ABSTRACT

This study investigates the impact of visual quality and user interface (UI) responsiveness on user satisfaction and loyalty in Academic Information Systems (AIS) within higher education. Given the growing demand for AIS that combine both functional efficiency and aesthetic appeal, this study aims to examine how these two dimensions contribute to users' perceptions and continued use of AIS. Using the Technology Acceptance Model (TAM) and SERVQUAL as theoretical frameworks, this research conducted a path analysis with a sample of 104 students actively using an AIS. The results reveal that visual quality positively influences perceived ease of use (PEOU) but does not significantly affect perceived usefulness (PU). In contrast, UI responsiveness shows a significant positive impact on both PEOU and PU, indicating that swift response times and system availability are critical for user satisfaction. Both PEOU and PU were found to be key predictors of user satisfaction, which in turn significantly influences user loyalty. The implications of these findings highlight the dual importance of interface design and functional responsiveness in developing AIS that meet user expectations. This study enriches the existing knowledge base on AIS user experience by providing empirical evidence of the combined effects of aesthetic and functional factors on satisfaction and loyalty. These findings offer practical recommendations for AIS developers, suggesting that systems should prioritize both visual appeal and performance efficiency to enhance student engagement and retention in educational contexts.

INTRODUCTION

In the digital era, higher education institutions have increasingly integrated technology to support their administrative and academic processes. Academic Information Systems (AIS) play a critical role in facilitating various tasks, including course registration, access to schedules, and viewing academic records. These systems provide real-time data access that simplifies the interaction between students and university administration, contributing to more efficient academic operations(Widyanto & Ariyani, 2023). With technological advancements continuously evolving, students' expectations for AIS have expanded beyond basic functionality to include enhanced visual design and responsive user interfaces (UI) (Kabir et al., 2022). The shift toward user-centered design in AIS highlights the importance of ensuring both visual appeal and operational performance to meet user satisfaction and retention (Yaacob et al., 2023).

Research shows that the quality of a UI, characterized by well-coordinated color schemes, consistent layouts, and aesthetic elements, impacts users' perception of a system's usability and reliability (Xiang et al., 2020). A visually appealing interface fosters positive initial impressions and promotes engagement by making navigation more intuitive and enjoyable (Sharma et al., 2024). Additionally, the responsiveness of a system its ability to process user input swiftly and without delay has been shown to significantly affect user satisfaction (Lee et al., 2022). High responsiveness minimizes frustration, ensuring that users can access necessary information efficiently, which is essential for

maintaining their positive experience and willingness to continue using the system (B. Yang & Zhao, 2021),(Rozan et al., 2024).

Despite the acknowledged significance of Accounting Information Systems (AIS) in academic environments, there remains a noticeable gap in studies that simultaneously assess the impact of visual quality and UI responsiveness on user satisfaction. Most existing research tends to focus either on the system's usability or its functional efficiency, often neglecting the interaction between visual and operational performance elements (Meiryani et al., 2023),(Marpaung et al., 2021). The Technology Acceptance Model (TAM), proposed by Venkatesh and Davis (Venkatesh & Davis, 2000), identifies perceived usefulness (PU) and perceived ease of use (PEOU) as key factors influencing the adoption and sustained use of technology. Both factors are influenced by visual design and UI responsiveness, indicating that a combined examination of these elements could offer deeper insights into user satisfaction and engagement with AIS (B. Yang & Zhao, 2021),(Jokonya, 2016).

The significance of visual quality in enhancing the user experience is supported by both theoretical and empirical evidence. SERVQUAL, a widely used model for assessing service quality, includes tangibles as a key dimension. In AIS, tangibles translate to UI design, where visual appeal builds trust and motivates consistent interaction (Sharma et al., 2024), (Parham-Mocello & Gupta, 2023). A UI that is designed with attention to detail incorporating visually harmonious elements and clear layouts can convey professionalism and reliability, thereby enhancing users' trust in the system (Mukred et al., 2024). Furthermore, responsiveness, as defined by SERVQUAL, pertains to the system's promptness in handling user requests, which aligns with maintaining high service quality (Dahri et al., 2024), (W. Yang & Liu, 2021). Effective UI responsiveness minimizes loading times and ensures smooth interactions, which are crucial for academic environments where timely information retrieval is paramount (Huang et al., 2023),(Aeni Hidayah et al., 2020).

The TAM framework offers a thorough perspective for analyzing how visual quality and responsiveness impact perceived usefulness (PU) and perceived ease of use (PEOU). Within TAM, PU is described as the extent to which a user feels that using the system enhances their performance, while PEOU reflects the ease with which the system can be operated (Venkatesh & Davis, 2000). An interface that is visually optimized aids PEOU by facilitating smoother navigation and enriching the user experience. This seamless interaction can, in turn, heighten PU, as users are more inclined to view the system as advantageous for academic tasks (Natasia et al., 2021). Moreover, a responsive UI reinforces both PEOU and PU by ensuring that the system reacts swiftly to user inputs, thereby further boosting user satisfaction and encouraging ongoing usage (Panagoulias et al., 2023). This theoretical framework highlights the importance of considering both visual and functional elements to gain a comprehensive understanding of user satisfaction in AIS contexts (Gunawan et al., 2023),(Putri et al., 2023).

While TAM focuses on perceived ease of use and usefulness, SERVQUAL complements it by assessing service quality from the user's viewpoint. Its dimensions of tangibles and responsiveness resonate with user expectations for both design and functionality (Sharma et al., 2024), (Jo & Bang, 2023). A study by Lee et al. (Lee et al., 2022) highlighted that when visual quality is paired with responsive design, users experience reduced perceived risk and increased trust. This relationship is crucial for fostering long-term engagement, as students who trust a system are more likely to continue its use and recommend it to peers (Gunawan et al., 2023). This dual consideration of visual and operational performance suggests that a holistic approach is necessary to capture the full spectrum of factors influencing user satisfaction (Wang et al., 2023),(Förster, 2024). Existing literature provides foundational insights but lacks a comprehensive analysis that simultaneously considers visual quality and UI responsiveness in AIS. Research by Mukred et al. (Mukred et al., 2024) revealed that systems optimized for both aesthetic appeal and responsiveness yield higher user satisfaction, confirming the need for further investigation in this area within higher education. Additionally, findings by Xiang et al. (Xiang et al., 2020) indicated that an engaging visual design can significantly enhance PEOU, which aligns with TAM's assertion that ease of use drives adoption. However, many studies often isolate either visual or functional factors without considering their combined effect on satisfaction (Meiryani et al., 2023). This study addresses this research gap by examining how visual quality and responsiveness together influence student satisfaction with AIS.

The literature on TAM has demonstrated that the interplay between PU and PEOU impacts user acceptance of technology. SERVQUAL's tangibles and responsiveness further elucidate how physical design and system promptness contribute to user experiences (Dahri et al., 2024),(Mata et al., 2024). These findings suggest that a study integrating both TAM and SERVQUAL frameworks can offer a more nuanced understanding of user satisfaction (Xiang et al., 2020). Insights from Huang et al. (Huang et al., 2023) indicated that when users find systems visually appealing and responsive, their confidence in using the system increases, which supports TAM's premise that perceived usefulness is a key predictor of continued use. Thus, examining these factors together is essential for providing actionable guidance on AIS design and improvement (Widyanto & Ariyani, 2023). The objective of this study is to investigate how visual quality and UI responsiveness impact user satisfaction with AIS, specifically within the context of higher education. This research hypothesizes that both factors significantly enhance PU and PEOU, which in turn increase overall user satisfaction. This study aims to combine TAM and SERVQUAL to address the research gap, offering empirical insights into how both visual and performance factors jointly impact satisfaction with AIS. The findings are expected to contribute to practical recommendations for AIS development, ensuring systems meet or exceed user expectations (Panagoulias et al., 2023) This dual focus addresses both aesthetic and operational elements, highlighting the importance of designing AIS that not only function effectively but also appeal visually to enhance student engagement and retention (B. Yang & Zhao, 2021),(Rodríguez-López et al., 2024).

RESEARCH METHODOLOGY

The study was designed to analyze the impact of Visual Quality and UI Responsiveness on User Satisfaction, mediated by Perceived Ease of Use and Perceived Usefulness, as well as their implications for User Loyalty. The research population consisted of students from the School of Management and Computer Science Lombok, selected through purposive sampling. The criteria for inclusion required students to be active during the odd semester of the 2023/2024 academic year, to have used the campus information system for at least one year or two semesters, and to have completed a questionnaire in full. Based on these criteria, a sample of 104 respondents was obtained. The data were analyzed using path analysis through SmartPLS 4.0 software(German Ruiz-Herrera et al., 2023),(Pal & Vanijja, 2020). The research design is presented in Figure 1. This study was structured to examine how Visual Quality and UI Responsiveness influence User Satisfaction, with Perceived Ease of Use and Perceived Usefulness serving as mediating factors, and to explore their effects on User Loyalty. The research population included students from the School of Management and Computer Science Lombok, selected through purposive sampling. Eligibility criteria required that students be actively enrolled in the odd semester of the 2023/2024 academic year, have used the campus information system for at least one year (or two semesters), and have fully completed a questionnaire. With these criteria, a sample of 104 respondents was gathered. Data analysis was conducted using path analysis in SmartPLS 4.0 software (German Ruiz-Herrera et al., 2023),(Pal & Vanijja, 2020). The research model is illustrated in Figure 1.

This study extends prior research, such as the work of Widyanto & Ariyani, 2023, who investigated satisfaction and loyalty within blockchain-based online media platforms using the Technology Acceptance Model (TAM). In a similar approach, this study incorporates TAM and combines it with the SERVQUAL model to examine how UI aesthetics and functionality affect user satisfaction in academic information systems (AIS) (Ly & Ly, 2022). Visual Quality, which includes elements like design aesthetics and color schemes, is proposed to improve Perceived Ease of Use (PEOU), a construct linked to increased user engagement across various technology platforms, as noted by Rozan et al. (2024)(Rozan et al., 2024). Additionally, UI Responsiveness, covering factors like system response time and page load speed, is expected to influence both PEOU and Perceived Usefulness (PU), echoing findings by Kabir et al. (2022) regarding ICT preferences among field officers(Kabir et al., 2022), (Belmonte et al., 2024), (Muhasyah et al., 2024)

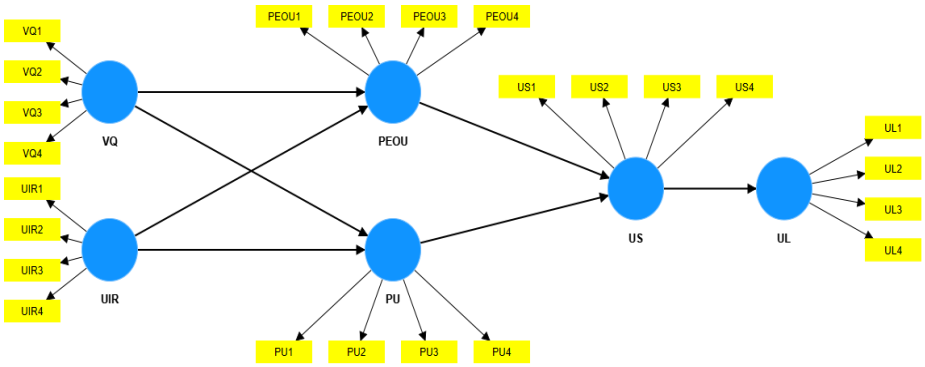

Figure 1: Research design

The mathematical equations that can be formulated based on the research design are as follows:

$PEOU=\beta 1VQ+\beta 2UIR+\varepsilon$ (1)

$PU=\beta 1VQ+\beta 2\ UIR+\varepsilon+\varepsilon$ (2)

$US=\beta 1PEOU+\beta 2PU+\varepsilon$ (3)

$UL=\beta US+\varepsilon$ (4)

Explanation:

ε = Residual
β, β1, β2 = Koefisien
VQ = Visual Quality
UIR = UI Responsiveness
PEOU = Perceived Ease of Use
PU = Perceived Usefulness
US = User Satisfaction
UL = User Loyalty

All research variables and the indicators used to measure each variable are defined in Table 1.

Table 1: Operational variables

Variable	Variable Types	Indicators	Code
Visual Quality (VQ)	Independen	Design Aesthetics	VQ1
		Layout Consistency	VQ2
		Color Selection	VQ3
		Display Consistency	VQ4
UI Responsiveness (UIR)	Independen	Information Access Speed	UIR1
		Page Loading Speed	UIR2
		System Availability	UIR3
		Interface Responsiveness to Input	UIR4
Perceived Ease of Use (PEOU)	Intervening	Ease of Operation	PEOU1
		Clarity of Information	PEOU2
		Interface Navigation	PEOU3
		Effortless Use	PEOU4
Perceived Usefulness (PU)	Intervening	System Effectiveness	PU1
		Productivity Improvement	PU2
		Performance Enhancement	PU3
		Needs Fulfillment	PU4
User Satisfaction (US)	Intervening	Overall Satisfaction	US1
		Comfort	US2
		Positive Experience	US3
		Willingness to Reuse	US4
User Loyalty (UL)	Dependen	Desire for Continued System Use	UL1
		Recommendation	UL2
		System Attachment	UL3
		Usage Frequency	UL4

Based on the research design, the following research hypotheses are proposed:
H1: Visual quality positively influences perceived ease of use.
H2: Visual quality positively impacts perceived usefulness.
H3: UI responsiveness positively influences perceived ease of use.
H4: UI responsiveness positively impacts perceived usefulness.
H5: Perceived ease of use has a positive effect on user satisfaction.
H6: Perceived usefulness positively influences user satisfaction.
H7: User satisfaction positively impacts user loyalty.

RESULTS AND DISCUSSION

Measurement outer model

This test aimed to assess the validity of each indicator used to measure the latent variables by analyzing the loading factor values for each indicator. A satisfactory validity level is indicated when the loading factor value exceeds 0.70. The results of the convergent validity test are displayed in Figure 2

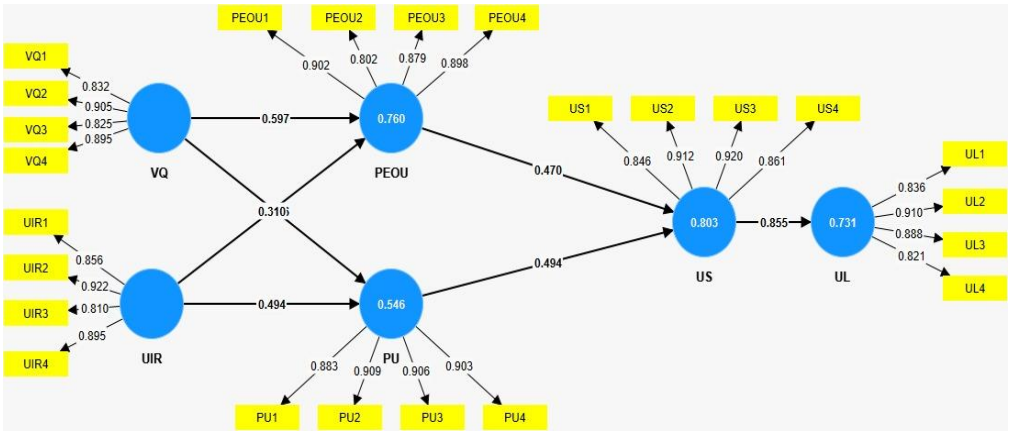

Figure 2: Loading factor values

The visual quality (VQ) variable, assessed through four indicators, met the requirements for convergent validity, with each indicator's loading factor exceeding the 0.70 threshold. The lowest loading factor was for color selection (VQ3) at 0.825. Other indicators, such as design aesthetics (VQ1), layout consistency (VQ2), and display consistency (VQ4), also passed, with values of VQ1 = 0.832, VQ2 = 0.905, and VQ4 = 0.895. For UI responsiveness (UIR), the loading factors were similarly above 0.70: information access speed (UIR1) = 0.856, page loading speed (UIR2) = 0.922, system availability (UIR3) = 0.810, and interface responsiveness to input (UIR4) = 0.895. The perceived ease of use (PEOU) variable also demonstrated convergent validity, with all indicators above 0.70: ease of operation (PEOU1) = 0.902, clarity of information (PEOU2) = 0.802, interface navigation (PEOU3) = 0.879, and effortless use (PEOU4) = 0.898.

Perceived usefulness (PU) showed similar validity, with all indicators having loading factors greater than 0.70: system effectiveness (PU1) = 0.883, productivity improvement (PU2) = 0.909, performance enhancement (PU3) = 0.906, and needs fulfillment (PU4) = 0.903. User satisfaction (US) indicators were also validated, with loading factors as follows: overall satisfaction (US1) = 0.846, comfort (US2) = 0.912, positive experience (US3) = 0.920, and willingness to reuse (US4) = 0.861. Lastly, user loyalty (UL) was confirmed valid, with indicators such as the desire to continue using the system (UL1) = 0.836, recommendation (UL2) = 0.910, attachment to the system (UL3) = 0.888, and usage frequency (UL4) = 0.821, all exceeding the 0.70 threshold.

Discriminant validity

All variables are deemed to satisfy the validity requirement if their Average Variance Extracted (AVE) value exceeds 0.50. This test is conducted to evaluate the validity level of all latent variables defined in the research framework. The outcomes of the discriminant validity test are displayed in Table 2.

Table 2: AVE values

Variables	Cronbach's alpha	Average variance extracted (AVE)
PEOU	0.893	0.759
PU	0.922	0.811
UIR	0.894	0.760
UL	0.887	0.747
US	0.908	0.784
VQ	0.887	0.748

Table 2 indicates that the AVE values for all latent variables in the study satisfy the validity criteria, with the lowest AVE recorded for user loyalty (UL) at 0.747, which is above the 0.50 threshold. Likewise, the other variables meet the validity standards: visual quality (VQ) = 0.748, UI responsiveness (UIR) = 0.760, perceived ease of use (PEOU) = 0.759, perceived usefulness (PU) = 0.811, and user satisfaction (US) = 0.784, all surpassing the required AVE threshold of 0.50.

Reliability test

The reliability test assumes that composite reliability and Cronbach's alpha values must exceed 0.70 to satisfy the reliability criteria for the latent variables in the study. Table 3 presents the reliability test results.

Table 3: Reliability test values

	Cronbach's alpha	Composite reliability
PEOU	0.893	0.894
PU	0.922	0.924
UIR	0.894	0.896
UL	0.887	0.888
US	0.908	0.910
VQ	0.887	0.890

Table 3 shows that both Cronbach's alpha and composite reliability values confirm that all latent variables meet the reliability standards, with the lowest Cronbach's alpha being 0.887 for visual quality (VQ) and user loyalty (UL), and the lowest composite reliability also found in user loyalty (UL). These values exceed the 0.70 threshold, indicating strong consistency among all indicators in measuring the latent variables.

Measurement inner model

Values R-square

Two approaches to evaluate the influence of independent variables on dependent variables involve analyzing the R-Square and Adjusted R-Square values. This study emphasizes the Adjusted R-Square value, as it offers a more precise representation when multiple dependent variables are involved. Table 4 presents the Adjusted R-Square values.

Table 4: Adjusted R-square values

	R-square	R-square adjusted
PEOU	0.760	0.755
PU	0.546	0.536
UL	0.731	0.728
US	0.803	0.798

Table 4 shows that perceived ease of use (PEOU) has an Adjusted R-Square value of 0.755, indicating that visual quality and UI responsiveness account for 75.5% of the variance in perceived ease of use, while the remaining 24.5% is influenced by factors outside the research model. This value of 0.755 reflects a strong relationship. In contrast, perceived usefulness (PU) has an Adjusted R-Square value of 0.536, or 53.6%, suggesting that the ability of visual quality and UI responsiveness to explain perceived usefulness is moderate, with other factors accounting for 46.4% of the variance in PU.

User loyalty (UL) shows an Adjusted R-Square value of 0.728, or 72.8%, suggesting a nearly strong relationship where user satisfaction (US) accounts for a significant portion of the variance in user loyalty, with the remaining 27.2% attributed to factors outside the model. In contrast, user satisfaction (US) holds the highest Adjusted R-Square value at 0.798, or 79.8%, indicating that perceived ease of use and perceived usefulness explain user satisfaction robustly, while the remaining 20.2% is due to external variables. This underscores the strong explanatory power of perceived ease of use and perceived usefulness for user satisfaction.

Path coefficient and significance test

The path coefficient test results are used to measure the strength of relationships between latent variables and to determine the direction of these relationships based on the research design. The larger the coefficient value, the stronger the relationship between the variables being tested. Significance values provide information on the degree of influence between variables. Significance is determined by a T statistic greater than 1.96 at a 5% significance level (0.05) and a p-value less than 0.05. The path coefficient values are presented in Table 5.

Table 5: Path coefficients and significance values

Variables	Original sample (O)	T statistics	P values
PEOU -> US	0.470	5.475	0.000
PU -> US	0.494	6.178	0.000
UI -> PEOU	0.310	2.590	0.010
UI -> PU	0.494	2.979	0.003
US -> UL	0.855	26.307	0.000
VQ -> PEOU	0.597	5.962	0.000
VQ -> PU	0.276	1.596	0.111

Table 5 shows that the effect of visual quality on perceived ease of use has a p-value of 0.000 and a T statistic of 5.962, exceeding the threshold of 1.96. This outcome indicates that visual quality significantly impacts perceived ease of use at both the 5% and 0.01 levels. The relationship is positive, with a coefficient of 0.597, supporting the acceptance of the first hypothesis (H1), which asserts that visual quality positively influences perceived ease of use. Visual quality, encompassing elements such as design aesthetics, layout consistency, and effective color schemes, contributes to a visually pleasing and comfortable interface, which enhances users' perception of ease in using the campus information system. This finding is consistent with Widyanto and Ariyani's (2023) research, which demonstrated that visual aesthetics and an attractive layout notably improve perceived ease of use (Widyanto & Ariyani, 2023).

The second hypothesis (H2), which suggests that visual quality significantly and positively impacts perceived usefulness, is not supported. This is based on a p-value of 0.111, which is above 0.05, and a T statistic of 1.596, which is below the critical value of 1.96, with a coefficient of 2.276. These results imply that users of the campus information system do not attribute substantial benefits or practical value to its aesthetic qualities. Users appear to prioritize functionality over visual appeal when assessing the system's usefulness. These findings are consistent with Rozan et al. (2024), who observed that users value functionality more than aesthetics in determining the usefulness of application platforms (Rozan et al., 2024).

UI responsiveness has a significant positive impact on perceived ease of use, as demonstrated by a p-value of 0.010 (below 0.05) and a T statistic of 2.590, which exceeds the critical value of 1.96, along with a coefficient of 0.310. Therefore, the third hypothesis (H3), which posits that UI responsiveness positively influences perceived ease of use, is supported. Fast access and reliable availability of the campus information system improve users' perceptions of ease of use. This outcome aligns with the findings of Kabir et al. (2022), which indicated that response speed and system availability enhance perceived ease of use in IT platforms (Kabir et al., 2022).

The influence of UI responsiveness on perceived usefulness shows a p-value of 0.003, which is below 0.05 and even 0.01, indicating significance at the 1% level. With a T statistic of 2.979, greater than 1.96, and a coefficient of 0.494, this confirms the acceptance of the fourth hypothesis (H4), which

posits that UI responsiveness significantly and positively impacts perceived usefulness. This result suggests that perceived usefulness is enhanced when users experience quick access, rapid interface responses, and minimal load times for new pages, providing notable benefits to campus information system users. This outcome is consistent with Sharma et al. (2024), who found that interface responsiveness and fast access times substantially influence perceived usefulness within FinTech (Sharma et al., 2024).

The fifth hypothesis (H5), which proposes that perceived ease of use impacts user satisfaction, is supported. With a p-value below 0.05, or even 0.010, a T statistic of 5.475 (exceeding 1.96), and a coefficient of 0.470, perceived ease of use demonstrates a strong and significant influence on user satisfaction. This finding indicates that an intuitive and easily navigable user interface enhances the user experience, enabling students to use the campus information system smoothly and contributing to their overall satisfaction. This result is in line with the study by Yaacob et al. (2023), which found that ease of navigation and high accessibility positively impact user satisfaction (Yaacob et al., 2023).

The sixth hypothesis (H6), which suggests that perceived usefulness significantly and positively influences user satisfaction, is supported. This is demonstrated by a p-value of 0.000, confirming significance at both the 5% and 1% levels. The substantial effect is further validated by a T statistic of 6.178, which is above the threshold of 1.96, and a coefficient of 0.494. These findings imply that when users view the system as valuable and beneficial such as aiding academic tasks, enhancing productivity, and fulfilling academic needs it fosters a sense of satisfaction with the system. This result aligns with the study by Sharma et al. (2024), which found that a strong perception of usefulness enhances productivity and promotes greater satisfaction with system usage in organizational settings (Sharma et al., 2024).

User satisfaction, with a p-value of 0.000 below both the 0.05 and 0.01 significance levels and a T statistic of 26.307, significantly higher than 1.96, demonstrates a substantial positive influence on user loyalty, as indicated by a high coefficient of 0.855. This strongly supports the seventh hypothesis (H7), which asserts that user satisfaction has a significant positive impact on user loyalty. When users are content with the system's interface and functionality, feel at ease using it, and enjoy a positive experience, their loyalty to the system grows, motivating them to use it regularly and increasing their frequency of use. This result aligns with Xiang et al. (2020), who found that user satisfaction with a system's functional design strongly correlates with sustained user loyalty over time (Xiang et al., 2020).

Based on the results of the path coefficient and significance tests, the final mathematical equations for the research model can be formulated as follows:

$$PEOU = 0.597VQ + 0.310UIR + 0.245 \quad (5)$$

$$PU = 0.276VQ + 0.494UIR + 0.464 \quad (6)$$

$$US = 0.470PEOU + 0.494PU + 0.202 \quad (7)$$

$$UL = 0.855US + 0.272 \quad (8)$$

CONCLUSION

This study underscores the importance of both visual quality and user interface (UI) responsiveness in enhancing user satisfaction and loyalty within Academic Information Systems (AIS). The results indicate that visual quality comprising design aesthetics, layout uniformity, and color schemes positively influences perceived ease of use (PEOU) but does not directly affect perceived usefulness (PU). In contrast, UI responsiveness, reflected in access speed and system reliability, significantly enhances both PEOU and PU, highlighting its crucial role in delivering a smooth user experience. Both PEOU and PU are pivotal in fostering user satisfaction, which, in turn, drives user loyalty. These findings suggest that while users appreciate visually appealing interfaces for easier navigation, they prioritize functional effectiveness when evaluating the usefulness of an AIS. This insight supports the integration of the Technology Acceptance Model (TAM) with the SERVQUAL framework, offering a comprehensive view of user satisfaction in higher education information systems. This study adds to the literature by clarifying the combined effects of aesthetic and functional qualities on AIS user satisfaction and provides practical recommendations for system designers to emphasize both visual design and operational efficiency. Future research could expand these insights by exploring other

contextual factors, such as user demographics or specific AIS features, that may impact the relative importance of visual quality and responsiveness. Additional studies might also examine how these elements interact with other SERVQUAL dimensions, like reliability and empathy, to develop a more nuanced approach to AIS design and user satisfaction.

Implications of the study

This study provides valuable insights for developers and decision-makers in academic institutions aiming to improve their Academic Information Systems (AIS). The findings underscore the dual importance of visual quality and user interface (UI) responsiveness in enhancing user satisfaction and loyalty. The significant role of visual quality in improving perceived ease of use (PEOU) highlights the necessity for AIS developers to prioritize design aesthetics, layout consistency, and intuitive navigation to create an engaging user experience. Additionally, the critical impact of UI responsiveness on both PEOU and perceived usefulness (PU) suggests that ensuring fast response times, system availability, and efficient page loading is essential to boost user satisfaction and retention.

For academic institutions, understanding that user satisfaction significantly influences loyalty provides a foundation for developing retention strategies through well-designed AIS. By integrating features that enhance satisfaction, institutions can foster long-term engagement with students. Furthermore, the integration of the Technology Acceptance Model (TAM) and SERVQUAL in this study offers a comprehensive framework for evaluating and enhancing AIS. This framework serves as a guide for future improvements and innovations to better align AIS functionalities with student needs and expectations. From a policy perspective, the study emphasizes the importance of investing in both visual and functional aspects of AIS to maximize academic outcomes. Such investments not only improve operational efficiency but also build trust and loyalty among students. By addressing both aesthetic and operational elements, this research bridges a critical gap in the existing literature on AIS user satisfaction, offering actionable recommendations for creating systems that are both effective and user-friendly.

REFERENCES

Aeni Hidayah, N., Hasanati, N., Novela Putri, R., Fiqry Musa, K., Nihayah, Z., & Muin, A. (2020, October 23). Analysis Using the Technology Acceptance Model (TAM) and DeLone McLean Information System (DM IS) Success Model of AIS Mobile User Acceptance. *2020 8th International Conference on Cyber and IT Service Management, CITSM 2020*. https://doi.org/10.1109/CITSM50537.2020.9268859

Belmonte, Z. J. A., Prasetyo, Y. T., Cahigas, M. M. L., Nadlifatin, R., & Gumasing, M. J. J. (2024). Factors influencing the intention to use e-wallet among generation Z and millennials in the Philippines: An extended technology acceptance model (TAM) approach. *Acta Psychologica*, *250*. https://doi.org/10.1016/j.actpsy.2024.104526

Dahri, N. A., Yahaya, N., Al-Rahmi, W. M., Aldraiweesh, A., Alturki, U., Almutairy, S., Shutaleva, A., & Soomro, R. B. (2024). Extended TAM based acceptance of AI-Powered ChatGPT for supporting metacognitive self-regulated learning in education: A mixed-methods study. *Heliyon*, *10*(8). https://doi.org/10.1016/j.heliyon.2024.e29317

Förster, K. (2024). Extending the technology acceptance model and empirically testing the conceptualised consumer goods acceptance model. *Heliyon*, *10*(6). https://doi.org/10.1016/j.heliyon.2024.e27823

German Ruiz-Herrera, L., Valencia-Arias, A., Gallegos, A., Benjumea-Arias, M., & Flores-Siapo, E. (2023). Technology acceptance factors of e-commerce among young people: An integration of the technology acceptance model and theory of planned behavior. *Heliyon*, *9*(6). https://doi.org/10.1016/j.heliyon.2023.e16418

Gunawan, A., Fatikasari, A. F., & Putri, S. A. (2023). The Effect of Using Cashless (QRIS) on Daily Payment Transactions Using the Technology Acceptance Model. *Procedia Computer Science*, *227*, 548–556. https://doi.org/10.1016/j.procs.2023.10.557

Huang, Y. C., Li, L. N., Lee, H. Y., Browning, M. H. E. M., & Yu, C. P. (2023). Surfing in virtual reality: An application of extended technology acceptance model with flow theory. *Computers in Human Behavior Reports*, *9*. https://doi.org/10.1016/j.chbr.2022.100252

Jo, H., & Bang, Y. (2023). Understanding continuance intention of enterprise resource planning (ERP): TOE, TAM, and IS success model. *Heliyon*, *9*(10). https://doi.org/10.1016/j.heliyon.2023.e21019

Jokonya, O. (2016). Validating technology acceptance model (TAM) during IT adoption in organizations. *Proceedings - IEEE 7th International Conference on Cloud Computing Technology and Science, CloudCom 2015*, 509–516. https://doi.org/10.1109/CloudCom.2015.56

Kabir, K. H., Hassan, F., Mukta, M. Z. N., Roy, D., Darr, D., Leggette, H., & Ullah, S. M. A. (2022). Application of the technology acceptance model to assess the use and preferences of ICTs among field-level extension officers in Bangladesh. *Digital Geography and Society*, *3*. https://doi.org/10.1016/j.diggeo.2022.100027

Lee, E. W. J., Lim, V. S. H., & Ng, C. J. K. (2022). Understanding public perceptions and intentions to adopt traditional versus emerging investment platforms: The effect of message framing and regulatory focus theory on the technology acceptance model. *Telematics and Informatics Reports*, *8*. https://doi.org/10.1016/j.teler.2022.100024

Ly, B., & Ly, R. (2022). Internet banking adoption under Technology Acceptance Model—Evidence from Cambodian users. *Computers in Human Behavior Reports*, *7*. https://doi.org/10.1016/j.chbr.2022.100224

Marpaung, J. F., Yasirandi, R., & Makky, M. Al. (2021). Examining the Actual System Use of CodePolitan' Consumers during the COVID-19 Pandemic Using TAM. *Proceedings - 2021 International Conference on Software Engineering and Computer Systems and 4th International Conference on Computational Science and Information Management, ICSECS-ICOCSIM 2021*, 92–97. https://doi.org/10.1109/ICSECS52883.2021.00024

Mata, M., Ancheta, R., Batucan, G., & Gonzales, G. G. (2024). Exploring technology acceptance model with system characteristics to investigate sustainable building information modeling adoption in the architecture, engineering, and construction industry: The case of the Philippines. *Social Sciences and Humanities Open*, *10*. https://doi.org/10.1016/j.ssaho.2024.100967

Meiryani, Sylvania, S., & Yunita. (2023). Assessing Accountant's Satisfaction Through Accounting Benefits and Technology Acceptance Model (TAM) in ERP System Implementation: A Quantitative Study on SMEs in Indonesia. *Proceedings - 2023 International Conference on Innovation, Knowledge, and Management, ICIKM 2023*, 31–37. https://doi.org/10.1109/ICIKM59709.2023.00015

Muhasyah, S., Hamidah, & Suhud, U. (2024). Can a Mandatory Information System Enhance User Satisfaction and Individual Performance within Organization? *Pakistan Journal of Life and Social Sciences*, *22*(2), 12623–12634. https://doi.org/10.57239/PJLSS-2024-22.2.00901

Mukred, M., Mokhtar, U. A., Hawash, B., AlSalman, H., & Zohaib, M. (2024). The adoption and use of learning analytics tools to improve decision making in higher learning institutions: An extension of technology acceptance model. *Heliyon*, *10*(4). https://doi.org/10.1016/j.heliyon.2024.e26315

Natasia, S. R., Wiranti, Y. T., & Parastika, A. (2021). Acceptance analysis of NUADU as e-learning platform using the Technology Acceptance Model (TAM) approach. *Procedia Computer Science*, *197*, 512–520. https://doi.org/10.1016/j.procs.2021.12.168

Pal, D., & Vanijja, V. (2020). Perceived usability evaluation of Microsoft Teams as an online learning platform during COVID-19 using system usability scale and technology acceptance model in India. *Children and Youth Services Review*, *119*. https://doi.org/10.1016/j.childyouth.2020.105535

Panagoulias, D. P., Virvou, M., & Tsihrintzis, G. A. (2023). Tailored Explainability in Medical Artificial Intelligence-empowered Applications: Personalisation via the Technology Acceptance Model. *Proceedings - International Conference on Tools with Artificial Intelligence, ICTAI*, 486–490. https://doi.org/10.1109/ICTAI59109.2023.00077

Parham-Mocello, J., & Gupta, A. (2023). Using the Technology Acceptance Model to Understand Intention to Use a CS-Based Curriculum. *Proceedings - Frontiers in Education Conference, FIE*. https://doi.org/10.1109/FIE58773.2023.10343359

Putri, G. A., Widagdo, A. K., & Setiawan, D. (2023). Analysis of financial technology acceptance of peer to peer lending (P2P lending) using extended technology acceptance model (TAM). *Journal of*

Open Innovation: Technology, Market, and Complexity, *9*(1). https://doi.org/10.1016/j.joitmc.2023.100027

Rodríguez-López, M. E., Higueras-Castillo, E., Rojas-Lamorena, Á. J., & Alcántara-Pilar, J. M. (2024). The future of TV-shopping: predicting user purchase intention through an extended technology acceptance model. *Technological Forecasting and Social Change*, *198*. https://doi.org/10.1016/j.techfore.2023.122986

Rozan, M., Delia, P., Soleha, Hamdani, Puspita, C., & Zakariya, R. (2024). Analysis of User Satisfaction with The Implementation of The Shopee Application Using the TAM Method. *Journal of Artificial Intelligence and Engineering Applications (JAIEA)*, *3*, 829–833. https://doi.org/10.59934/jaiea.v3i3.521

Sharma, V., Jangir, K., Gupta, M., & Rupeika-Apoga, R. (2024). Does service quality matter in FinTech payment services? An integrated SERVQUAL and TAM approach. *International Journal of Information Management Data Insights*, *4*(2). https://doi.org/10.1016/j.jjimei.2024.100252

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, *46*(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Wang, C., Ahmad, S. F., Bani Ahmad Ayassrah, A. Y. A., Awwad, E. M., Irshad, M., Ali, Y. A., Al-Razgan, M., Khan, Y., & Han, H. (2023). An empirical evaluation of technology acceptance model for Artificial Intelligence in E-commerce. *Heliyon*, *9*(8). https://doi.org/10.1016/j.heliyon.2023.e18349

Widyanto, W., & Ariyani, N. (2023). Technology Acceptance Model To Analyze Satisfaction And Loyalty Of Users Of Satuguru Blockchain-Based Online Media Platform. *International Journal of Educational Research & Social Sciences*, *4*(4), 683–696. https://doi.org/10.51601/ijersc.v4i4.692

Xiang, M., Sha, L., & Qilin, Z. (2020). User Satisfaction Model of Functional Animation Design in the Digital Technology Perspective based on TAM. *Proceedings - 2020 International Conference on Innovation Design and Digital Technology, ICIDDT 2020*, 301–305. https://doi.org/10.1109/ICIDDT52279.2020.00061

Yaacob, Y., Mahmud, M. M., Ahmad, R., & A'Seri, M. S. M. (2023). Students' Satisfaction towards Blackboard: An Integration of Technology Acceptance Model for Quality eLearning. *Proceedings - 2023 10th International Conference on Electrical and Electronics Engineering, ICEEE 2023*, 236–240. https://doi.org/10.1109/ICEEE59925.2023.00050

Yang, B., & Zhao, Y. (2021). Research on the Continuance Intention of MOOC Platforms Based on the Technology Acceptance Model : A Case of MOOC Learning Platforms in Chinese Universities. *Proceedings - 2021 2nd International Conference on Artificial Intelligence and Education, ICAIE 2021*, 642–645. https://doi.org/10.1109/ICAIE53562.2021.00141

Yang, W., & Liu, Y. (2021). Research on Purchase Intention of Fresh Agricultural Products Based on TAM Model in Pre-sale Mode. *Proceedings - 2nd International Conference on E-Commerce and Internet Technology, ECIT 2021*, 302–309. https://doi.org/10.1109/ECIT52743.2021.00071