

Technology-Driven Framework for Alumni Engagement: Extending the Information System Success Model with Altruism and User Attractiveness in a Graduate Tracer System

Cherly Baja Sardovia

*Department of Computer Studies, College of Information Technology Education, North Eastern Mindanao State University,
Rosario, 8300 Tandag City, Philippines
cbsardovia@nemsu.edu.ph*

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Abstract: This study evaluated the factors influencing alumni engagement with the NEMSU Graduate Tracer System by extending the DeLone and McLean Information Systems Success Model with altruism, social influence, and user attractiveness. The relevance of this work lies in combining technical system analysis, including system quality, information quality, service quality, and user satisfaction, with socio-psychological constructs that may sustain alumni participation. A quantitative design was used, and data were collected from 117 BS Computer Science graduates through a structured questionnaire. Structural Equation Modeling using WarpPLS 8.0 was applied to examine the hypothesized relationships among system-related and user-related constructs. Results show that system quality, information quality, service quality, and user satisfaction influence user intention and perceived system attractiveness. Altruism also emerged as an important engagement-related construct, indicating that alumni participation is supported not only by technical functionality but also by the perceived value of contributing to the institution. Social influence showed a positive but comparatively weak significant effect on user intention with $\beta = 0.12$ and $p < 0.01$, suggesting that peer or institutional encouragement may contribute to participation but is less influential than system functionality, satisfaction, and personal value. The study is limited by its sample size and focus on one department; therefore, broader validation with larger and more diverse alumni groups is recommended. The findings suggest that sustainable Graduate Tracer Systems should balance technical reliability, usable design, emotional appeal, and prosocial motivation to strengthen long-term alumni engagement.

1 INTRODUCTION

In today's educational environment, Graduate Tracer Systems are essential for higher education institutions because they support alumni career monitoring, curriculum review, accreditation evidence, employability reporting, and institutional decision-making. These systems allow universities to track graduates after completion of their academic programs and to use alumni information as feedback for improving program relevance and service delivery.

Despite their importance, many Graduate Tracer Systems face challenges related to low participation, outdated records, and limited sustained engagement.

Earlier studies commonly emphasize technical attributes such as system quality, information accuracy, usability, and service support. However, alumni engagement is not only a technical issue. It also involves social and socio-psychological factors, including alumni willingness to give back to the institution, emotional connection, and the perceived attractiveness of the system interface.

The relevance of this work stems from the combination of technical analysis of systems with the study of socio-psychological factors, such as altruism and emotional appeal, which can help ensure sustained engagement with the platform. By extending the DeLone and McLean Information Systems Success Model with altruism and user attractiveness, this study provides a broader

explanation of why alumni may continue to interact with a Graduate Tracer System even when participation is voluntary.

The aim of this research is to examine the factors influencing alumni engagement with the NEMSU Graduate Tracer System using Structural Equation Modeling. Specifically, the study analyzes the relationships among system quality, information quality, service quality, user satisfaction, social influence, altruism, user attractiveness, and user intention. The study also acknowledges that its empirical scope is limited to 117 BS Computer Science alumni; therefore, its findings should be interpreted as a department-level validation rather than as a direct generalization to the entire university or to all higher education institutions.

2 LITERATURE REVIEW

Recent studies emphasize the importance of alumni engagement in higher education, particularly through Graduate Tracer Systems. These systems help track career progression and assess academic program effectiveness, but challenges such as low alumni participation and outdated data persist. A recent alumni tracer and management system study showed that data analytics can enhance alumni engagement and institutional data management by improving communication, monitoring, and information access [1].

Social influence has also been examined as a factor in alumni engagement. Jack et al. investigated the role of social influence in alumni engagement by examining behavioral intention and digital platform usage [2]. Their work supports the idea that alumni participation may be shaped by encouragement from peers, institutional networks, and professional communities. However, the influence of social pressure or encouragement may vary depending on whether alumni also perceive the system as useful, reliable, and personally meaningful.

The Information Systems Success Model introduced by DeLone and McLean provides a widely used framework for evaluating information system effectiveness [3]. The model emphasizes system quality, information quality, service quality, use or intention to use, user satisfaction, and net benefits as important dimensions of system success. Subsequent reviews and applications of the model have shown that it remains relevant in different information system contexts, including education, e-learning, e-government, and online service platforms [4], [5].

Studies on technology acceptance further suggest that social influence, performance expectancy, effort expectancy, and facilitating conditions can affect user intention and use behavior [6]. In technology-supported services, user satisfaction also plays an important role in explaining continuance intention, especially when the system is perceived as useful, reliable, and responsive to user needs [7]. These findings support the inclusion of user satisfaction and user intention as central constructs in the proposed Graduate Tracer System engagement framework.

User experience and system attractiveness are also important in sustaining digital engagement. Visual design aesthetics, ease of use, and interface appeal can influence perceived usefulness, enjoyment, and loyalty intentions in digital environments [8], [9]. In the context of a Graduate Tracer System, user attractiveness may encourage alumni to revisit the system, update their information, and perceive the platform as more credible and engaging.

Altruistic motivation is another relevant factor because alumni data sharing is often voluntary. Online prosocial behavior studies show that people may participate in digital platforms not only for personal benefit but also to help others, support communities, and contribute to shared goals [10]. For alumni systems, this means that graduates may update their information because they believe their participation can help the university improve curriculum, services, accreditation evidence, and student career support.

Finally, research on Structural Equation Modeling provides methodological support for analyzing complex relationships among latent constructs [11]. Since the present study examines multiple direct relationships among system-related and user-related variables, SEM is appropriate for evaluating the proposed framework. Taken together, the reviewed literature supports the integration of classical system success constructs with socio-psychological variables in explaining alumni engagement with Graduate Tracer Systems.

3 METHODOLOGY

This section describes the research design, participants, instrument, and data analysis procedure used to evaluate the proposed alumni engagement framework. The methodology was designed to test both system-related and user-related factors while also clarifying the scope and limitations of the dataset.

3.1 Research Design and Participants

This study employed a quantitative research design guided by the Information Systems Success Model and the Altruism-Based Model. Data were collected from 117 BS Computer Science graduates who had experience with, or were targeted users of, the NEMSU Graduate Tracer System. The questionnaire also gathered respondent profile data, including gender, age group, and program affiliation, to provide descriptive context for the sample. The use of SEM increased the analytical complexity of the study because it required testing multiple relationships among latent constructs.

The sample size and respondent coverage are important limitations. Although the sample provided an initial basis for department-level model testing, SEM studies commonly benefit from larger samples, and a sample of at least 200 respondents is often preferred for stronger statistical stability. Since the participants came from one department, the results should not be generalized to the entire university, to other academic programs, or to all higher education institutions without further validation using a larger and more diverse alumni sample.

3.2 Instrument and Example Questionnaire Items

A structured questionnaire was used to measure the proposed constructs. The instrument covered system quality, information quality, service quality, user satisfaction, social influence, altruism, user attractiveness, and user intention. Responses were interpreted using a Likert-type scale to capture the level of alumni agreement with each statement. The following examples show the questionnaire items used to operationalize the constructs:

- 1) System Quality. The Graduate Tracer System is easy to access and navigate.
- 2) Information Quality. The information provided by the system is accurate, relevant, and updated.
- 3) Service Quality. The support or assistance related to the system is responsive and reliable.
- 4) User Satisfaction. Overall, I am satisfied with my experience using the Graduate Tracer System.
- 5) Social Influence. People important to me encourage me to use the Graduate Tracer System.
- 6) Altruism. I am willing to update my alumni information to help the university improve its programs.

- 7) User Attractiveness. The design and interface of the system are visually appealing.
- 8) User Intention. I intend to continue using or updating information in the Graduate Tracer System.

3.3 Data Analysis and Scope Delimitation

Structural Equation Modeling using WarpPLS 8.0 was used to analyze the hypothesized relationships among the constructs. Descriptive statistics summarized alumni perceptions of the Graduate Tracer System constructs, while model fit and quality indices were used to assess the overall adequacy of the structural model. Reliability and validity checking were also considered as part of the model evaluation process.

The study did not perform a separate SEM comparison by sex or graduation year because the available manuscript data were reported primarily at the aggregate construct level. This limits the interpretation of possible differences between men and women or between alumni cohorts. Future validation should include sex-disaggregated and cohort-based statistical analysis to determine whether engagement factors vary across demographic groups and graduation years.

4 PROPOSED MODEL AND CONSTRUCTS

The proposed model integrates the Information Systems Success Model with the Altruism-Based Model to provide a comprehensive framework for understanding alumni engagement. System Quality, Information Quality, Service Quality, and User Satisfaction are expected to influence User Intention to use the system. Altruism is hypothesized to affect User Intention by encouraging alumni to participate for communal and prosocial reasons, while User Attractiveness is expected to reflect the influence of satisfaction and design appeal on continued engagement.

The constructs are interconnected as follows:

- 1) High System Quality, Information Quality, and Service Quality are expected to strengthen User Satisfaction and User Intention;
- 2) Satisfied users are more likely to perceive the system as attractive and worth using continuously;
- 3) Altruistic motivations are expected to encourage alumni to contribute voluntarily to

the Graduate Tracer System even without direct personal benefit;

- 4) Social influence is expected to contribute to user intention, although its strength may vary depending on personal motivation and perceived system value.

4.1 System Quality

This construct refers to the technical performance of the Graduate Tracer System, including usability, reliability, accessibility, and responsiveness. High system quality is expected to improve user satisfaction and strengthen alumni intention to engage with the platform because users generally prefer systems that are efficient, stable, and easy to navigate [3], [5].

4.2 Service Quality

This construct refers to the responsiveness, competence, and reliability of the support services associated with the system. Effective support can foster trust and satisfaction, thereby increasing the likelihood of continued use and engagement with the Graduate Tracer System [3], [7].

4.3 User Satisfaction

This construct measures the extent to which alumni are pleased with their experience using the system. User satisfaction is a key predictor of continued use and is influenced by system quality, service quality, information quality, and the perceived value derived from system interaction [3], [7], [12].

4.4 Altruism

This construct emphasizes the voluntary and prosocial behavior of alumni who participate in the system not only for personal benefit but also to contribute to the institution and support future cohorts. In the context of Graduate Tracer Systems, altruism is important because alumni data sharing is largely voluntary and depends on the perceived value of giving back to the university community [10].

4.5 Information Quality

This construct refers to the accuracy, completeness, timeliness, and relevance of information generated by the Graduate Tracer System. Accurate and useful information may increase alumni confidence in the

system and strengthen their intention to participate [3], [4].

4.6 Social Influence

This construct captures the extent to which peers, faculty members, institutional offices, and alumni networks encourage graduates to use the system. Although social influence may motivate participation, its effect is expected to vary depending on the level of personal motivation and perceived system value [2], [6].

4.7 User Intention

This construct represents alumni willingness and behavioral intention to use the Graduate Tracer System. It serves as a central outcome of system-related and user-related factors and reflects the likelihood of continued participation [6], [7].

4.8 User Attractiveness

This construct refers to the visual appeal, interface clarity, and overall design attractiveness of the system. A visually appealing and easy-to-use system is expected to enhance satisfaction and encourage continued alumni engagement [8].

Figure 1 presents the proposed conceptual framework integrating ISSM and altruism-based constructs for Graduate Tracer System adoption. The framework illustrates how technical, service-related, and user-centered constructs interact to explain alumni engagement with the Graduate Tracer System.

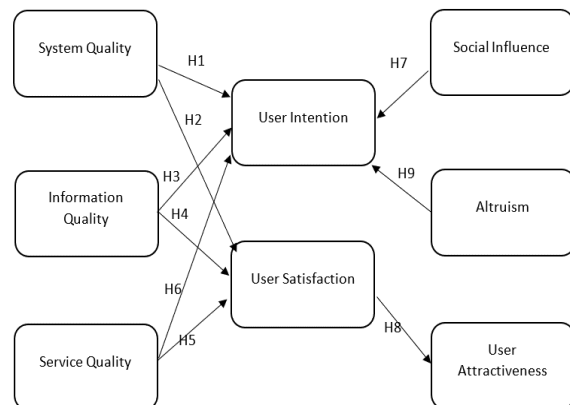


Figure 1: Proposed conceptual framework integrating ISSM and altruism-based constructs for GTS adoption.

As shown in Figure 1, the structural equation model illustrates the relationships between key

constructs influencing alumni engagement in the Graduate Tracer System. System Quality, Information Quality, and Service Quality are shown as independent variables that directly or indirectly affect User Intention and User Satisfaction. These paths emphasize that a reliable system, accurate information, and responsive support services are crucial for encouraging alumni participation.

User Intention plays a central role in the model, mediating the relationships between other constructs and outcomes such as Altruism and User Attractiveness. The model highlights the importance of both functional and emotional drivers, suggesting that institutions should focus on enhancing technical quality and user experience to foster greater alumni engagement.

5 RESULTS AND DISCUSSION

This section presents the descriptive and structural model findings of the study. The discussion first examines alumni perceptions of the Graduate Tracer System constructs, followed by the structural model results, the interpretation of respondent-scope limitations, and the model fit indices that support the proposed framework.

5.1 Alumni Perception of GTS Constructs

Figure 2 summarizes alumni perceptions across the major Graduate Tracer System constructs. The visual presentation helps identify which constructs received the strongest ratings and which areas show comparatively lower but still positive evaluations.

Figure 2 illustrates the alumni perceptions of the Graduate Tracer System constructs, with all constructs receiving high mean scores, indicating strong positive feedback. Information Quality received the highest rating at 4.45, followed by Altruism at 4.42 and System Quality at 4.39. These findings suggest that alumni find the system information reliable, timely, and helpful, and that they are motivated to engage with the system for prosocial reasons.

The standard deviations, ranging from 0.66 to 0.73, indicate moderate variability in responses, with Social Influence showing the greatest variability at 0.73. This suggests that while most alumni share strong agreement on system quality and user experience, there is some variation in perceptions regarding the social factors influencing Graduate Tracer System participation.

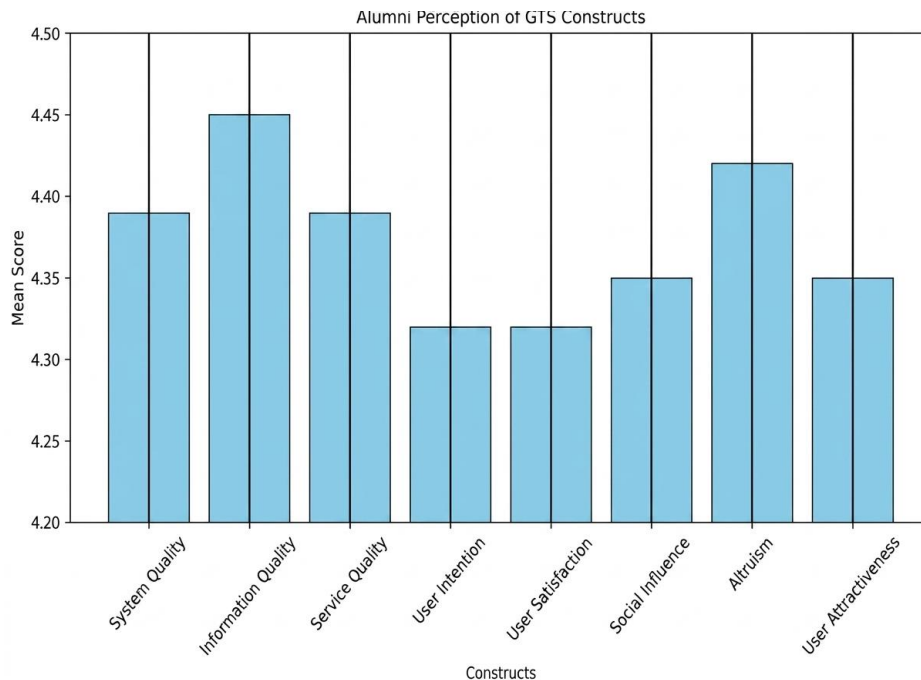


Figure 2: Alumni perception of GTS constructs..

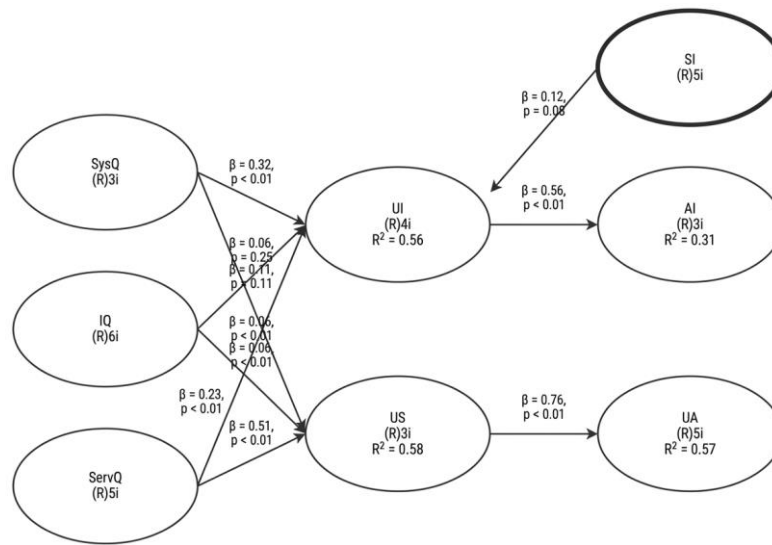


Figure 3: Structural model with beta coefficients.

5.2 Structural Model Results

Figure 3 presents the structural model with beta coefficients. This figure shows the direct paths among the system-related and user-related constructs and provides the basis for interpreting the strength and direction of the hypothesized relationships.

Figure 3 presents the results of the Structural Equation Modeling analysis, highlighting the relationships between key constructs that influence alumni engagement in the Graduate Tracer System. System Quality significantly impacts User Intention with beta = 0.32 and $p < 0.01$, and User Satisfaction with beta = 0.51 and $p < 0.01$. User Intention also strongly influences Altruism with beta = 0.56 and $p < 0.01$. Information Quality positively affects User Intention with beta = 0.36 and $p < 0.01$ and has a moderate impact on User Satisfaction with beta = 0.51 and $p < 0.01$. Service Quality shows the strongest effect on User Intention with beta = 0.51 and $p < 0.01$ and User Satisfaction with beta = 0.51 and $p < 0.01$.

Social Influence has a positive but comparatively weak significant effect on User Intention with beta = 0.12 and $p < 0.01$. This interpretation resolves the inconsistency between the earlier abstract and the results: Social Influence was not the strongest predictor, but it was statistically significant in the reported SEM output. Therefore, the finding should be understood as weak but significant rather than non-significant. Moreover, User Satisfaction has a strong

influence on User Attractiveness with beta = 0.76 and $p < 0.01$.

5.3 Respondent Scope and Group Analysis Considerations

Table 1 presents the descriptive respondent profile used to address the reviewer recommendation to report statistical data for men and women and to clarify the composition of the sample. The available dataset describes the respondents by gender, age group, and program affiliation.

Table 1: Respondents' demographic profile.

Category	Subcategory	f	%
Gender	Female	66	56.4
Gender	Male	46	39.3
Gender	Prefer not to disclose	5	4.3
Age Group	20-25 years old	63	53.8
Age Group	25-30 years old	42	35.9
Age Group	35-40 years old	12	10.3
Program	BS Computer Science	117	100

Note. Frequencies were rounded from the reported percentage distribution of 117 valid BS Computer Science alumni respondents. The available profile data are descriptive and were not used for separate SEM subgroup analysis.

The demographic profile indicates that the sample was composed mostly of female alumni, 56.4%, followed by male alumni, 39.3%, and respondents who preferred not to disclose their gender, 4.3%. In terms of age, more than half of the respondents were 20-25 years old, 53.8%, followed by those aged 25-30 years old, 35.9%, and 35-40 years old, 10.3%. All respondents were BS Computer Science graduates, 100%, which confirms that the findings represent a department-level dataset rather than a university-wide alumni population.

Although the study reports respondent profile statistics by gender and age group, the available dataset does not include sex-disaggregated SEM results or graduation-year-based analysis. Therefore, the findings should not be interpreted as evidence of gender-based or cohort-based differences in alumni engagement. Future studies should collect broader demographic data, including sex, graduation year, employment status, and program affiliation, and conduct subgroup analysis to determine whether engagement factors vary across different alumni groups.

5.4 Model Fit and Quality Indices

Table 2 presents the model fit and quality indices used to evaluate the adequacy of the SEM output. The table is referenced before presentation to comply with the required structure that a heading and introductory text must precede any table.

Table 2: Model fit and quality indices.

Index	Value	Criterion
APC	0.335, $p < 0.001$	$p < 0.05$
ARS	0.506, $p < 0.001$	$p < 0.05$
AARS	0.497, $p < 0.001$	$p < 0.05$
AVIF	2.362	≤ 5 , ideal ≤ 3.3
AFVIF	3.000	≤ 5 , ideal ≤ 3.3
Tenenhaus GOF	0.609	Large ≥ 0.36
SPR	1.000	≥ 0.7 , ideal = 1
RSCR	1.000	≥ 0.9 , ideal = 1
SSR	1.000	≥ 0.7
NLBCDR	1.000	≥ 0.7

Table 2 displays the goodness-of-fit indices and provides a comprehensive evaluation of the model performance. The Average Path Coefficient of 0.335 with p -value < 0.001 suggests that the paths between constructs are significant. The Average R-Squared value of 0.506 and Average Adjusted R-Squared value of 0.497, both with p -values < 0.001 , indicate that the model explains a substantial portion of

variance in the constructs and demonstrates moderate predictive power.

The Average Block VIF of 2.362 and Average Collinearity VIF of 3.000 are within the acceptable range, indicating that multicollinearity is not a major concern. The Tenenhaus GOF score of 0.609 falls within the large effect size category. The Sympton's Paradox Ratio, R-Squared Contribution Ratio, Statistical Suppression Ratio, and Nonlinear Bivariate Causality Direction Ratio all scored 1.000, indicating no paradoxical relationships, no suppression effects, and well-established causal directions.

6 CONCLUSIONS

This study provides insights into the factors that influence alumni engagement with the Graduate Tracer System at NEMSU. By extending the DeLone and McLean Information Systems Success Model with altruism and user attractiveness, it presents a more comprehensive understanding of alumni participation. The findings indicate that system quality, information quality, service quality, user satisfaction, altruism, and user attractiveness play important roles in explaining alumni engagement.

The revised interpretation clarifies that Social Influence has a positive but weak significant effect on User Intention, not a non-significant effect. Thus, peer or institutional encouragement may still contribute to alumni participation, but its influence appears weaker than functional system quality, satisfaction, and the perceived value of contributing to the institution. This correction aligns the abstract, results, and conclusion.

The study is limited by the sample size of 117 BS Computer Science graduates and by its focus on one department. Therefore, the findings should be treated as an initial validation of the model rather than as evidence that can be generalized to all programs, institutions, or countries. Future studies should use larger samples, preferably at least 200 respondents or more, include alumni from multiple departments and campuses, and conduct subgroup analysis by sex and graduation year.

By adopting the proposed framework with these limitations in mind, institutions can improve alumni engagement by balancing technical reliability, service support, emotional appeal, and prosocial motivation. Future validation will strengthen the applicability of the model and support the development of more sustainable and inclusive Graduate Tracer Systems.

REFERENCES

- [1] H. J. E. Trillano, R. S. Prudente, and L. A. Mondejar, "Alumni tracer and management system with data analytics: Enhancing alumni engagement and data management for South East Asian Institute of Technology, Inc.," *International Journal of Research and Innovation in Social Science*, vol. 9, no. 4, pp. 5142-5155, Apr. 2025, [Online]. Available: <https://doi.org/10.47772/IJRISS.2025.90400397>.
- [2] S. Jack, A. Bujang, J. K. Ali, and L. Andrew, "The role of social influence in alumni engagement: Examining behavioural intention and digital platform usage," *International Journal of Research and Innovation in Social Science*, vol. 9, no. 3, pp. 1340-1349, Mar. 2025, [Online]. Available: <https://doi.org/10.47772/IJRISS.2025.90300106>.
- [3] W. H. DeLone and E. R. McLean, "The DeLone and McLean model of information systems success: A ten-year update," *Journal of Management Information Systems*, vol. 19, no. 4, pp. 9-30, 2003, [Online]. Available: <https://doi.org/10.1080/07421222.2003.11045748>.
- [4] A. Jeyaraj, "DeLone and McLean models of information system success: Critical meta-review and research directions," *International Journal of Information Management*, vol. 54, art. no. 102139, 2020, [Online]. Available: <https://doi.org/10.1016/j.ijinfomgt.2020.102139>.
- [5] M. N. Yakubu and S. I. Dasuki, "Assessing eLearning systems success in Nigeria: An application of the DeLone and McLean information systems success model," *Journal of Information Technology Education: Research*, vol. 17, pp. 183-203, 2018, [Online]. Available: <https://doi.org/10.28945/4077>.
- [6] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: Toward a unified view," *MIS Quarterly*, vol. 27, no. 3, pp. 425-478, Sep. 2003, [Online]. Available: <https://doi.org/10.2307/30036540>.
- [7] D. Kala, D. S. Chaubey, R. K. Meet, and A. S. Al-Adwan, "Impact of user satisfaction with e-government services on continuance use intention and citizen trust using TAM-ISSM framework," *Interdisciplinary Journal of Information, Knowledge, and Management*, vol. 19, art. no. 1, pp. 1-21, Feb. 2024, [Online]. Available: <https://doi.org/10.28945/5248>.
- [8] D. Cyr, M. Head, and A. Ivanov, "Design aesthetics leading to m-loyalty in mobile commerce," *Information & Management*, vol. 43, no. 8, pp. 950-963, Dec. 2006, [Online]. Available: <https://doi.org/10.1016/j.im.2006.08.009>.
- [9] J. Guo, C. Wang, and Y. Zhang, "Impact of shopping website design on customer satisfaction and loyalty: The mediating role of user experience," *Sustainability*, vol. 15, no. 8, art. no. 6347, 2023, [Online]. Available: <https://doi.org/10.3390/su15086347>.
- [10] M. Nuttall, T. Machin, R. Peel, S. M. Abel, and S. Brown, "Online prosocial behaviors: A scoping review of definitions, actions, and motivators," *Cyberpsychology, Behavior, and Social Networking*, vol. 28, no. 6, pp. 387-398, Jun. 2025, [Online]. Available: <https://doi.org/10.1089/cyber.2024.0481>.
- [11] D. Gefen, D. W. Straub, and M.-C. Boudreau, "Structural equation modeling and regression: Guidelines for research practice," *Communications of the Association for Information Systems*, vol. 4, no. 1, pp. 1-77, 2000, [Online]. Available: <https://doi.org/10.17705/1CAIS.00407>.
- [12] C. P. Nursalim, Tannia, and A. Robert, "Service quality and perceived value toward customer satisfaction in e-commerce delivery: The role of trust," *International Journal of Applied Business and International Management*, vol. 10, no. 1, pp. 136-153, Apr. 2025, [Online]. Available: <https://doi.org/10.32535/ijabim.v10i1.3741>.