JOURNAL OF CREATIVE WRITING
VOLUME 8 ISSUE 3
2024, Pp 23-39
ISSN 2410-6259

HTTPS://DOI.ORG/10.70771/JOCW.129

EVALUATING USER SATISFACTION, PERCEIVED EFFICIENCY AND ENGAGEMENT OF UNIVERSITY WEBSITE FOR FACULTY, STAFF, AND STUDENTS OF BANGLADESHI UNIVERSITIES

ANGELA SAJJAN[1]
REBAKA KHANAM[2]
MD HOSSAIN MAHTAB[3]
NAZMUS SAKIB[4]

ABSTRACT
This study focuses on the relationship between user satisfaction, efficiency, and engagement with university websites, as well as the impact of age differences on these factors. Using a quantitative approach, data were collected from 220 users across three age groups (18–25, 26–30, and 31–60) and analyzed through regression and ANOVA. The findings reveal that user satisfaction and efficiency significantly influence engagement, explaining 67.2% of the variance. ANOVA results show notable differences in satisfaction, efficiency, and engagement across age groups. Older users (31–60) reported higher levels of satisfaction, efficiency, and engagement compared to younger users. These findings highlight the importance of user-centered website design that caters to diverse user needs. Prioritizing efficiency, usability, and satisfaction can enhance user engagement. This study underscores the critical role of satisfaction and efficiency in driving engagement with university websites. Future research should explore factors like cultural differences and technological advancements to further improve website design strategies.

INTRODUCTION

In the digital era, where paperless operations have become the norm, university websites play a critical role in facilitating academic and administrative tasks. However, many university websites fail to meet user expectations, leading to significant challenges for students, faculty, and administrative staff. Research highlights that poorly designed or underperforming websites can impede access to essential resources, depriving users of the full benefits of digitalization, such as enhanced efficiency and ease of use (DeLone & McLean, 2003). These inefficiencies often result in delayed tasks, increased operational

[1] Lecturer, Port City International University, Email: sajjanangela423@gmail.com, ORCID ID: 0009-0003-9060-6101
[2] Lecturer, Port City International University, ORCID ID: 0009-0001-4720-2473
[3] Postgraduate Researcher, Business Analytics, Northeastern University, MA, USA, ORCID: 0009-0003-1937-5291
[4] Universiti Teknologi Malaysia, ORCID ID: 0009-0006-6781-2267

costs, and frustration among users, further underscoring the importance of reliable and functional platforms.

The consequences of inadequate website performance are not limited to operational delays. Studies have shown that user satisfaction and perceived efficiency are key determinants of engagement with digital platforms (Ali et al., 2021). Websites that fail to meet these criteria may disengage users, reducing the likelihood of continued use and trust in the platform. Thus, it becomes imperative to explore the relationship between website user satisfaction, perceived efficiency, and user engagement in the context of university websites. Addressing these factors is essential to developing user-centered platforms that not only support academic and administrative functions but also enhance overall user experience and efficiency.

LITERATURE REVIEW

The questionnaire for evaluating user satisfaction with the University's online platform has been designed to include key components of the Information System Success Model (ISSM). This is a well-established theoretical framework based on recent research. Among various methods to measure information system success, the DeLone & McLean (2003) model is widely accepted and frequently used (Ojo, 2017). In 1992 The mode was proposed and it was considered one of the most significant and highly cited theories in information system research (Nguyen et al., 2015; Urbach & Müller, 2012).

The original model included only information quality and system quality, which were criticized as insufficient to fully understand system success. It Became more comprehensive and effective when service quality added to it (Nguyen et al., 2015).

Applications of the Model

The updated version of the model has been tested in different contexts. For example, Ali et al., (2021) found in a study on the tourism sector that system quality, information quality, and service quality are key factors for information system success. Nonetheless, research into the application of this approach for mobile travel applications in developing nations are limited. This research employs the DeLone and McLean (2003) model to fill this gap.

Reasons for Choosing the Model

1. Versatility: The model's components and connections have been evaluated across several domains, including clothing (Trivedi & Trivedi, 2018), e-wallets (Abbasi et al., 2022), e-learning environments (Hsu, 2023), and higher education (Khand & Kalhoro, 2020). This adaptability renders it appropriate for analyzing mobile travel applications.
2. Inclusion of Technological Advancements: The model has been adjusted to include service quality, particularly within e-commerce settings (DeLone & McLean, 2003).
3. Integrated Method: The model mixes technical dimensions (information and system quality) with human dimensions (service quality). This offers a more extensive viewpoint than the Technology Acceptance Model (TAM) introduced by Davis (1989).

This study includes emotional factors (enjoyment and engagement) as key predictors of user engagement. Emotional aspects are critical for understanding user behaviour in mobile travel app usage. Prior studies have shown the significance of these factors:

- Won et al. (2023) identified enjoyment as a key predictor of app usage.
- Liu et al. (2020) and Cheung & To (2021) found engagement to be a positive predictor of technology adoption and success.

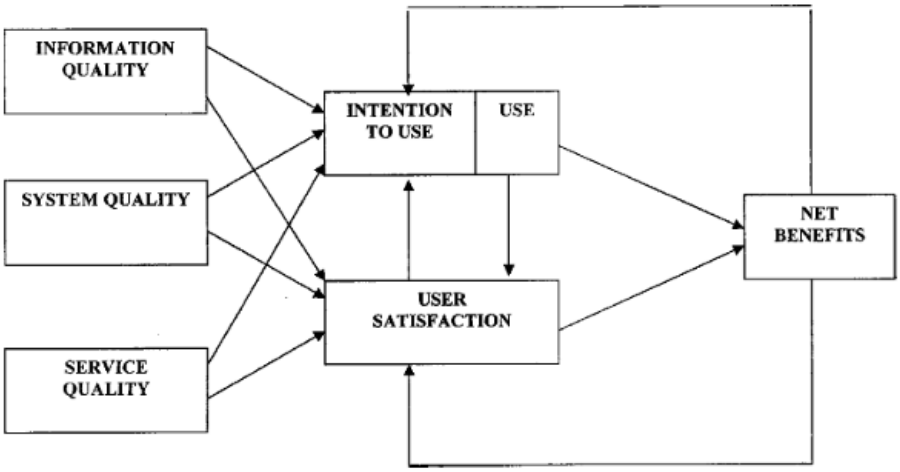

Figure 1: Updated D&M IS Success Model (DeLone & McLean, 2003)

User Satisfaction

System Quality

System quality usually refers to the characteristics that influence the usability, performance, and dependability of an information system. In the DeLone and McLean Information Systems Success Model (ISSM), system quality is recognized as an essential element for assessing the efficacy of an information system. This quality is measured through multiple facets, including navigation, design, and performance, based on user experience. Studies indicate that usability and system dependability are essential for user satisfaction and adoption, especially in the educational domain (DeLone & McLean, 2003).

High-quality systems simplify, accelerate, and make users' tasks more manageable. Gable et al. highlighted the technical and design elements when evaluating system quality. Users typically assess the functioning and design of a system as criteria for their experience. Romney and Steinbart have identified dependability, availability, timeliness, security, usability, flexibility, and customer service as critical factors for the success of an information system (IS). Meanwhile, Heidmann has stressed the importance of integration, flexibility, and media richness.

Ramayah & Lee (2012) classified system quality by characteristics including usability, adaptability, dependability, learnability, and efficiency. Bailey & Pearson (1983) measured system quality through criteria such as accessibility, adaptability, integration, and response time. Seddon emphasized the importance of stability, similarity in the user interface, user-friendliness, and maintainability in technological code.

Lee et al. (2009) measured system quality for web-based systems through the evaluation of network speed, availability, adaptability, integration, and response time. The main indicators of system quality Nelson et al. identified were reliability, adaptability, and response times.

Excellent systems inspire user happiness and excitement for system application. Particularly in e-learning, characteristics include system usability, simplicity of learning, availability, and fast reaction increase student experiences and raise the standard of

instruction. A good system not only satisfies user wants but also time-efficient and easily navigable, thereby raising production (Pituch & Lee, 2006).

Information Quality

The measures of information quality include correctness, relevancy, comprehensiveness, and clarity. These attributes significantly affect consumers' confidence in and trust on information systems. M. Ali et al. (2018) underlined the requirement of current, accurate, and well-defined knowledge to satisfy users' administrative and academic needs. By analyzing these factors, the platform guarantees dependability and reduces the necessity for supplementary information sources.

It is essential to successfully handle information, instead of simply accumulating it. Meade & Sarkis (1999) claimed that in the current competitive environment, just experience, abilities, and knowledge are insufficient. It is essential to convert these into real outcomes. This transformation, or "adaptability," assists organizations in achieving consumer satisfaction. Continuous learning and development are necessary to achieve adaptability, which is contingent upon the integration of technology and experience.

Professor Wang took Meade and Sarkis's work further. He found similarities between the quality of industrial products and information processing. Wang claimed that the processing of sensitive data to produce information products can enhance productivity. He recommended that companies manage their information with the same care as their products to enhance efficiency.

Turban et al. (2007) defined information as "data managed in a way that gives meaning to the user." Turban, Copeland, and Simpson enlarged this definition to include 'all communication or representation of knowledge, including facts or data, in any form or environment.'

DeLone and McLean (1992) proposed a model to evaluate information system success. It involves six elements: individual impact, organizational impact, system quality, information quality, usage, and user satisfaction. According to this paradigm, user satisfaction and usage are positively influenced by system quality and information quality. These factors influence individual behavior, which in turn affects the effectiveness of organizations.

Many researchers (e.g., Seddon & Kiew, 1996; Myers, James H and Shocker, 1981) later used this model to study organization-led information systems. Pitt et al.(1995) concluded that improving communication, changing user attitudes, and establishing clear requirements can improve the service quality of information systems.

Many research investigations, such as studies by Kettinger et al. (2009), have highlighted the significance of service quality in information systems. In 2003, DeLone and McLean updated their model. Service quality has been included as a fundamental factor affecting customer happiness and system utilization. This revised near assesses the efficacy of information systems by examining the relationship among system utilization, user happiness, and system advantages.

User satisfaction with the system's quality and information quality enhances individual performance. This efficiency results in improved efficiency within the organization. The majority of previous research analyzed information systems from a product viewpoint, frequently disregarding service quality (Pitt et al.,1995).To address this, DeLone and McLean (2003) added a "service quality" dimension to their model. This update reflects changes in the information systems environment, particularly the growth of e-commerce. The revised model measures the success of information systems by analyzing

system usage, user satisfaction, and overall benefits. It serves as a framework to assess the effectiveness of information processing systems.

Service Quality

This section analyzes the immediate accessibility of support and technical solutions for users. It analyzes the platform's efficacy in fulfilling user requirements according to four SERVQUAL dimensions: responsiveness, assurance, reliability, and empathy (Turban et al., 2007).

Research indicates that high service quality enhances user confidence and elevates satisfaction levels. When users receive timely technical support and clear guidance, they feel less frustrated even when facing issues and are more comfortable using the platform (Quinn et al., 2009).

Usage and User Satisfaction

This section examines the platform's user experience and functionality. It emphasizes the significance of user engagement, satisfaction, and a desire to recommend the platform to others.

Regular and continuous usage of a platform by users indicates their confidence and happiness. According to the DeLone and McLean Information Systems Success Model, satisfaction is both a cause and an outcome of successful systems (DeLone & McLean, 2003).

Net Benefits

This section investigates the platform's impact on users' efficacy, speed, and reduced reliance on external assistance. It emphasizes the advantages of improved resource management, quicker manufacturing, and time efficiency.

Research shows that an effectively built platform improves user efficiency and improves procedures. It not only keeps time but also minimizes irritation (Sagandira & Berg, 2020).

In education, these platforms are especially helpful in enhancing user engagement and pleasure. This evaluation evaluates the platform's ability to accelerate tasks and guarantee an excellent user experience.

Perceived Website Effectiveness

User experience depends critically on perceived efficiency, which reflects users' capacity to complete activities with a system requiring little time and effort. It includes factors that together define the success of a website: speed, dependability, accessibility, and simplicity of use.

Reaction and Velocity

User satisfaction and efficiency are much affected by the speed with which a website loads and responds to user interactions. Studies reveal that consumers of websites with lag or delay are likely to leave them (Ali et al., 2021). Easy navigation and fast loading times help to build user confidence and motivate regular visits (DeLone & McLean, 2003). Maintaining user involvement and lowering irritation also depend on information being easily found within a suitable timescale (Nguyen et al., 2015).

Consistency and Dependability

Perceived efficiency depends on dependability—defined by regular access and few technological problems. Regular mistakes, crashes, or unavailability erode users' faith in the system, which causes discontent and less use (Ketinger et al., 2009). Stable functionality guarantees visitors can finish their activities without interruptions, so supporting the impression of the website as a trustworthy tool (Pituch & Lee, 2006).

Accessibility and Navigation

Basic elements of website design include accessibility and easy navigation. Good layout and easy design enable users to locate material rapidly and reduce cognitive burden (Ramayah & Lee, 2012). Particularly for users with different goals and different technological knowledge, easily navigable websites improve perceived efficiency (Cheung & To, 2021).

Task Completion and Easy Use

A pillar of supposed efficiency is task efficiency—that is, the capacity to finish projects with ease. Websites that offer clear direction, reduce the need for outside assistance, and simplify task completion encourage users to feel autonomous and satisfied (Ali et al., 2018). Effective processes and clear directions help users to feel confident about their capacity to use the platform (DeLone & McLean, 2003).

General Considered Efficiency

The whole effect of speed, dependability, accessibility, and task completion shapes general efficiency. When a website satisfies users' performance expectations and cuts the time needed for administrative or academic work, they consider it to be efficient. This view supports user involvement and platform confidence (Wan Roslina et al., 2022).

User Involvement

User engagement in the context of systems is the degree of attention, involvement, and emotional investment users show. Positive user experiences, satisfaction, and ongoing use have been linked to high degrees of engagement.

Frequency and Regularity of Use

Regular and continuous use of a website reveals user dependability and interaction. Even in cases when users do not have immediate demands, websites offering pertinent, timely information stimulate frequent visits (Ali et al., 2021). Furthermore, reflecting trust in the content and functionality of the website is consistency in using (Cheung & To, 2021).

Interaction and involvement

Interactive elements and interactive opportunities improve user involvement. Participating actively in online services including form filings or applications helps one to feel involved and satisfied (N Nguyen et al., 2015). Interesting elements inspire users to explore the platform and participate (Hsu, 2023).

Emotional Attachment and Contentment

User happiness and a connection with the platform define emotional involvement. Viewing a system as essential part of their academic or administrative experience, satisfied users are more likely to feel emotionally involved in it (DeLone & McLean, 2003). A good emotional connection supports loyalty and ongoing participation (Liu et al., 2020).

Relevance and Considered Usefulness

User involvement directly results from the relevancy and usefulness of website content. Websites offering relevant, current information enable users to keep informed and monitor development, hence encouraging engagement and purpose (Won et al., 2023). Relevant material guarantees visitors view the website as useful for their daily activities (Ali et al., 2018).

Frequent interaction with Websites

Frequency, interaction, emotional investment, and perceived value taken together define engagement. Indicating a good general experience, engaged visitors are more likely to suggest the website to others and return for updates (Ramayah & Lee, 2012). This participation helps the website to be the main source of information for activities connected to universities (Wan Roslina et al., 2022).

RESEARCH OBJECTIVES

1. What is the role of website user satisfaction and perceived efficiency on user engagement.
2. What is the difference among various age groups of website users in satisfaction, perceived website efficiency, and website engagement.

METHODOLOGY

Research Design

This study employs a comparative research design to investigate differences in website user satisfaction, perceived efficiency, and engagement among different user groups, including students, faculty, and administrative staff. A comparative design is ideal for examining how specific variables differ across groups based on demographics, roles, or other defining characteristics (Cohen et al., 2017). This approach enables the identification of patterns and trends that may inform targeted improvements to university websites, particularly for enhancing user satisfaction and engagement.

The comparative research design aligns with the study's objectives to:

1. Analyze the role of website user satisfaction and perceived efficiency in influencing user engagement.
2. Examine differences in satisfaction, perceived efficiency, and engagement across various age groups and roles.

By using this design, the study can identify disparities in website experiences across user groups and evaluate how these differences impact overall website usage. This provides actionable insights for creating user-centered designs tailored to the specific needs of diverse user demographics.

Sample

The sample was stratified by type of university and usage experience. A significant proportion of participants had 2–3 years of experience using the website, with 38.2% and 30.9% reporting 2 and 3 years of usage, respectively. Universities included in the study ranged from prestigious public institutions such as Dhaka University to private entities like North South University, ensuring diverse representation.

The sample for this study consisted of 220 participants representing three primary roles within the university community: students, faculty members, and non-academic staff. Among these, the majority (81.8%) were students, followed by 10.9% non-academic staff, and 7.3% faculty members. Participants were drawn from both public and private universities, with 45.5% from public institutions and 54.5% from private ones.

Age distribution among the respondents ranged from 19 to 64 years, with the majority (34.5%) aged 23, followed by 16.4% aged 24, and smaller percentages distributed across other age groups. Participants reported varying frequencies of using the university website for academic purposes: 38.2% used the website daily, 30.9% weekly, 14.5% monthly, and 16.4% occasionally. For non-academic purposes, most participants (57.4%) accessed the website occasionally, while fewer reported daily (5.6%), weekly (14.8%), or monthly (22.2%) usage.

Data Analysis Techniques

To assess how satisfaction and perceived efficiency (independent variables) influence user engagement (dependent variable), Multiple Regression Analysis was employed. This method is appropriate for examining the relationship between multiple independent variables (satisfaction and perceived efficiency) and a continuous dependent variable (user engagement). The regression coefficients (β) indicated the strength and direction of the

relationships. This analysis measured the strength of the relationship using R^2 and adjusted R^2, which indicated the proportion of variance in user engagement explained by the predictors.

Secondly, to compare satisfaction, perceived efficiency, and engagement across different age groups (categorical independent variable) One-Way ANOVA was used.

ANOVA is used to test for differences in mean scores of satisfaction, perceived efficiency, and engagement among the age groups. For this, assumptions include checking for normality and homogeneity of variances (Levene's test). Post-hoc tests (e.g., Tukey's HSD) can identify specific group differences if the ANOVA result is significant. In this analysis, effect size was measured with Eta-squared (η^2) or Omega-squared (ω^2) to evaluate the practical significance of the differences.

Table 1: Summary of Statistical Approaches

Research Objective	Variables	Analysis Type	Post-Hoc Test/Evaluation
Role of satisfaction and efficiency on engagement	IVs: Satisfaction, Perceived Efficiency DV: Engagement	Multiple Regression	R2, coefficients (β)
Differences among age groups in satisfaction, efficiency, and engagement	IV: Age Group (categorical) DVs: Satisfaction, Perceived Efficiency, Engagement	One-Way ANOVA	Tukey's HSD, η2\ / ω2

THE MEASURE

System Quality

Fundamentally, users' impressions of usability, speed, and dependability—qualities included in DeLone and McLean's Information Systems Success Model (ISSM)—are what define an information system's success. The questionnaire items center on elements like navigation, design, and performance, in line with results stressing simplicity of use and system dependability as fundamental to user satisfaction and system acceptance in academic environments (DeLone & McLean, 2003). Empirical research confirm that these elements greatly affect users' experiences and involvement as, in educational situations, high satisfaction and recurring use depend on dependable, user-friendly systems (Wan Roslina et al., 2022).

Information Quality

Key elements impacting user trust and dependence on information systems include accuracy, relevance, completeness, and clarity, hence questions evaluating information quality center on these aspects. Al-Okaily et al. (2020) underline that addressing users' administrative and academic needs depends on timely, accurate, and precisely given knowledge. By evaluating these features, this component seeks to guarantee that the platform satisfies its function as a consistent source of information, which is especially important in lowering the demand for other information sources (Frontiers, 2021).

Service Quality

The part on Service Quality assesses technical support timeliness and accessibility to support resources. These products evaluate how well the platform meets user demands in terms of help and direction in line with SERVQUAL dimensions—responsiveness, assurance, dependability, and empathy. Studies indicate that user happiness depends on

efficient support since timely technical assistance and easily available materials raise users' confidence in utilizing academic platforms (IIETA, 2023). The framework of this part draws on best practices from studies on educational IT services, where assistance quality is regularly connected to improved user happiness and lowered irritation with system problems.

Usage and User Satisfaction

This section of the survey gauges users' involvement, level of satisfaction, and probability of platform recommendation. Strong markers of user trust in a system and satisfaction include literature supports for frequency of usage and simplicity of autonomous navigation. Studies on ISMS show that user satisfaction is a precursor and result of good system use; satisfied users are more likely to keep using and advocating the platform (DeLone & McLean, 2003; Wan Roslina et al., 2022). These products thus enable to better capture the whole user experience and offer analysis on the effectiveness of the system in satisfying users' administrative and academic requirements.

Net Benefits

The section on Net Benefits at last evaluates how well the platform increases users' efficiency, involvement, and decrease of external assistance requirements. These questions below are meant to gauge perceived benefits, which studies find to be fundamental results of a well-functioning information system: better efficiency and easier access to university resources (Ghobakhloo & Tang, 2015). Platforms that improve user productivity and lower the demand for outside assistance help to increase user satisfaction and involvement in educational settings, therefore accomplishing the main objectives of information systems in such circumstances.

Supported by ISM and ServQUAL models, this methodical methodology offers a strong platform for evaluating user happiness. Covering important elements validated in past research, the questionnaire seeks to provide thorough understanding of the user experience with the National University of Bangladesh's online platforms, so ensuring that results reflect both academic rigor and practical relevance (Wan Roslina et al., 2022; IIETA, 2023).

RESULTS

Demographic Analysis

Role Distribution

Out of the 220 respondents, the largest group was students (81.8%), followed by non-academic staff (10.9%) and faculty members (7.3%). This distribution highlights a predominance of student representation in website usage patterns.

Age Distribution

Participants' ages spanned from 19 to 64 years, with a median age of 23 years. A notable concentration was observed in the younger age groups, with 34.5% aged 23 and 16.4% aged 24. Representation from older age groups (e.g., ages 50 and above) was minimal but ensured inclusivity.

Website Usage Frequency

For academic purposes, 38.2% of respondents reported daily website use, followed by 30.9% using it weekly, 14.5% monthly, and 16.4% occasionally. Non-academic website usage was predominantly occasional (57.4%), with smaller proportions reporting monthly (22.2%), weekly (14.8%), or daily (5.6%) access.

University Types

Respondents were split between public (45.5%) and private (54.5%) universities. This nearly equal distribution ensures insights reflect experiences across diverse institutional settings.

Years of Experience

A significant majority of respondents reported using the website for 2–3 years, accounting for 69.1% of the sample, while smaller percentages reported 1 year (16.4%) or 4+ years (12.8%).

Multiple Regression Analysis

Model Summary

The regression analysis examined the predictors of user engagement, with perceived efficiency and user satisfaction as independent variables. The model demonstrated a strong relationship between the predictors and user engagement, with $R=0.819$, indicating a high correlation. $R^2=0.672$, meaning that 67.2% of the variance in user engagement is explained by perceived efficiency and user satisfaction. Adjusted $R^2=0.668$, confirming the model's reliability after accounting for the number of predictors. The ANOVA test confirmed the model's statistical significance $F(2,217)=221.804$, $p<0.001$, indicating that the predictors significantly explain the variance in user engagement.

Coefficients and Significant Predictors

The coefficients table revealed that Perceived Efficiency was the strongest predictor, suggesting that perceived efficiency significantly contributes to user engagement $\beta=0.599$, $t=11.981$, $p<0.001$. On the other hand, user satisfaction ($\beta=0.297$, $t=5.948$, $p<0.001$) also significantly predicts user engagement, but to a lesser extent than perceived efficiency. The constant term was not significant ($p=0.808$).

Normality Diagnostics

The normality of residuals was also checked. In histogram, the residuals showed a normal distribution with a mean close to 0. While in P-P Plot, the standardized residuals closely followed the diagonal line, supporting the assumption of normality. Finally, in Scatterplot, residuals appeared randomly distributed, indicating no major violations of homoscedasticity.

Collinearity Diagnostics

Collinearity statistics confirmed no multicollinearity issues as such Tolerance level was 0.605 for both predictors. And VIF value was 1.652 for both predictors.

Residual Statistics

Predicted values ranged from 1.852 to 4.701, with a mean of 3.406. Residuals had a mean of 0 and a standard deviation of 0.374, indicating a well-fitted model.

Interpretation of MRA results

To sum all above, the regression analysis highlights that both perceived efficiency and user satisfaction significantly predict user engagement. Perceived efficiency had the stronger impact, explaining more of the variance. The model explained 67.2% of the variability in user engagement, with all assumptions of normality, linearity, and homoscedasticity satisfied. These findings emphasize the importance of perceived efficiency and user satisfaction in designing user-centered university websites.

ANOVA Results Report

A one-way ANOVA was conducted to examine the differences in user satisfaction, perceived efficiency, and user engagement across three age groups: 18–25, 26–30, and 31–60.

Homogeneity of Variances

Levene's test for homogeneity of variances indicated that the assumption of equal variances was met for perceived efficiency ($p=0.394$) and user engagement ($p=0.320$), but not for user satisfaction ($p=0.047$).

The ANOVA Results

The ANOVA results revealed significant differences among age groups for all three dependent variables. For User Satisfaction, the analysis yielded $F(2,217)=10.885$, $p<0.001$, $\eta 2=0.091$, indicating a moderate effect size. Similarly, for Perceived Efficiency, the results were $F(2,217)=10.068$, $p<0.001$, $\eta 2=0.085$, reflecting a small to moderate effect. Finally, for User Engagement, the findings showed $F(2,217)=10.874$, $p<0.001$, $\eta 2=0.091$, again with a moderate effect size. These results suggest that age significantly influences user satisfaction, perceived efficiency, and engagement, with meaningful differences among the three age groups.

Post-hoc Analysis

Post-hoc comparisons using Tukey's HSD test revealed the following significant differences for all three variables, the age group 31–60 scored significantly higher than both 18–25 ($p<0.001$) and 26–30 ($p<0.001$). No significant differences were found between the 18–25 and 26–30 age groups ($p>0.05$).

Effect Sizes

The effect sizes ($\eta 2$) were small to moderate for all three dependent variables, indicating meaningful differences in satisfaction, efficiency, and engagement among age groups.

Interpretation of ANOVA Results

The findings indicate that older users (31–60) report significantly higher levels of satisfaction, perceived efficiency, and engagement with university websites compared to younger users (18–30). This suggests that older users may prioritize reliability, usability, and efficiency more than younger users. However, the lack of significant differences between the 18–25 and 26–30 age groups highlight a uniform experience within these younger demographics.

DISCUSSION

The findings of this study provide significant insights into the relationship between user satisfaction, perceived efficiency, and user engagement with university websites, as well as the impact of age differences on these variables. The results align with existing literature, emphasizing the critical role of well-designed and efficient online platforms in fostering user satisfaction and engagement.

The regression analysis revealed that perceived efficiency and user satisfaction are significant predictors of user engagement, explaining 67.2% of the variance in engagement levels. Perceived efficiency emerged as the strongest predictor ($\beta=0.599$, $p<0.001$), corroborating previous research highlighting the importance of system quality and performance in influencing user behavior (DeLone & McLean, 2003). This finding emphasizes the need for university websites to prioritize speed, reliability, and ease of navigation to enhance user engagement (Ali et al., 2021). User satisfaction ($\beta=0.297$, $p<0.001$) was also significant, though less impactful than efficiency, suggesting that satisfaction plays a complementary role in engaging users with the platform.

The ANOVA results further demonstrated significant differences among age groups in satisfaction, efficiency, and engagement ($F(2,217)=10.885$, $p<0.001$; $F(2,217)=10.068$, $p<0.001$; $F(2,217)=10.874$, $p<0.001$, respectively). Older users (31–60) consistently reported higher satisfaction, efficiency, and engagement scores compared to younger age groups (18–25 and 26–30). These findings suggest that older users may value website reliability, stability, and intuitive design more than younger users, as supported by studies on system quality in educational contexts (Pituch & Lee, 2006; Ramayah & Lee, 2012). The lack of significant differences between the younger age groups highlights the uniformity of their experiences and potentially lower expectations for website performance.

The observed significance of perceived efficiency is consistent with the Information System Success Model (ISSM), which identifies system quality, information quality, and service quality as critical dimensions influencing user satisfaction and system usage (DeLone & McLean, 2003). Websites with faster loading times, intuitive navigation, and reliable performance are more likely to meet users' academic and administrative needs, fostering a sense of trust and engagement (Nguyen et al., 2015; Wan Roslina et al., 2022).

These findings also underscore the importance of tailoring website designs to address the specific needs of different user demographics. For example, younger users might benefit from features that enhance interactivity and provide dynamic content, while older users may prioritize reliability and usability. Such targeted approaches can improve overall satisfaction and engagement levels, ensuring the website serves as an effective tool for academic and administrative tasks.

Implications for Practice

The results highlight the need for university administrators and web developers to prioritize efficiency enhancements through improving the website speed, reducing downtime, and ensuring seamless navigation. In addition, satisfaction drivers must be incorporated in the light of user feedback to align website features with user preferences. Lastly, demographic customization should also be addressed by designing features that cater to the unique expectations of different age groups.

CONCLUSION

This study highlights the critical role of perceived efficiency and user satisfaction in fostering user engagement with university websites. Perceived efficiency emerged as the most significant predictor, emphasizing the need for websites that are fast, reliable, and easy to navigate. User satisfaction also plays an important complementary role, reflecting the impact of meeting user expectations on engagement.

Significant differences in satisfaction, efficiency, and engagement across age groups underscore the need for demographic-specific website designs. Older users (31–60) reported higher satisfaction and engagement levels, suggesting a preference for reliable and stable platforms, while younger users may benefit from features that enhance interactivity and dynamic content.

These findings offer valuable insights for university administrators and web developers, emphasizing the importance of user-centered design strategies to improve website functionality and user experience. Future research should explore additional factors, such as cultural and technological influences, to develop more inclusive and adaptive website designs.

REFERENCE

Abbasi, G. A., Sandran, T., Ganesan, Y., & Iranmanesh, M. (2022). Go cashless! Determinants of continuance intention to use E-wallet apps: A hybrid approach using PLS-SEM and fsQCA. *Technology in Society*, *68*, 101937. https://doi.org/https://doi.org/10.1016/j.techsoc.2022.101937

Ali, F., Terrah, A., Wu, C., Ali, L., & Wu, H. (2021). Antecedents and consequences of user engagement in smartphone travel apps. *Journal of Hospitality and Tourism Technology, 12*(2), 355–371. https://doi.org/10.1108/JHTT-09-2020-0221

Ali, M., Raza, S. A., Qazi, W., & Puah, C. H. (2018). Assessing e-learning system in higher education institutes: Evidence from structural equation modelling. *Interactive Technology and Smart Education, 15*(1), 59–78. https://doi.org/10.1108/ITSE-02-2017-0012

Bailey, J. E., & Pearson, S. W. (1983). Development of a Tool for Measuring and Analyzing Computer User Satisfaction. *Management Science*, *29*, 530–545. https://api.semanticscholar.org/CorpusID:195703234

Cheung, M. F. Y., & To, W. M. (2021). Effect of customer involvement on co-creation of services: A moderated mediation model. *Journal of Retailing and Consumer Services, 63*, 102660. https://doi.org/10.1016/j.jretconser.2021.102660

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, *13*(3), 319–339. https://doi.org/10.2307/249008

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems, 19*(4), 9–30. https://doi.org/10.1080/07421222.2003.11045748

Hsu, L. (2023). What makes good LMOOCs for EFL learners? Learners' personal characteristics and Information System Success Model. *Computer Assisted Language Learning, 36*(1–2), 1–25. https://doi.org/10.1080/09588221.2021.1899243

Kettinger, W., Park, S.-H., & Smith, J. (2009). Understanding the consequences of information systems service quality on IS service reuse. *Information & Management*, *46*, 335–341. https://doi.org/10.1016/j.im.2009.03.004

Khand, Z. H., & Kalhoro, M. R. (2020). Testing and Validating DeLone and MacLean IS Model: ERP System Success in Higher Education Institutions of Pakistan. *Engineering, Technology & Applied Science Research*, *10*(5), 6242–6248. https://doi.org/10.48084/ETASR.3762

Lee, S., Shin, B., & Lee, H. G. (2009). Understanding Post-adoption Usage of Mobile Data Services: The Role of Supplier-side Variables. *Journal of the Association for Information Systems*, *10*(12), 2. https://doi.org/10.17705/1jais.00217

Liu, Y., Li, Q., Edu, T., & Negricea, I. C. (2020). Exploring the Continuance Usage Intention of Travel Applications in the Case of Chinese Tourists. *Journal of Hospitality & Tourism Research, 47*(1), 6–32. https://doi.org/10.1177/1096348020962553

Meade, L. M., & Sarkis, J. (1999). Analyzing organizational project alternatives for agile manufacturing processes: An analytical network approach. *International Journal of Production Research*, *37*(2), 241–261. https://doi.org/10.1080/002075499191751

Myers, James H and Shocker, A. D. (1981). The nature of product-related attributes. *Research in Marketing*, *5*(5), 211–236.

Nguyen, T. D., Nguyen, T. M., & Cao, T. H. (2015). Future data and security engineering: Second international conference, FDSE 2015 Ho Chi Minh City, Vietnam, November 23–25, 2015 proceedings. *Lecture Notes in Computer Science, 9446*, 242–256. https://doi.org/10.1007/978-3-319-26135-5

Ojo, A. I. (2017). Validation of the delone and mclean information systems success model. *Healthcare Informatics Research*, *23*(1), 60–66. https://doi.org/10.4258/hir.2017.23.1.60

Pitt, L. F., Watson, R. T., & Kavan, C. B. (1995). Service Quality: A Measure of Information Systems Effectiveness. *MIS Quarterly*, *19*(2), 173–187. https://doi.org/10.2307/249687

Pituch, K. A., & Lee, Y. K. (2006). The influence of system characteristics on e-learning use. *Computers & Education, 47*(2), 222–244. https://doi.org/10.1016/j.compedu.2004.10.007

Quinn, A., Lemay, G., Larsen, P., & Johnson, D. (2009). Service quality in higher education. *Total Quality Management & Business Excellence*, *20*, 139–152. https://doi.org/10.1080/14783360802622805

Ramayah, T., & Lee, J. (2012). System characteristics, satisfaction and e-learning usage: A structural equation model (SEM). *Turkish Online Journal of Educational Technology, 11*, 196–206.

Sagandira, C., & Berg, K. (2020). *User Interface design in e-commerce and it impacts on consumer trust*. https://doi.org/10.13140/RG.2.2.31943.32164

Seddon, P., & Kiew, M.-Y. (1996). A Partial Test and Development of Delone and Mclean's Model of IS Success. *Australasian Journal of Information Systems*, *4*(1 SE-Research Articles). https://doi.org/10.3127/ajis.v4i1.379

Trivedi, J. P., & Trivedi, H. (2018). Investigating the Factors That Make a Fashion App Successful: The Moderating Role of Personalization. *Journal of Internet Commerce*, *17*(2), 170–187. https://doi.org/10.1080/15332861.2018.1433908

Turban, E., Aronson, J. E., & Liang, T.-P. (2007). DECISION SUPPORT SYSTEMS AND INTELLIGENT SYSTEMS. In *Prentice-Hall Of India Private Ltd*. https://doi.org/10.1089/dia.2022.2504

Urbach, N., & Müller, B. (2012). Informations Systems Theory: Vol.2. *Springer*, *28*(May), 461. https://doi.org/10.1007/978-1-4419-6108-2

Wan Roslina, W. M. A., Zainon, M. A., & Nurhasyima, M. A. (2022). Evaluating library information system success: Applying the DeLone and McLean model. *International Journal of Integrated Engineering, 14*(3), 175-183. https://doi.org/10.30880/ijie.2022.14.03.020

Wang, F., Ding, L., Yu, H., & Zhao, Y. (2020). Big data analytics on enterprise credit risk evaluation of e-Business platform. *Information Systems and E-Business Management*, *18*(3), 311–350. https://doi.org/10.1007/s10257-019-00414-x

Won, D., Chiu, W., & Byun, H. (2023). Factors influencing consumer use of a sport-branded app: the technology acceptance model integrating app quality and perceived enjoyment. *Asia Pacific Journal of Marketing and Logistics, 35*(5), 1112–1133. https://doi.org/10.1108/APJML-09-2021-0709/full/xml

Appendix: Questionnaire
Demographic Information

Role	Age Group	Frequency of Use	Years of Experience Using the NU Website
1. Student 2. Faculty 3. Staff	1. 18-25 2. 26-35 3. 36-45 4. 46+	**1. Academic purposes:** Daily / Weekly / Monthly / Occasionally **2. Administrative purposes:** Daily /	1. Less than 1 year 2. 1-2 years 3. 3-5 years 4. More than 5 years

		Weekly / Monthly / Occasionally	

User Satisfaction
Section 1: System Quality

Please rate each item below on a scale from 1 to 5, where: 1 - Strongly Disagree, 2 – Disagree, 3 – Neutral, 4 – Agree, 5 - Strongly Agree

1. The website is easy to navigate and use.
2. The design and layout of the website are visually appealing.
3. The website loads quickly and operates smoothly.
4. The website is compatible with different devices (e.g., mobile, tablet, desktop).
5. The website is reliable and rarely has technical issues.
6. The website's design supports easy access to frequently used sections.

Section 2: Information Quality

1. The information on academic programs is relevant to my needs.
2. The information on administrative services is relevant to my needs.
3. The content on the website is clear and easy to understand.
4. The website provides up-to-date information.
5. The information available on the website is accurate.
6. The website provides complete information on academic, administrative, and student-related matters.

Section 3: Service Quality

1. I can easily find support resources (e.g., help desk, FAQ) on the website.
2. The support resources are helpful and provide effective assistance.
3. Technical support addresses issues in a timely and effective manner.
4. I can easily locate contact options for technical support on the website.
5. The website provides adequate guidance on how to use its features.

Section 4: Usage

1. I frequently use the website to complete academic or administrative tasks.
2. I can easily find what I am looking for on the website without needing additional help.
3. I feel comfortable navigating the website independently.
4. The website facilitates my academic or administrative tasks effectively.
5. I can independently find the answers to my questions on the website.
6. I use the website to access important information related to my studies or work.

Section 5: User Satisfaction

1. Overall, I am satisfied with my experience using the website.
2. The website meets my expectations for an academic institution's platform.
3. I would recommend the website to others as a reliable information source.
4. Compared to other university websites, I find this website satisfactory.
5. The website's features and functionality fulfill my needs.
6. The website adequately supports my needs as a university community member.

Section 6: Net Benefits

1. The website has improved my efficiency in completing academic or administrative tasks.
2. The website has made it easier for me to participate in university activities.
3. The website has reduced my reliance on external assistance for university-related information.
4. The website positively impacts my engagement with the university community.
5. Using the website helps me manage my university tasks more efficiently.
6. The website has helped reduce in-person visits or phone inquiries for university-related assistance.

Perceived Efficiency

Section 1: Speed and Responsiveness

1. The website loads quickly on my device.
2. I rarely experience delays or lagging while navigating the website.
3. Information on the website is easy to find within a reasonable amount of time.

Section 2: Reliability and Stability

1. I can access the website consistently without experiencing unexpected downtime.
2. The website functions reliably without frequent errors or crashes.
3. The website is available and functional whenever I need it for my tasks.

Section 3: Accessibility and Navigation

1. The website's layout makes it easy for me to navigate between sections.
2. The website's design is intuitive, allowing me to find what I am looking for quickly.
3. I am able to access all necessary information without extensive searching or repeated clicks.

Section 4: Task Completion and Ease of Use

1. I can complete my tasks (e.g., viewing results, applying for services) efficiently on the website.
2. The website provides clear guidance or instructions for tasks when needed.
3. I rarely need to seek external help (e.g., from staff) to use the website effectively.

Section 5: Overall Perceived Efficiency

1. Overall, I feel the website is well-designed for the purposes it serves.
2. The website meets my expectations for efficient performance.
3. Using the website reduces the time I need to spend on university-related tasks

User Engagement

Section 1: Frequency and Consistency of Use

1. I frequently use the university website for my academic or administrative needs.
2. I visit the website regularly, even when I don't have immediate needs.
3. I rely on the website as a primary source of information for university-related matters.

Section 2: Interaction and Participation

1. I actively explore different sections of the website to stay informed.
2. I participate in online services provided on the website (e.g., filling forms, submitting applications).
3. I feel motivated to interact with the website's features when new information is available.

Section 3: Emotional Investment and Satisfaction

1. I feel a sense of satisfaction when using the website.
2. Using the website makes me feel connected to the university community.

3. I feel that the website adds value to my overall university experience.

Section 4: Perceived Usefulness and Relevance

1. I find the website's information relevant and useful for my daily university activities.
2. I feel engaged when I use the website to track my academic progress or access resources.
3. The website helps me stay up-to-date with important events and announcements from the university.

Section 5: Overall Engagement with the Websites

1. Overall, I am engaged with the university websites and their contents.
2. I would recommend the website to other students, faculty, or staff as a useful resource.
3. The website keeps me interested and motivated to return for updates.