



E-Service Quality and Loyalty Driving E-Satisfaction and E-WOM in Higher Education

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Abstract

This study examines the influence of core e-service quality dimensions, information quality, website performance, and website confidentiality, on perceived emotional value, e-satisfaction, student loyalty, and electronic word-of-mouth (e-WOM) within the digital delivery of higher education services in Vietnam. Drawing upon the Stimulus–Organism–Response (SOR) framework, the Expectation–Confirmation Theory (ECT), and the Value-Based Adoption Model (VAM), this research investigates behavioral outcomes through psychological mediators. Data were collected from 311 university students with prior experience in using their universities' electronic service platforms, including learning and academic management systems. Measurement scales were adapted from established studies, and data were analyzed using Partial Least Squares Structural Equation Modeling (PLS–SEM). The results reveal that e-service quality positively influences perceived emotional value, which subsequently drives e-satisfaction, student loyalty, and e-WOM. Furthermore, student loyalty reinforces e-WOM, underscoring the critical role of digital engagement in higher education. This study contributes to existing theory by integrating service quality dimensions, emotional responses, and behavioral intentions into a unified model. It also offers practical insights for enhancing student engagement, optimizing digital learning environments, and strengthening institutional reputation in today's increasingly competitive digital education landscape.

Keywords:

E-Satisfaction;
E-Service Quality;
E-WOM;
Higher Education;
Loyalty.

Article History:

| | | | |
|-------------------|----|----------|------|
| Received: | 10 | August | 2025 |
| Revised: | 12 | November | 2025 |
| Accepted: | 17 | November | 2025 |
| Published: | 08 | December | 2025 |

1- Introduction

The rapid digital transformation in higher education has fundamentally redefined how educational quality is perceived and delivered. Beyond curriculum design and teaching effectiveness, the quality of students' online experiences has become a critical determinant of institutional reputation and student satisfaction [1]. The COVID-19 pandemic further accelerated this transformation, compelling universities worldwide to invest in technological infrastructure, enhance website performance, and strengthen cybersecurity to sustain effective and engaging learning environments [2, 3]. In this increasingly competitive context, ensuring seamless, reliable, and secure online services has evolved from an operational requirement into a strategic advantage that directly influences student satisfaction, loyalty, and information-sharing behaviors [4, 5]. Meanwhile, electronic word-of-mouth (e-WOM) has emerged as a powerful form of informal digital communication, especially through social media, significantly shaping institutional reputation and influencing prospective students' decisions [6-8].

Despite extensive research on e-service quality, satisfaction, and loyalty in commercial settings such as e-commerce [9], empirical evidence in the higher education sector, particularly within emerging economies like Vietnam, remains

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DOI: <http://dx.doi.org/10.28991/ESJ-2025-SIED1-019>

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limited. Few studies have explored how specific e-service quality dimensions, including information quality, website performance, and website confidentiality, shape students' emotional value, e-satisfaction, and e-WOM behaviors [7]. Nevertheless, with the rise of artificial intelligence (AI), the emerging concept of AI-generated word-of-mouth (AI-WOM) illustrates how personalized recommendation systems can replicate and amplify users' online advocacy [10]. Managing e-WOM effectively today thus provides a foundation for developing reliable and intelligent AI-WOM in the future.

To address this gap, the present study integrates three theoretical frameworks, the Stimulus–Organism–Response (SOR) framework [11], the Expectation–Confirmation Theory (ECT) [12], the Value-Based Adoption Model (VAM) [13], to construct and test a comprehensive structural model. This framework explains how students evaluate online educational services, perceive emotional value, and engage in loyalty and e-WOM behaviors. The findings are expected to contribute to theory by deepening the understanding of digital service quality in higher education and to offer practical insights for enhancing student engagement and strengthening institutional reputation. The remainder of this paper is organized as follows: Section 2 reviews relevant literature and presents the proposed research model; Section 3 outlines the research methods; Section 4 reports and discusses empirical findings; and Section 5 concludes with theoretical and managerial implications, limitations, and future research directions.

2- Literature Review and Research Model

2-1- Literature Review

Electronic Word-of-Mouth (e-WOM) refers to any positive or negative statement made by former, current, or potential customers about a product, service, or business that is widely disseminated through the Internet [6]. Essentially, e-WOM inherits and expands upon traditional WOM, which is defined as the verbal exchange of information related to the speaker's experience with a product or service [14]. Unlike traditional WOM, e-WOM has the potential to spread rapidly across space and time due to its digital nature and persistent availability on online platforms [8, 15, 16]. Today, e-WOM is not limited to textual formats but also includes visual content, videos, or even implicit consumer behaviors that are publicly shared online [17].

Stimulus-Organism-Response (SOR) is a foundational theoretical framework that explains how external environmental stimuli influence individual behavioral responses through internal emotional and cognitive processes [11]. In this model: (1) Stimuli are external environmental factors capable of triggering psychological reactions; (2) the organism represents internal states such as emotions, perceptions, or attitudes; and (3) the response refers to the individual's behavioral reaction, such as approach or avoidance [18].

Expectation-Confirmation Theory (ECT) explains how individuals' expectations formed before using a service influence their post-use satisfaction and subsequent behavioral intentions [19]. The theory posits that positive confirmation leads to satisfaction, while negative disconfirmation results in dissatisfaction. Initially, consumers form expectations based on prior experience, available knowledge, and information from various sources [20]. After the consumption experience, they compare actual performance with their initial expectations. If the perceived performance exceeds expectations, satisfaction occurs; if it falls short, dissatisfaction ensues [21]. The degree of confirmation thus directly impacts satisfaction, which in turn influences future behavioral intentions [22].

Value-Based Adoption Model (VAM) analyzes individuals' intentions to adopt a service based on their perceived value, defined as the trade-off between perceived benefits and perceived sacrifices [13]. According to Kim et al. [23], benefits include perceived usefulness and enjoyment, while sacrifices encompass technical complexity and perceived cost. This model extends the understanding of perceived value in the context of technology adoption, bridging the gap between service evaluation and technological behavior, and providing a more holistic view of user decision-making.

The conceptual model of this study is grounded in the integration of three foundational theories: the Stimulus–Organism–Response (SOR) [11], the Expectation–Confirmation Theory (ECT) [12], the Value-Based Adoption Model (VAM) [13]. First, the SOR model provides a comprehensive theoretical lens for explaining how external stimuli such as information quality, website performance, and website confidentiality shape learners' internal psychological states, including perceived emotional value and e-satisfaction, which subsequently lead to behavioral outcomes like loyalty and e-WOM. Second, the ECT enriches this framework by emphasizing the role of expectation and post-usage evaluation, thereby elucidating the formation of e-satisfaction as a key mediating factor. It explains how students compare their pre-use expectations with their actual online learning experiences to form satisfaction judgments. Finally, the VAM complements the two preceding models by highlighting the perceived value derived from the balance between perceived benefits (e.g., usefulness, enjoyment) and perceived sacrifices (e.g., cost, effort). It clarifies why perceived emotional value serves as a mediating mechanism that translates e-service quality into satisfaction and loyalty. The integration of SOR, ECT, and VAM thus creates a synergistic theoretical foundation that captures the cognitive–emotional–behavioral process of students' online learning experiences, ensuring both theoretical robustness and contextual relevance in the Vietnamese higher education setting.

2-2-Related Works

Recent research has continued to underscore the critical role of e-service quality in shaping user satisfaction and loyalty across digital environments. In the e-commerce context, Mamakou et al. [24] demonstrated a positive association between e-service quality and overall customer satisfaction. Extending this perspective to education, Alterkait et al. [9] confirmed that information quality exerts a significant impact on learners' satisfaction, highlighting its central role in digital learning experiences. Similarly, Ghazi et al. [25] found that perceived service quality influences student satisfaction both directly and indirectly through perceived value, emphasizing the mediating importance of value perception in educational service evaluation. In Vietnam, Nguyen et al. [26] revealed that university service quality significantly affects student satisfaction and loyalty, contributing valuable evidence to the understanding of student behavioral dynamics in higher education. Furthermore, Aslan & Aslan [27] emphasized that student satisfaction fosters positive word-of-mouth behavior, reinforcing its strategic importance in sustaining institutional reputation. Overall, studies conducted between 2023 and 2025 have predominantly focused on e-learning and e-commerce contexts, often assessing service quality as a broad construct rather than isolating specific dimensions of e-services in higher education. This research addresses that gap by examining distinct aspects of online service quality and their behavioral implications in the context of Vietnamese universities.

Growing scholarly interest has been directed toward understanding how perceived e-service quality, perceived emotional value, e-satisfaction, loyalty, and e-WOM interact within the context of higher education. These studies often draw on foundational theoretical frameworks such as the Stimulus-Organism-Response (SOR) [11], Expectation-Confirmation Theory [12], the Value-Based Adoption Model [13] to explain the psychological and behavioral responses of students engaging with digitalized academic services. One relevant study by Kethüda & Bilgin [28] explores how university-led social media marketing activities influence students' e-WOM behaviors. Their model categorizes activities into four dimensions: entertainment, interaction, trendiness, and personalization, the authors confirm that these activities significantly affect organizational image, satisfaction, and loyalty, ultimately reinforcing positive e-WOM. This study highlights the power of relational marketing to transform students into brand ambassadors in the digital landscape. Zeqiri et al. [29] examine how components of e-service quality, namely website performance, information quality, and security, affect students' perceived service quality, satisfaction, and e-WOM, they concluded that e-service quality serves as a key driver of favorable WOM behavior. Their work underlines the strategic importance of optimizing technical and informational aspects of university portals to enhance student experience. Leonnard [30] applies the E-S-QUAL model, which includes efficiency, fulfillment, system availability, and privacy, to investigate student satisfaction and loyalty in higher education. The findings show that efficiency and fulfillment strongly impact e-satisfaction, while privacy and fulfillment significantly influence e-trust. The study confirms that both e-trust and e-satisfaction serve as mediators in establishing student loyalty, thereby enriching the ECT perspectives within the educational context. Seo & Um [31] reframe service quality and perceived value in a blended learning environment, it revealed that e-service quality primarily contributes to perceived conditional value, while offline quality influences knowledge, social, and emotional values. Emotional and conditional values, in turn, emerge as decisive factors in student satisfaction. This multidimensional perspective on perceived value validates the relevance of the SOR framework in hybrid education contexts.

Collectively, these studies form a foundational body of literature that informs the current research. They emphasize the pivotal role of digital service experience in shaping students' emotional responses and behavioral intentions. The present study extends this body of work by focusing specifically on the Vietnamese higher education environment, exploring how perceived e-service quality translates into e-satisfaction, loyalty, and positive e-WOM within an emerging market context.

2-3-Research Model

Based on the SOR framework, research model is grounded in the Expectation-Confirmation Theory (ECT) [19], the Value-Based Adoption Model (VAM) [13], as well as recent contributions from Ashiq & Hussain [32]; Kethüda & Bilgin [28]; Seo & Um [31]; Theodosiou et al. [33]; Udo et al. [34]; Xiang & Wang [35]; and Zeqiri et al. [29]. The proposed research model is illustrated in Figure 1.

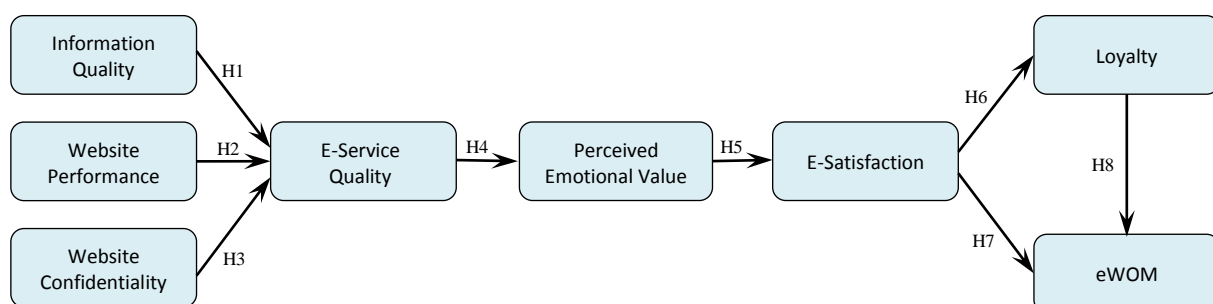


Figure 1. Research model

E-Service Quality (ESQ) is defined as the extent to which online service providers fulfill customer expectations [36]. Moreover, Parasuraman et al. [37] further note that high-quality e-service must deliver consistent support throughout the entire customer journey. ESQ dimension is not only associated with transaction efficiency but also with emotional and cognitive experiences that influence perceived value [38].

Information Quality (INQ) is defined as the degree of accuracy, completeness, timeliness, and relevance of the data provided by an information system to its users [39]. In online environments, INQ is reflected in how accurately and efficiently information is delivered, directly affecting user satisfaction and decision-making [40]. Furthermore, Kim et al. [41] emphasized that information technology is socially embedded and shaped by user interaction. High-quality information enhances both reliability and user experience personalization [39]. INQ is closely linked to E-Service Quality, with reliable, accessible information fostering positive system perceptions [42]. Accordingly, for higher education, hypothesis H1 is proposed as follows:

H1: Information Quality has a positive impact on E-Service Quality.

Website Performance (WEP) is a key indicator of a website's effectiveness, commonly assessed through traffic volume, user engagement, and return visit rate. From a technical perspective, it is influenced by system availability [37], and user-friendly interface design [43]. Besides, Vo et al. [44] found that WEP directly shapes customer experience and perceptions of service quality. Thus, hypothesis H2 is proposed as follows:

H2: Website Performance has a positive impact on E-Service Quality.

Website Confidentiality (WEC) concerns the ability of online platforms to safeguard users' personal information during digital transactions, service registration, or data exchange [29]. Besides, Montoya-Weiss et al. [45] highlighted that WEC not only influences users' evaluations of service quality but also shapes their risk perceptions. Berlo et al. [46] underscored Website Confidentiality as a cornerstone of user trust in information systems. Hence, for higher education, hypothesis H3 is proposed as follows:

H3: Website Confidentiality has a positive impact on E-Service Quality.

Perceived Emotional Value (PEV) represents the psychological benefits and emotional states experienced by users when interacting with a product or service [47]. PEV is derived from positive emotional responses triggered by the service experience. A high level of E-Service Quality is likely to enhance emotional value, whereby users feel understood and supported, fostering a positive user-platform relationship [31]. Hence, for higher education, hypothesis H4 is proposed as follows:

H4: E-Service Quality has a positive impact on Perceived Emotional Value.

E-Satisfaction (ESA) refers to the level of user satisfaction derived from online experiences [48]. Satisfaction is generally understood as a psychological state resulting from the evaluation of a service or transaction, incorporating both affective and cognitive dimensions [49]. It is influenced by factors such as prior expectations, service performance, and user enjoyment [3]. Moreover, Ledden et al. [50] emphasized the importance of individual value perceptions in shaping attitudes and behaviors in the educational context. Numerous studies have confirmed the direct link between emotional value and satisfaction. For instance, Ravald & Grönroos [51] found that higher Emotional Value leads to greater customer satisfaction, and Zeithaml [52] noted that emotionally satisfied consumers are more likely to exhibit positive attitudes. Hence, for higher education, hypothesis H5 is proposed as follows:

H5: Perceived Emotional Value has a positive impact on E-Satisfaction.

Loyalty (LOY) is broadly defined as a deeply held commitment to repurchase or continue using a service despite the presence of alternatives, encompassing both attitudinal and behavioral components such as preference, intention, and long-term engagement [53]. In the context of higher education, LOY manifests through continued enrollment, positive recommendations, and sustained alumni involvement [54]. One key driver of Loyalty is E-Service Quality, which includes responsiveness, reliability, and usability; when digital services meet or exceed expectations, students are more likely to remain loyal [55]. Research shows that such emotional bonds positively influence loyalty intentions [31]. E-Satisfaction, defined as students' positive evaluation of online platforms and services, has been shown to promote Loyalty as satisfied users are more likely to maintain long-term engagement with digital service providers [48]. Hence, for higher education, hypothesis H6 is proposed as follows:

H6: E-Satisfaction has a positive impact on Loyalty.

Electronic Word-of-Mouth (e-WOM) is a powerful form of informal digital communication that significantly shapes user decisions across various online contexts [6]. In the higher education sector, e-WOM plays a central role in influencing institutional image, as students increasingly share their experiences on digital platforms [56]. Research indicates that e-WOM behavior varies across user demographics, such as gender and levels of social media engagement [57]. E-Satisfaction, defined as students' favorable evaluation of digital learning platforms and services, enhances their

willingness to share positive experiences online [48]. Loyalty, understood as attitudinal and behavioral commitment, is a well-documented driver of e-WOM, as loyal students are more likely to recommend their institutions and promote them within their networks [40, 58-60]. Hence, for higher education, hypothesis H7 and H8 are proposed as follows:

H7: E-Satisfaction has a positive impact on e-WOM.

H8: Loyalty has a positive impact on e-WOM.

3- Research Methods

3-1-Data Collection and Measurement Scale

First, an initial measurement scale was developed based on well-established theoretical foundations and prior empirical studies, including the Stimulus-Organism-Response (SOR) [11], Expectation-Confirmation Theory (ECT) [19], and the Value-Based Adoption Model (VAM) [13]. Measurement items were adapted from validated instruments used in previous research, particularly those by Kethüda & Bilgin [28]; Seo & Um [31]; Zeqiri et al. [5], with necessary contextual modifications to suit the Vietnamese higher education environment (Appendix I).

The draft scale was subsequently reviewed by academic experts and practitioners in educational services and digital platforms to ensure content validity, semantic clarity, and contextual relevance. Based on expert feedback, several revisions were made to improve item precision and reliability. Following expert validation, a pilot study was conducted with a small sample of university students to assess the internal consistency of the scales. Upon refinement, the final questionnaire was formalized using a 5-point Likert scale, ranging from (1) Strongly Disagree to (5) Strongly Agree. Data were collected through an online survey employing a convenience sampling approach. The target population consisted of students currently enrolled in higher education institutions in Vietnam who had experience using digital academic platforms or services. The questionnaire was distributed via Google Forms over approximately one month. A total of 350 responses were obtained, of which 311 valid responses were retained for further analysis. All data were processed and analyzed using SmartPLS software. The analytical procedure consisted of several key stages, including: reliability testing, convergent and discriminant validity assessment, measurement model evaluation, and structural model testing using Partial Least Squares Structural Equation Modeling (PLS-SEM).

A 5-point Likert scale was employed in this study to ensure clarity and ease of response for participants, some of whom were not comfortable with lengthy online questionnaires. Previous research has shown that 5-point and 7-point scales often yield comparable reliability and validity when measuring attitude constructs [61]. Moreover, the 5-point format reduces respondent fatigue and cognitive load, which is particularly relevant for moderate-sized student samples. Nonetheless, future research may consider adopting a 7-point scale to capture finer distinctions in perception and increase variance in structural modeling.

3-2-Descriptive Statistics

Data collection was carried out between May and July 2025, yielding 311 valid responses. The survey sample primarily consisted of young individuals, with the majority aged between 18 and 22 (89.7%), followed by smaller portions aged 23–27 (7.1%) and 28–34 (3.2%). Notably, there were no participants over the age of 35. In terms of gender, 71.1% of respondents were female, while 28.9% were male, and no participant identified as other. Regarding their professions, the dominant group was students, accounting for 90.4% of the sample, whereas office workers and management staff comprised 5.8% and 0.6%, respectively; 3.2% selected “Other” as their job category. Concerning educational background, the majority of respondents held a high school or university qualification (81.4%), followed by those with a bachelor's degree (17.4%), while a few had completed a master's degree (0.3%) and none had a PhD. The analysis of internet usage revealed that 35.4% of participants used the internet for 10 to under 15 hours per day. Meanwhile, 57.9% reported using it for less than 10 hours per day, 6.1% for 15 to under 20 hours, and 0.6% for over 20 hours daily.

4- Research Results

4-1-Measurement Model Assessment

Convergent validity was assessed to determine the extent to which the observed variables correlate with the constructs they are intended to measure, while internal consistency reliability evaluates the coherence among the indicators of each construct. The detailed results of the measurement model assessment are shown in Table 2. Accordingly, the constructs and items are presented along with their respective outer loadings, Cronbach's alpha (α), Composite Reliability (CR), and Average Variance Extracted (AVE) values.

As recommended by Hair et al. [62], outer loading values exceeding 0.70 suggest acceptable indicator reliability. In this study, all indicators met this threshold, with loadings ranging from 0.711 to 0.885, indicating that each item reliably contributes to its respective latent construct. Internal consistency was assessed using Cronbach's Alpha and Composite

Reliability. Values above 0.70 are generally considered satisfactory. The constructs in this study showed Cronbach's Alpha values ranging from 0.717 (WEP) to 0.866 (EWM) and CR values ranging from 0.842 to 0.913, all of which support strong internal consistency reliability. The AVE value of 0.5 or higher indicates acceptable convergent validity [63]. All constructs in the model achieved AVE values ranging from 0.635 (ESQ) to 0.777 (WEC), satisfying the minimum criterion and confirming that each construct explains more than half of the variance of its indicators. The measurement model demonstrates adequate indicator reliability, internal consistency, and convergent validity. These findings affirm that the constructs are appropriately measured and that the model is suitable for further analysis using the PLS-SEM approach, as shown in Table 1.

The Heterotrait–Monotrait (HTMT) ratios used to assess discriminant validity (Table 2). Following the guidelines of Henseler & Sarstedt [64] and Kline [65], HTMT values below 0.85 indicate adequate discriminant validity, and all construct pairs in this study met this criterion. Nevertheless, recent literature, Hair et al. [62] suggests that for conceptually similar constructs, values up to 0.90 may still be acceptable. In this study, the HTMT values range from 0.503 to 0.877, with most values falling below the 0.85 threshold. Although some HTMT values slightly exceed 0.85, they remain within the acceptable limit of 0.90, indicating no serious threat to discriminant validity. Therefore, it can be concluded that the measurement scales used in this study adequately satisfy the requirement for discriminant validity.

Table 1. Constructs' reliability and validity assessment

| Construct | Item | Outer | α | CR | AVE |
|---------------------------|------|-------|----------|-------|-------|
| Information Quality | INQ1 | 0.869 | 0.762 | 0.863 | 0.678 |
| | INQ2 | 0.818 | | | |
| | INQ3 | 0.780 | | | |
| Website Performance | WEP1 | 0.711 | 0.717 | 0.842 | 0.642 |
| | WEP2 | 0.816 | | | |
| | WEP3 | 0.868 | | | |
| Website Confidentiality | WEC1 | 0.878 | 0.857 | 0.913 | 0.777 |
| | WEC2 | 0.883 | | | |
| | WEC3 | 0.885 | | | |
| E-Service Quality | ESQ1 | 0.814 | 0.808 | 0.874 | 0.635 |
| | ESQ2 | 0.738 | | | |
| | ESQ3 | 0.820 | | | |
| | ESQ4 | 0.814 | | | |
| Perceived Emotional Value | PEV1 | 0.867 | 0.824 | 0.895 | 0.740 |
| | PEV2 | 0.862 | | | |
| | PEV3 | 0.852 | | | |
| E-Satisfaction | ESA1 | 0.849 | 0.804 | 0.884 | 0.718 |
| | ESA2 | 0.834 | | | |
| | ESA3 | 0.858 | | | |
| Loyalty | LOY1 | 0.853 | 0.772 | 0.867 | 0.686 |
| | LOY2 | 0.781 | | | |
| | LOY3 | 0.849 | | | |
| e-WOM | EWM1 | 0.824 | 0.866 | 0.908 | 0.713 |
| | EWM2 | 0.866 | | | |
| | EWM3 | 0.853 | | | |
| | EWM4 | 0.834 | | | |

Table 2. Discriminant validity (HTMT)

| | INQ | WEP | WEC | ESQ | PEV | ESA | LOY | EWM |
|------------|-------|-------|-------|-------|-------|-------|-------|-----|
| INQ | - | | | | | | | |
| WEP | 0.767 | - | | | | | | |
| WEC | 0.668 | 0.656 | - | | | | | |
| ESQ | 0.724 | 0.807 | 0.743 | - | | | | |
| PEV | 0.599 | 0.570 | 0.513 | 0.687 | - | | | |
| ESA | 0.655 | 0.552 | 0.626 | 0.780 | 0.654 | - | | |
| LOY | 0.531 | 0.736 | 0.536 | 0.751 | 0.743 | 0.672 | - | |
| EWM | 0.577 | 0.567 | 0.503 | 0.652 | 0.775 | 0.664 | 0.877 | - |

4-2- Structural Model Assessment

Since the data for all constructs were collected from a single source, Harman's single-factor test was performed to examine the potential for common method bias [66]. All measurement items were entered into an unrotated exploratory factor analysis. The results indicated that the first factor accounted for 41.6% of the total variance, which is below the recommended threshold of 50%, suggesting that common method bias is not a serious concern in this study.

In addition, variance inflation factor (VIF) values were examined to assess potential multicollinearity issues. According to Hair et al. [62], a VIF value greater than 5 indicates a possible multicollinearity problem. As shown in Table 3, all VIF values were below 5, confirming that the model does not suffer from multicollinearity. Therefore, these results collectively indicate that the data are free from serious bias and that the model ensures validity and reliability (Table 3 and Figure 2).

In light of the observed deviation of PLE3 from the overall pattern of indicators within its construct, despite meeting the minimum outer loading requirement, the PLS-SEM approach was employed to ensure robust estimation. To further assess the statistical significance and reliability of the model parameters without assuming multivariate normality, the bootstrapping technique was applied. Based on the evaluation of the measurement model, including reliability assessment, convergent validity assessment, and discriminant validity assessment, the results indicate that the model meets the requirements to proceed with hypothesis testing using the bootstrapping technique with 5,000 resamples to examine the impact levels of the relationships. Most of the impact coefficients in the model show statistically significant relationships at a significance level of $p = 0.05$. The results of the hypothesis testing are summarized in Table 3.

Hypotheses with a p -value < 0.05 were accepted, while those with a p -value ≥ 0.05 were rejected. The regression analysis results, as presented in Table 3 and Figure 2, demonstrate that all hypothesized relationships are statistically significant at the 0.05 level. Specifically, Information Quality (INQ), Website Performance (WEP), and Website Confidentiality (WEC) exert significant positive effects on E-Service Quality (ESQ) (supporting H1–H3). Among these, WEC ($f^2 = 0.158$) exhibits the strongest influence, followed by WEP ($f^2 = 0.135$) and INQ ($f^2 = 0.052$), suggesting that users' perception of website confidentiality contributes most substantially to overall service quality. Furthermore, E-Service Quality (ESQ) positively influences Perceived Emotional Value (PEV) (H4, $f^2 = 0.458$), which, in turn, has a strong positive impact on E-Satisfaction (ESA) (H5, $f^2 = 0.399$). E-Satisfaction also plays a crucial role in enhancing Loyalty (LOY) (H6, $f^2 = 0.424$) and e-WOM (EWM) (H7, $f^2 = 0.088$). Finally, Loyalty (LOY) exerts a strong positive influence on e-WOM (EWM) (H8, $f^2 = 0.558$), confirming its mediating and amplifying role in shaping customers' behavioral intentions.

The inclusion of effect size indicators (f^2) allows for a more nuanced interpretation beyond mere statistical significance. According to Cohen's [67] guidelines, 0.02 (small), 0.15 (medium), and 0.35 (large), the model demonstrates several medium-to-large effects, particularly for the paths $ESQ \rightarrow PEV$, $ESA \rightarrow LOY$, and $LOY \rightarrow EWM$, highlighting both practical and statistical relevance. Table 3 also presents the 95% confidence intervals obtained through the bootstrapping procedure, all of which exclude zero, thereby further confirming the significance of the hypothesized relationships.

To assess the extent to which a variable is explained by the variance of a latent variable in each endogenous construct, researchers use the R^2 value [68]. After data analysis, the R^2 results were summarized by the author in Table 4. According to the analysis results, for EWM, this dependent variable has an adjusted R^2 value of 0.555. Therefore, the independent variables ESA and LOY explain 55.5% of the variance in EWM, indicating a substantial explanatory power of these constructs in shaping students' e-WOM behavior in the digital education context.

For E-Satisfaction (ESA), the dependent variable is influenced by three independent variables: INQ, WEP, and WEC, with an adjusted R^2 of 0.522. This suggests that over half of the variation in perceived service quality is explained by these digital service characteristics. In terms of PEV, which is predicted by ESQ, the adjusted R^2 is 0.312. This result

indicates that E-Service Quality accounts for approximately 31.2% of the variance in students' emotional value perception, demonstrating a moderate level of explanation. LOY is predicted by ESA, with an adjusted R^2 of 0.295, implying that ESA contributes to nearly 29.5% of the variance in Loyalty toward universities' digital service platforms. Similarly, ESA is predicted by PEV, and has an adjusted R^2 value of 0.283, meaning that PEV explains 28.3% of the variance in E-Satisfaction.

Table 3. Results of structural equation modeling

| H | Path | Coefficient | SD | t Statistics | p-value | f^2 | CI | | VIF | Result |
|----|-----------|-------------|-------|--------------|---------|-------|-------|-------|-------|----------|
| | | | | | | | 2.5% | 97.5% | | |
| H1 | INQ → ESQ | 0.203 | 0.064 | 3.193 | 0.001 | 0.052 | 0.083 | 0.325 | 1.792 | Accepted |
| H2 | WEP → ESQ | 0.323 | 0.064 | 5.071 | 0.000 | 0.135 | 0.198 | 0.447 | 1.736 | Accepted |
| H3 | WEC → ESQ | 0.342 | 0.049 | 7.035 | 0.000 | 0.158 | 0.232 | 0.444 | 2.250 | Accepted |
| H4 | ESQ → PEV | 0.561 | 0.053 | 10.586 | 0.000 | 0.458 | 0.454 | 0.656 | 2.054 | Accepted |
| H5 | PEV → ESA | 0.534 | 0.055 | 9.630 | 0.000 | 0.399 | 0.415 | 0.629 | 1.919 | Accepted |
| H6 | ESA → LOY | 0.546 | 0.049 | 11.23 | 0.000 | 0.424 | 0.444 | 0.635 | 1.799 | Accepted |
| H7 | ESA → EWM | 0.235 | 0.050 | 4.739 | 0.000 | 0.088 | 0.136 | 0.328 | 1.799 | Accepted |
| H8 | LOY → EWM | 0.593 | 0.046 | 12.873 | 0.000 | 0.558 | 0.495 | 0.680 | 1.767 | Accepted |

Table 4. R-squared and Q-squared

| | R^2 | R^2 adjusted | Q^2 |
|-----|-------|----------------|-------|
| ESQ | 0.526 | 0.522 | 0.325 |
| PEV | 0.314 | 0.312 | 0.226 |
| ESA | 0.285 | 0.283 | 0.194 |
| LOY | 0.298 | 0.295 | 0.189 |
| EWM | 0.558 | 0.555 | 0.388 |

According to Hair et al. [62], adjusted R^2 values ranging from 0.283 to 0.555 indicate a moderate level of explanatory power. This suggests that the proposed model accounts for a substantial portion of the variance in key behavioral outcomes such as e-satisfaction, loyalty, and e-WOM. In the context of higher education, such explanatory strength is theoretically and practically acceptable, as students' behavioral intentions are shaped by numerous external and psychological factors beyond the current model's scope. Hence, the findings demonstrate that the model effectively captures the core determinants of learners' engagement while leaving scope for additional contextual variables, such as perceived teaching quality, curriculum design, or peer interaction, to further enhance predictive accuracy in future research., to further enhance predictive accuracy in future studies.

To evaluate predictive relevance, Q^2 values were assessed, and all endogenous constructs recorded values greater than zero, confirming the model's out-of-sample predictive validity. Among these, EWM ($Q^2 = 0.388$) exhibited the highest predictive relevance, followed by ESQ ($Q^2 = 0.325$), PEV ($Q^2 = 0.226$), ESA ($Q^2 = 0.194$), and LOY ($Q^2 = 0.189$). As all Q^2 values exceed the 0.15 benchmark, the model demonstrates at least moderate predictive accuracy, reinforcing its practical utility in forecasting digital service outcomes within higher education environments.

4-3-Discussion

This study investigates how Information Quality, Website Performance, and Website Confidentiality influence students' perceptions of E-Service Quality, which in turn affects their Emotional Value, E-Satisfaction, Loyalty, and e-WOM within the context of higher education in Vietnam. A total of eight hypotheses were proposed and tested using structural equation modeling. All eight hypotheses were statistically supported based on the results.

The results show that the impact of INQ on ESQ is statistically significant, with H1 supported ($\beta = 0.203$; $p < 0.001$). This finding confirms that accurate and relevant information enhances users' perceptions of ESQ. It aligns with Zeqiri et al. [29], who reported a similar effect ($\beta = 0.242$) between IQ and ESQ. In line with the SOR framework, INQ serves as a stimulus shaping students' internal evaluations of digital services. Reliable information fosters positive impressions of ESQ, which may influence subsequent responses such as E-Satisfaction or Loyalty.

WEP significantly impacts ESQ, with H2 supported ($\beta = 0.323$; $p < 0.001$). The result affirms that strong technical performance enhances perceived service quality in online education. This is consistent with Zeqiri et al. [29], who found a stronger effect of WEP on ESQ ($\beta = 0.588$). The lower coefficient observed in this study may be partially explained

by contextual factors in Vietnam's higher education environment, where students might be accustomed to occasional technical limitations or place greater emphasis on information quality rather than system responsiveness. Notwithstanding, this interpretation should be treated with caution, as students' tolerance for technical issues was not directly measured in the current study. Future research could empirically investigate this factor to validate its influence. The analysis also supports H3 ($\beta = 0.342$; $p < 0.001$), indicating that WEC significantly influences ESQ. This is particularly relevant in digital education, where privacy concerns have grown due to increased online interactions. Compared to Zeqiri et al. [29], who found a smaller effect of WC on ESQ ($\beta = 0.099$), the stronger relationship in this study may reflect heightened privacy awareness among Vietnamese students. In the SOR framework, WEC acts as a stimulus shaping users' internal evaluations, highlighting the role of trust in enhancing perceived service quality.

H4 is confirmed with a strong and significant path coefficient ($\beta = 0.561$; $p < 0.001$), indicating that ESQ substantially influences PEV. This supports the notion that high-quality e-service not only fulfills functional expectations but also evoke emotional responses such as reassurance, appreciation, and connection, particularly important in the context of sustained digital learning. Compared to Seo & Um [31], who reported a smaller effect of OSQ on emotional value ($\beta = 0.182$), the stronger link here may be due to the emotional significance of academic services in the Vietnamese context. This reinforces the SOR model by demonstrating how service quality as a stimulus shapes users' emotional responses, ultimately fostering positive learning outcomes.

Hypothesis H5 is supported ($\beta = 0.534$; $p < 0.001$), indicating a strong impact of PEV on ESA in the context of online education. Compared to Seo & Um [31], who reported a lower coefficient ($\beta = 0.250$) for the link between Emotional Value and E-Satisfaction, the current result suggests a much stronger relationship. This difference may stem from contextual variation, while Seo & Um [31] focused on general satisfaction, this study emphasizes E-Satisfaction, which tends to be more sensitive to emotional experiences due to the absence of direct interaction. The finding aligns with both ECT and the SOR model, where PEV serves as a psychological state influenced by service stimuli and leads to behavioral responses such as satisfaction. This pathway highlights the importance of emotional rather than purely rational factors in digital learning, where learners increasingly seek humanized and emotionally fulfilling experiences.

Hypothesis H6 is supported ($\beta = 0.546$; $p < 0.001$), confirming that ESA exerts a strong and statistically significant influence on LOY in online higher education. This result aligns with foundational theories such as Expectation Confirmation and SOR, where satisfaction functions as an internal response triggered by service-related stimuli, subsequently shaping behavioral intentions like Loyalty. The finding is consistent with Leonnard [30], who demonstrated that student satisfaction significantly contributes to Loyalty in digital education, reinforcing the notion that fulfilled learners tend to maintain long-term engagement. Additionally, Kethüda & Bilgin [28] emphasize the mediating role of satisfaction between digital experiences and Loyalty, underlining its pivotal function in relationship-building. This study thus strengthens the established ESA–LOY linkage while extending its applicability to the digital education landscape, where students demand more personalized, responsive, and seamless service experience.



Figure 2. PLS-SEM results

H7 is supported ($\beta = 0.235$; $p < 0.001$), indicating that satisfied students are more likely to engage in positive e-WOM, such as leaving favorable reviews or recommending their institutions online. This finding fits well within the SOR model, where ESA, as an internal emotional state, leads to behavioral responses like e-WOM. While Kethüda & Bilgin [28] did not directly examine the ESA–e-WOM path, they did find that two E-Satisfaction-related variables influenced e-WOM with $\beta = 0.286$ and $\beta = 0.221$. The current result affirms the foundational role of E-Satisfaction in encouraging students to become digital advocates. This echoes findings by Santika et al. [60]; Serra-Cantallops et al. [69], who note that satisfied students often act as brand ambassadors. Enhancing ESA not only boosts student retention but also amplifies institutional reputation. H8 is strongly supported ($\beta = 0.593$; $p < 0.001$), confirming that LOY is a

major driver of positive e-WOM in online higher education. This supports the SOR framework, where Loyalty, shaped by previous experiences and emotional states, leads to proactive behavioral responses such as advocacy. The finding is aligned with Anderson & Srinivasan [48]; Pearson [70] who identified Loyalty as a key antecedent of WOM in digital settings. Similarly, Brown & Mazzarol [58]; Helgesen & Nettet [59]; Kethüda & Bilgin [28] emphasized that loyal students frequently promote their institutions online. This study affirms that in digital education, fostering Loyalty translates directly into enhanced e-WOM behavior.

Overall, the findings collectively confirm that e-service quality serves as a fundamental driver of students' emotional and behavioral outcomes in digital education. By validating the mediating roles of emotional value and e-satisfaction, this study extends the SOR framework and supports the theoretical propositions of ECT and VAM. Specifically, it demonstrates that the external stimuli of information quality, website performance, and website confidentiality not only influence cognitive evaluations but also trigger affective responses that ultimately shape behavioral intentions such as loyalty and e-WOM.

5- Conclusion

The primary objective of this study was to examine and evaluate the key components of e-service quality in higher education and their effects on perceived emotional value, e-satisfaction, loyalty, and electronic word-of-mouth (e-WOM) among students. Using Partial Least Squares Structural Equation Modeling (PLS-SEM), the study clarified the structural relationships among service quality dimensions (information quality, website performance, and website confidentiality), psychological responses (perceived emotional value and e-satisfaction), and behavioral outcomes (loyalty and e-WOM) within the integrated frameworks of the Stimulus–Organism–Response (SOR), Expectation–Confirmation Theory (ECT), and Value-Based Adoption Model (VAM).

The empirical results support all eight proposed hypotheses. Specifically, information quality, website performance, and website confidentiality significantly enhance overall e-service quality, which strongly predicts perceived emotional value. In turn, emotional value has a significant impact on e-satisfaction, which further promotes loyalty and e-WOM. Moreover, loyalty positively reinforces e-WOM, forming a robust behavioral chain in the digital education context. Theoretically, these findings extend the applicability of the SOR and VAM frameworks by illustrating how external stimuli, such as e-service quality dimensions, affect internal psychological states, which then drive behavioral intentions and advocacy behaviors in digital environments.

Furthermore, the rapid advancement of artificial intelligence (AI) technologies is shaping a new era of digital communication, referred to as AI-generated word-of-mouth (AI-WOM), where AI systems can directly interact with learners through personalized recommendations. Effective management of current e-WOM practices can therefore lay the foundation for reliable and intelligent AI-WOM in the future. The trust, reputation, and positive experiences established through e-WOM may be inherited and amplified by AI-driven recommendation systems, influencing institutional reputation and student engagement. Future research should explore how e-WOM data contribute to AI-WOM formation and investigate the implications of AI-based advocacy mechanisms in higher education.

Overall, this study underscores the pivotal roles of perceived emotional value and e-satisfaction in shaping student loyalty and e-WOM, while reaffirming the foundational influence of e-service quality. These behavioral drivers are critical to optimizing digital distribution strategies in higher education, enabling institutions to enhance service delivery, strengthen digital branding, and foster long-term student engagement in an increasingly competitive digital education landscape.

5-1- Theoretical Implications

Recent studies have extensively explored the role of e-service quality, perceived emotional value, e-satisfaction, loyalty, and e-WOM in higher education [28-31]. These studies have adopted foundational theories such as SOR, ECT, and VAM to explain student behaviors in digital learning environments. Nonetheless, prior literature often investigates only partial relationships among these constructs or focuses on traditional or blended learning contexts.

This study contributes to theoretical development by integrating all key constructs into a comprehensive structural model that connects service quality components (information quality, website performance, and website confidentiality) with emotional responses (perceived emotional value, and e-satisfaction) and subsequent behavioral outcomes (loyalty, and e-WOM). By employing the SOR framework, the study confirms that functional stimuli evoke internal psychological responses that shape digital loyalty and advocacy. The inclusion of ECT and VAM clarify the mediating role of perceived emotional value and e-satisfaction in the formation of loyalty and communicative behaviors.

This research extends existing theory by confirming that emotional mechanisms are essential mediators in service encounters, especially in the context of online higher education in emerging markets like Vietnam. It provides empirical validation that e-service quality not only influences e-satisfaction directly but also indirectly drives loyalty and e-WOM through emotional value, thereby enriching the theoretical understanding of digital service interactions in education.

5-2-Practical Implications

Based on the study's findings, several practical implications can be drawn to guide university administrators in enhancing student experiences and fostering long-term behavioral outcomes in the digital learning environment. Since information quality significantly affects students' perception of e-service quality, universities should prioritize the development of a user-centered information architecture on their online platforms. This includes ensuring that content is accurate, useful, and easy to navigate. Institutional websites should present academic policies, schedules, fees, and support services in a structured and searchable format.

As a composite construct influenced by information quality, website performance and website confidentiality, e-service quality reflects students' overall impressions of digital platforms. This calls for a holistic service management strategy where institutions continuously assess student feedback using instruments like Net Promoter Score (NPS), satisfaction surveys, and user experience audits. Establishing a dedicated digital service unit may further improve coordination and responsiveness in resolving platform-related issues. Emotional value plays a crucial role in translating e-service quality into e-satisfaction and loyalty. Hence, universities should craft emotionally engaging learning experiences beyond functional effectiveness. Strategies such as goal-setting tools, personalized academic tracking, and positive feedback mechanisms can foster feelings of accomplishment, self-confidence, and emotional attachment. These efforts contribute to stronger student-institution relationships and longer-term brand loyalty.

E-satisfaction serves as a crucial mediator linking emotional value with both student loyalty and electronic word-of-mouth. To strengthen e-satisfaction, universities should ensure consistent, seamless, and responsive digital interactions across all online services. Regularly collecting and analyzing student feedback enables continuous improvement and long-term satisfaction. Student loyalty represents a lasting emotional and behavioral commitment to the institution. Universities can cultivate loyalty by maintaining personalized and engaging online experiences that foster a sense of belonging and recognition (for example, tailoring content and notifications to different student groups). Initiatives such as alumni communities, online mentoring, or digital networking platforms can sustain students' connections even after graduation. Strengthening loyalty not only enhances retention but also encourages students to act as positive advocates for the university through electronic word-of-mouth, thereby reinforcing institutional reputation and trust within the digital education ecosystem.

5-3-Limitations and Future Works

This work acknowledged several limitations that may affect the interpretation and generalizability of its findings. First, as the data were collected using a convenience sampling method, potential selection bias may exist, limiting the generalizability of the findings. To mitigate this issue, the sample included students from multiple universities and diverse academic majors to ensure heterogeneity and enhance representativeness. Future studies are encouraged to expand the scope of data collection to include a broader and more representative population, such as working professionals, adult learners, and students from rural or remote areas, to improve external validity.

Second, this study focused on the influence of specific components of e-service quality, namely information quality, website performance, and website confidentiality, on emotional value, e-satisfaction, loyalty, and e-WOM. While these variables explain significant variance in behavioral outcomes, the model does not account for other potential determinants such as personalization, user interface design, and responsiveness of academic support services. Future research should consider integrating these additional service attributes to provide a more holistic view of digital learning experiences.

Finally, the cross-sectional nature of the survey limited the ability to assess causality over time. As most responses were collected based on students' general perceptions rather than continuous interactions, the data may reflect temporary impressions influenced by recent experiences. Longitudinal studies are recommended to track changes in emotional value, e-satisfaction, and loyalty over the academic lifecycle to uncover more stable patterns and causal relationships.

6- Declarations

6-1-Author Contributions

Conceptualization, V.T.T.N., T.G.T., and T.D.N.; methodology, T.G.T. and T.D.N.; software, V.T.T.N. and T.G.T.; validation, T.D.N.; formal analysis, V.T.T.N. and T.D.N.; investigation, V.T.T.N. and T.D.N.; resources, V.T.T.N., T.G.T., and T.D.N.; data curation, V.T.T.N. and T.G.T.; writing—original draft preparation, V.T.T.N., T.G.T., and T.D.N.; writing—review and editing, T.D.N.; visualization, T.G.T. and T.D.N.; supervision, V.T.T.N. and T.D.N. All authors have read and agreed to the published version of the manuscript.

6-2-Data Availability Statement

The data presented in this study are available on request from the corresponding author.

6-3-Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

6-4- Institutional Review Board Statement

Not applicable.

6-5- Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

6-6- Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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Appendix I: Measurement items

| Construct | Item | | Construct |
|---------------------------|------|--|-----------------------|
| Information Quality | INQ1 | The information on the university website matches user needs | Zeqiri et al. [29] |
| | INQ2 | The information provided on the website is useful | |
| | INQ3 | Information on the website is easy to locate | |
| Website Performance | WEP1 | The website presents content clearly and visually | Zeqiri et al. [29] |
| | WEP2 | The website structure is easy to navigate | |
| | WEP3 | The website responds within an acceptable time | |
| Website Confidentiality | WEC1 | I trust that my personal information is kept secure | Zeqiri et al. [29] |
| | WEC2 | I believe that my personal data will not be misused | |
| | WEC3 | I trust that my personal data will not be shared with third parties | |
| E-Service Quality | ESQ1 | The online service quality consistently meets user needs | Zeqiri et al. [29] |
| | ESQ2 | The university's website provides reliable online services | |
| | ESQ3 | The overall quality of online services provided by the university is excellent | |
| | ESQ4 | Using the university's online services provides a positive experience | |
| Perceived Emotional Value | PEV1 | Learning outcomes depend on personal effort | Seo & Um [31] |
| | PEV2 | Studying at the university increases self-confidence | |
| | PEV3 | Studying at the university brings a sense of achievement | |
| E-satisfaction | ESA1 | The experience of using the university's online services is satisfying | Leonnard [30] |
| | ESA2 | The services provided through the university's online platforms are satisfactory | |
| | ESA3 | The university's online services are preferred for information access | |
| Loyalty | LOY1 | I will maintain my connection with the university after graduation | Kethüda & Bilgin [28] |
| | LOY2 | I would prioritize pursuing my postgraduate studies at this university | |
| | LOY3 | I am interested in becoming a member of the university's alumni association | |
| e-WOM | EWM1 | I am willing to share information from the university's online platforms with my friends | Kethüda & Bilgin [28] |
| | EWM2 | I am willing to post positive comments about the university on online platforms | |
| | EWM3 | I am willing to recommend the university to others through online platforms | |
| | EWM4 | I am willing to repost content from the university's online platforms on my page... | |