

Website Innovation Affects Student Satisfaction

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Abstract

University websites are more and more essential in communicating, exchanging information, providing educational services, and implementing marketing programs. Innovating the website is an important solution to improve the quality of educational services and attract students. This study was conducted to demonstrate the role of website innovation on student satisfaction. Research data were collected using quota sampling with 280 students studying at universities in Vietnam. Qualitative and quantitative research are used to test the research hypotheses. Applying structural equation modeling (SEM), the study shows that website innovation positively affects students' perceived ease of use, perceived usefulness, and trust. Besides, perceived ease of use, perceived usefulness, and trust positively influence student satisfaction. This study has demonstrated that website innovation affects student satisfaction through the mediating role of perceived ease of use, perceived usefulness, and trust.

Keywords: website innovation, satisfaction, student, university.

INTRODUCTION

Websites become an integral element in the development of the Internet (Datt & Singh, 2021). Website is an important tool to help educational institutions implement marketing and public relations programs with prospective customers (Al-Debei, 2014). During the industrial revolution 4.0, educational institutions realized the importance of websites in conveying reliable academic information (Bairamzadeh & Bolhari, 2010). University websites are seen as information providers (El-Halees & Abu-Zaid, 2017). Websites are useful interactive tools between educational institutions and students and represent the image of the educational institution (Manzoor & Hussain, 2012; Karani et al., 2021; Hai & Nguyen, 2022). Recognizing the importance of the website, both domestic and foreign universities have carried out website innovation (Rezaeean et al., 2012), considering website

renewal as a priority strategy to improve information quality and effectiveness in attracting students (Al-Debei, 2014).

Website innovation is regularly carried out in most universities, although it requires an investment of resources. The result of website innovation brings a lot of benefits to universities (Van Deventer & Lues, 2020). Regularly updating technology and improving the website help provide support services and improve the quality of education (Mentes & Turan, 2012). Innovating an educational institution's website creates trust and improves student satisfaction (Bairamzadeh & Bolhari, 2010; Rezaeean et al., 2012). The literature review shows that some studies have demonstrated the influence of website innovation on student satisfaction such as Rezaeean et al. (2012), and Sriwardiningsih et al. (2016). However, there are few studies done in developing countries, including Vietnam.

Therefore, this study was conducted to point out the influence of website innovation on student satisfaction in Vietnamese universities through the mediating factors of perceived ease of use, perceived usefulness, and brand trust.

THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

Theoretical framework

Website innovation (WI)

University websites are the most popular means of information sharing with existing and potential students (Datt & Singh, 2021), contact information, annual activities, the latest news, and curriculum (Islam & Tsuji, 2011; Menten & Turan, 2012). According to Loiacono et al. (2007), website innovation is reflected in the creativity and novelty of a website, while increasing website quality is also an important factor. Website quality is represented by the quality of services provided by the website system (Li & Jiao, 2008), which is the website's ability to enable users to accomplish their goals (Loiacono et al., 2002). Website innovation is applying new technologies and new applications together to make the website more attractive (Rezaeean et al., 2012).

Satisfaction (SA)

According to Kotler & Armstrong (2010), satisfaction is a customer's feeling of preference or disappointment when comparing expectations and experiences with a product or service. Online customer satisfaction is the response of customers when experiencing online services (Heron & Whitwan, 2001). Customer satisfaction can be measured by the services provided by the website (Jeon & Jeong, 2017). From the perspective of a university website, students are satisfied with a university website if it is highly accessible, reliable, and fast (Sun et al., 2008), free of technical errors, and easy to use (Manzoor & Hussain, 2012). Satisfaction with the university website indicates the success of the university website (Rezaeean et al., 2012).

Perceived Ease of Use (PEU)

Davis (1989) has argued that perceived ease of use is the degree to which an individual believes that a great deal of effort is not required to use technology. It is the expectation that the technology system is user-friendly and easy to use. Perceived ease of use is the degree of ease when using a particular system (Venkatesh et al., 2003). Ease of use is one of the important characteristics of a website (Offutt, 2002), which is a major determinant of a website's effectiveness. The perceived ease of use of a website is expressed through factors such as speed, clarity, intuitive navigation, ease of use, readability, and personalization (Chen et al., 1999). In the field of education, perceived ease of use is an essential factor affecting students' acceptance of technology (Lee et al., 2009; Liu et al., 2010; Ngampornchai & Adams, 2016; Almaiah et al., 2019; Bardakci, 2019; Yakubu & Dasuki, 2019; Azizi et al., 2020; Abbad, 2021; Alghazi et al., 2021).

Perceived Usefulness (PU)

According to Davis (1989), perceived usefulness is one of the important factors in the technology acceptance model (TAM). It is the degree to which a person believes that using a particular system may improve job performance. Perceived usefulness is the degree to which users believe that adopting technology may help them achieve higher work efficiency (Venkatesh et al., 2003; Jambulingam, 2013). In a research in 2020, Van Deventer & Lues confirmed that perceived usefulness is the value obtained from using the website. In the field of education, perceived usefulness plays a significant role in the intention to adopt a new technology (Lee et al., 2009; Liu et al., 2010; Lee & Lehto, 2013; Al-Azawei & Lundqvist, 2015; Jung & Lee, 2015; El-Masri & Tarhini, 2017; Sivo et al., 2018; Almaiah et al., 2019; Bardakci, 2019; Yakubu & Dasuki, 2019; Azizi et al., 2020; Azhar et al., 2021; Abbad, 2021; Alghazi et al., 2021).

Trust (TR)

Trust is an important factor in maintaining the relationship between the customer and the service provider (Parasuraman et al., 1991).

Therefore, trust is emphasized as one of the main components to develop relationships between customers and suppliers (Morgan & Hunt, 1994; Tax et al., 1998; Garbarino & Johnson, 1999; Schoorman et al., 2007). The trust and willingness of customers reduce perceived risks in using services (Gambetta, 2000). Customer trust is created based on the perceived competency, benevolence, and integrity of suppliers (Mayer et al., 1995). In the field of education, trust positively influences students' satisfaction with the website of an educational institution (Bairamzadeh & Bolhari, 2010; Rezaeean et al., 2012; Hai & Nguyen 2022).

Research hypotheses

According to Nielsen (2000), perceived ease of use is an extremely important aspect of website innovation. The relationship between website innovation and perceived ease of use is interactive (Isman & Isbulan, 2010; Al-Debei, 2014; Caffaro et al., 2020). University website innovation positively affects students' perceived usefulness (Bairamzadeh & Bolhari, 2010; Rezaeean et al., 2012; Al-Debei, 2014). Website innovation helps to improve customer trust (Flavián et al., 2006). In the field of education, website innovation positively affects students' trust in the website (Rezaeean et al., 2012), and trust in the brand of educational institutions (Hai & Nguyen, 2022). Therefore, the study proposes the following hypotheses: Hypothesis H1: Website innovation positively affects students' perceived ease of use; Hypothesis H2: Website innovation positively impacts students' perceived usefulness; Hypothesis H3: Website innovation positively affects students' trust.

The positive relationship between perceived ease of use and website satisfaction has been demonstrated by many studies (Flavián et al., 2006; Sun et al., 2008; Van Deventer & Lues, 2020). In addition to this, perceived usefulness is an important factor, positively affecting satisfaction with websites (Arbaugh, 2000; Sun et al., 2008; Rezaeean et al., 2012; Cheok & Wong, 2015; Nayanajith et al., 2019; Van Deventer & Lues, 2020). Improving trust may enhance student satisfaction with the

educational institution's website (Bairamzadeh & Bolhari, 2010; Rezaeean et al., 2012; Hai & Nguyen 2022). Thus, the study proposes the following hypotheses: Hypothesis H4: Perceived ease of use positively affects student satisfaction with the university website; Hypothesis H5: Perceived usefulness positively influences student satisfaction with the university website; Hypothesis H6: Trust positively affects student satisfaction with the university website.

Based on the literature review and research hypotheses, the study organized 2 participatory rural appraisals (PRA) with 16 students from 2 prestigious universities in Vietnam (Ho Chi Minh City University of Economics, and Can Tho University), and each group has 8 students. The students selected for discussion are students who regularly visit the university's website and use online services. The result of the discussions tested the appropriateness of the research hypotheses and identified appropriate scales for the research model. The proposed research model is as below.

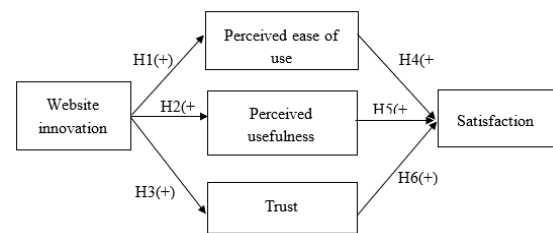


Figure 1: Proposed research model

Table 1: Interpretation of observed variables in the research model

Factor	Observed variables	Scale	Reference resources
Website Innovation	WI1. After the innovation, the website provides a lot of useful information and is always updated with the latest information.	Likert 1-5	Rezaeean et al. (2012), Cerdá Suárez (2016), Napitupulu (2017), Van Deventer & Lues (2020).
	WI2. After the innovation, the website offers more diverse content.	Likert 1-5	
	WI3. The website interface after the innovation is creative and	Likert 1-5	

	professional.		
	WI4. After the innovation, the website has a high transmission speed and a high level of interaction.	Likert 1-5	
	WI5. After the innovation, the website has beautiful and intuitive images.	Likert 1-5	
	WI6. After the innovation, the website is always updated with the latest technologies.	Likert 1-5	
Perceived Ease of Use	PEU1. Website after innovation makes it easier for me to see and read.	Likert 1-5	Rezaeean et al. (2012), Cerdá Suárez (2016), Napitupulu (2017)
	PEU2. Website after innovation provides higher data processing speed.	Likert 1-5	
	PEU3. The structure and content of the website after innovation is easy to understand.	Likert 1-5	
	PEU4. The website innovation makes it easier for me to search for information.	Likert 1-5	
	PEU5. The website innovation makes it easier for me to navigate.	Likert 1-5	
	PEU6. The website innovation makes it easier for me to use.	Likert 1-5	
Perceived Usefulness	PU1. The website innovation helps me search for information faster.	Likert 1-5	Rezaeean et al. (2012), Liu et al. (2010), Almahamid et al. (2016), Napitupulu (2017), Van Deventer & Lues (2020)
	PU2. The website after innovation helps my interaction process faster.	Likert 1-5	
	PU3. The website innovation makes my learning process easier.	Likert 1-5	
	PU4. The website innovation helps me complete my study tasks faster.	Likert 1-5	
	PU5. I feel it is useful to innovate the website.	Likert 1-5	
Trust	TR1. Innovating	Likert	Rezaeean

	the website makes me more confident about the honest information provided.	1-5	et al. (2012), Napitupulu (2017), Hai & Nguyen (2022)
	TR2. Innovating the website makes me more confident about providing the fastest information.	Likert 1-5	
	TR3. I believe that website innovation can meet my information search needs.	Likert 1-5	
	TR4. I believe that website innovation provides reliable information.	Likert 1-5	
	TR5. The website innovation makes me feel more confident.	Likert 1-5	
Satisfaction	SA1. I am satisfied with the results I got after the website innovation.	Likert 1-5	Rezaeean et al. (2012), Cerdá Suárez (2016), Van Deventer & Lues (2020)
	SA2. I am satisfied with the information quality after the website innovation.	Likert 1-5	
	SA3. I am satisfied with the experience of using the website after the innovation.	Likert 1-5	
	SA4. I am satisfied with the website innovation.	Likert 1-5	

RESEARCH METHODOLOGY

Analytical methods

A combination of qualitative and quantitative research is applied to prove the research hypotheses. In the qualitative research step, the participatory rural appraisal (PRA) is used to identify the appropriate scales for the research model. The study organized 2 group discussions (each group has 8 members) with the participation of students from two prestigious universities in Vietnam (University of Economics, Ho Chi Minh City; and Can Tho University). In the quantitative research step, analyses used in the following order: (1). Testing the reliability of the scale by Cronbach's alpha coefficient; (2). Exploratory factor analysis (EFA) to evaluate the

convergent and discriminant validity; (3). Confirmatory factor analysis (CFA) to assess the relevance of research data; (4). Structural equation modeling (SEM) to test the research hypotheses.

Data collection method

Determining the research sample size: According to Tho (2011), the required sample size for the study depends on many factors such as the data analysis method and reliability. As presented by Raykov & Widaman (1995), structural equation modeling (SEM) requires a large sample size because it is based on the sample distribution theory. According to Hoyle (1995), to achieve reliability in the SEM test, a sample size from 100 to 200 is satisfactory. However, the sample size in the study using SEM should be larger than 200 for higher reliability (Hoelter, 1983; Kline, 2011).

Data collection: The study surveyed from 02/2023 to 03/2023 by the method of email interview and online interview using Goole Form. The study used quota sampling with grouping criteria including university classification, number of years in the university of students, student's major, and student's gender. The survey subjects of the research are students studying at universities, including the University of Economics, Ho Chi Minh City; Ton Duc Thang University; Can Tho University; Nguyen Tat Thanh University; and FPT University. The number of questionnaires achieved was 285, after removing unsuitable questionnaires (low reliability), a total of 280 valid questionnaires were used to test the research hypotheses.

RESEARCH RESULTS AND DISCUSSION

Analytical results

Reliability of research scales

Cronbach's alpha test is used to remove the observed variables that are not suitable for the research scale (Hair et al., 2010). Based on the result in Table 2, all research scales are reliable with Cronbach's alpha value all greater than

0.8 (Nunnally & Bernstein, 1994). The smallest value is the Website innovation scale (0.846) and the highest value is the Trust scale (0.895). Besides, the corrected item-total correlation of variables is all greater than 0.3, so no observed variables are excluded from the research model (Slater, 1995; Hair et al., 2010). Thus, all research scales have met the reliability requirements (Nunnally, 1978; Peterson, 1994; Slater, 1995).

Table 2: *Cronbach's alpha test result*

Factor	Number of observed variables	Cronbach's alpha	Corrected Item-total Correlation
Website Innovation (WI)	6	0.846	0.568
Perceived ease of use (PEU)	6	0.875	0.593
Perceived usefulness (PU)	5	0.858	0.628
Trust (TR)	5	0.895	0.652
Satisfaction (SA)	4	0.870	0.681

Exploratory factor analysis (EFA) was used to test the convergent and discriminant validity of the scales (Hair et al., 1998; Hair et al., 2010). The test result shows the following values: (1) Bartlett's test of variable correlation meets the requirements with Sig. = 0.000 (Hair et al., 1998); (2) The suitability test is guaranteed with KMO = 0.875 (Hair et al., 1998); (3) Cumulative variance test reaches the value of 64.5 % higher than the level of 50% (Anderson & Gerbing, 1988), this shows that observed variables included in the model have high explanatory power; (4) Factor loading coefficients is satisfactory with the value > 0.5 (Hair et al., 1998). The test result has proved that the research data achieve convergent and discriminant validity. Thereby, 5 factors are created from 26 observed variables and there is no variable disturbance, so the names of the factors remain the same.

Table 3: *Factors created from the exploratory factor analysis (EFA)*

Sign	Observed variables	Factor name
F ₁	6 variables: WI1, WI2, WI3, WI4, WI5, WI6	Website Innovation (WI)
F ₂	6 variables: PEU1, PEU2,	Perceived Ease of

	PEU3, PEU4, PEU5, PEU6	Use (PEU)
F ₃	5 variables: PU1, PU2, PU3, PU4, PU5	Perceived Usefulness (PU)
F ₄	5 variables: TR1, TR2, TR3, TR4, TR5	Trust (TR)
F ₅	4 variables: SA1, SA2, SA3, SA4	Satisfaction (SA)

Confirmatory factor analysis (CFA) was used to assess measurement errors (Steenkamp & Van Trijp, 1991). The CFA result shows the following values: Chi-square/df = 1.702 < 2 with P = 0.00 0 ≤ 0.05; The TLI and CFI indicators reach the value of 0.935 and 0.942, all higher than 0.9, RMSEA = 0.05 < 0.08 (Bentler & Bonett, 1980; Carmines, 1981; Anderson & Gerbing, 1988; Steiger, 1990; Hair et al., 2014). The above result proves that the model fits the research data.

Table 4: CFA analysis result

Assessment criteria	CFA	Comparative index	Reference resources
χ^2/df	1.702	≤ 2.00	Anderson & Gerbing (1988), Hair et al. (2014)
P-value	0.000	< 0.05	
TLI	0.935	≥ 0.90	
CFI	0.942	≥ 0.90	
RMSEA	0.050	≤ 0.08	

Based on the calculation result of the composite reliability (CR) and average variance extracted (AVE) in Table 5, the CR and AVE values are all satisfactory, with the minimum CR value

reaching 0.857 and the minimum AVE value reaching 0.501. Therefore, the research data is consistent with the market data, achieving convergent validity, unidimensionality, discriminant validity, and reliability.

Table 5: Scale testing result

Factor	Number of observed variables	CR	AVE	Reference Resources
Website Innovation (WI)	6	0.850	0.486	Jöreskog (1971), Fornell & Larcker (1981)
Perceived Ease of Use (PEU)	6	0.857	0.501	
Perceived Usefulness (PU)	5	0.859	0.550	
Trust (TR)	5	0.895	0.633	
Satisfaction (SA)	4	0.871	0.629	

Test the research hypotheses

Structural equation modeling (SEM) was used to test the research hypotheses. The SEM analytical result shows the following values: Chi-square/df = 1.796 < 2 with P = 0.000 ≤ 0.05; The TLI and CFI reach the value of 0.926 and 0.933, all > 0.9; RMSEA = 0.053 < 0.08. This proves that the research model is well established.

Table 6: Testing the relationship between factors

Relationship	Unstandardized			Standardized Estimated Value	Significance	Hypothesis
	Estimated value	Standard Error S.E.	Critical ratio C.R.			
PEU <-- WI	0.471	0.076	6.170	0.453	***	H1: accepted
PU <-- WI	0.399	0.090	4.418	0.317	***	H2: accepted
TR <-- WI	0.299	0.096	3.108	0.213	***	H3: accepted
SA <-- PEU	0.448	0.077	5.821	0.371	***	H4: accepted
SA <-- PU	0.217	0.060	3.596	0.218	***	H5: accepted
SA <-- TR	0.319	0.054	5.891	0.358	***	H6: accepted

Based on Table 6, the hypotheses H1, H2, H3, H4, H5, and H6 are all accepted with a 99% reliability level. The study has shown that website innovation positively affects students' perceived ease of use, perceived usefulness, and trust with a statistical significance of 1%. At the same time, the study has indicated that perceived ease of use, perceived usefulness,

and trust positively influence student satisfaction with a statistical significance of 1%.

Discussion

Hypothesis H1, H2, H3: Website innovation positively affects students' perceived ease of use, perceived usefulness, and trust. After the

innovation, the website always updates useful information, provides diverse content, creative and professional interface, high-speed information transmission and interaction, and especially keeps up to date with the latest technologies, which will enhance students' perceived ease of use, perceived usefulness, and trust. The study has confirmed a positive correlation between website innovation and perceived ease of use (Isman & Isbulan, 2010; Al-Debei, 2014; Caffaro et al., 2020), the correlation between website innovation and perceived usefulness (Bairamzadeh & Bolhari, 2010; Rezaeean et al., 2012; Al-Debei, 2014), the correlation between website innovation and student trust (Rezaeean et al., 2012; Hai & Nguyen, 2022).

Hypothesis H4: Perceived ease of use positively affect student satisfaction with the website. Based on Table 6, perceived ease of use positively influences student satisfaction with the standardized estimated coefficient of 0.371 and statistical significance level $p = 0.000$. If students feel that the website innovation makes it easier to search for information and control the website, and faster data process, their satisfaction with the website improves. The result is consistent with studies suggested by Flavián et al. (2006), Sun et al. (2008), Van Deventer and Lues (2020).

Hypothesis H5: Perceived usefulness positively affects student satisfaction with the website. This hypothesis is accepted with the standardized estimated value of 0.218 and the level of statistical significance $p = 0.000$. The fact shows that, after the website innovation, students can easily look for information, the interaction process is faster, and the learning process is more convenient to help students complete their learning tasks. This improves student satisfaction with the website innovation. The finding is consistent with studies suggested by Arbaugh (2000), Sun et al. (2008), Rezaeean et al. (2012), Cheok & Wong (2015), Nayanajith et al. (2019), Van Deventer & Lues (2020).

Hypothesis H6: Trust positively affects student satisfaction with the website. Table 6 shows that there is a positive relationship between the

trust and satisfaction of students with the standardized estimated value of 0.358 and the statistical significance level $p = 0.000$. If students find that the website innovation provides faster information-searching speed and reliable information content which meets the information-searching demands, student satisfaction with the website enhances. In the field of education, the result is similar to studies proposed by Bairamzadeh & Bolhari (2010), Rezaeean et al. (2012), Hai and Nguyen (2022).

CONCLUSION

In general, the study has achieved the set goals. The study has proven that website innovation affects student satisfaction through the mediating role of perceived ease of use, perceived usefulness, and trust. Research results have shown a positive influence of website innovation on perceived ease of use, perceived usefulness, and trust. Besides, the factors of perceived ease of use, perceived usefulness, and trust positively affect student satisfaction with the website after the innovation. The study has confirmed the essential role of website innovation in improving student satisfaction and the quality of educational services. The research results provide a useful reference for educational managers.

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