pISSN: 1906 - 6406 The Scholar: Human Sciences
eISSN: 2586 - 9388 The Scholar: Human Sciences
http://www.assumptionjournal.au.edu/index.php/Scholar

The Investigation on Student Satisfaction and Loyalty Toward Online Learning during COVID-19: A Case Study of a University in Chengdu, China

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Received: April 11, 2023. Revised: August 28, 2023. Accepted: September 5, 2023.

Abstract

Purpose: This research investigates student satisfaction and loyalty determinants in a university in Chengdu, Sichuan Province, China during the current COVID-19 epidemic. A conceptual framework based on previous studies includes perceived value, service quality, system quality, perceived usefulness, university reputation, trust, satisfaction, and loyalty. **Research design, data, and methodology:** The quantitative method was conducted through a questionnaire as a survey tool to examine 500 students at Southwest Jiaotong University. The index of Item-Objective Congruence and Cronbach's Alpha reliability of the pilot test (n=50) was ensured before the data collection. The validity and reliability of the measurement model are analyzed by confirmatory factor analysis (CFA). Furthermore, structural model fitness and hypothesis testing results analyze the structural equation model (SEM). **Results:** The results show that perceived value, service quality, system quality, perceived usefulness, and university reputation significantly impact satisfaction. Satisfaction significantly impacts loyalty. Nevertheless, trust has no significant impact on loyalty. **Conclusions:** This study contributes to higher education institutions during the epidemic. In order to guarantee students' enthusiasm and completion of learning, students' satisfaction and loyalty to online learning are also related to teachers' teaching plans and how to better adapt to the new teaching environment from traditional teaching.

Keywords: Online Learning, Trust, Perceived Value, Satisfaction, Loyalty

JEL Classification Code: E44, F31, F37, G15

1. Introduction

Education will be the most concerned area of the Internet industry in the future. Internet education is based on the Internet and mobile communications, big data, cloud computing, social platforms, search engines, and other information technology to disseminate educational content and rapid learning methods. Qian Bosi, President of Cisco, has a famous saying: The Internet will bring great influence and benefits to all walks of life, but in the end, education will have the most profound influence and benefit (Gu, 2019).

A new teaching mode using the Internet came into being,

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that is, online learning, which has the advantages of high efficiency, convenience, real-time, and so on. Over the years, it has flourished in various training courses. Entering 2020, China's schools at all levels under normal lines have been greatly affected due to the rampant New Coronavirus. In order to block the transmission route of the virus, the Ministry of Education has made instructions of “stopping classes without stopping teaching” and “stopping classes without stopping school” (Feng, 2020). China’s education bureaus, schools, and major website platforms have responded to the call to actively prepare and construct an “air cloud classroom,” which has pushed the popularity of online teaching to an unprecedented height (Zhan, 2020). Chinese universities have realized the whole region, full coverage, and online learning practice.

The importance of this study lies in the research on the key factors influencing the satisfaction and loyalty to online learning of college students from a university in Chengdu, Sichuan Province. Against the backdrop of the COVID-19 pandemic, which has become a regular trend, China's Ministry of Education has issued the instruction of "no suspension of teaching" to ensure student’s learning status. Online learning has become an important way for students to learn, and the satisfaction and loyalty of online learning also directly reflect students’ learning status. Therefore, it is necessary to understand the factors influencing students' satisfaction and loyalty to online learning. Accordingly, this study will fill the gap from previous research by investigating the key antecedents of satisfaction and loyalty of college students toward online learning in Chengdu, Sichuan province, China, during the current COVID-19 epidemic. The variables examined in this study are perceived value, service quality, system quality, perceived usefulness, university reputation, trust, student satisfaction, and loyalty.

2. Literature Review

2.1 Perceived Value

Perceived value is essentially a difference that comes from the difference between potential customers’ evaluation of product benefits and costs and their perceived substitutes (Kotler, 2003). Consumers can perceive and determine the value and are unique, situational, and experiential. The essence of price is the accumulation of customer value creation, which is pointed out by Grönroos (2011). Tam (2004) noted that perceived value is a decisive factor in customer satisfaction. Many factors determine whether customers are satisfied, among which perceived value is decisive. According to Cronin et al. (2000), perceived value is cognitively oriented prior to emotion-oriented satisfaction. Some research also addressed the important antecedent factors affecting consumer satisfaction, including perceived value (Cronin et al., 2000; Vanderley et al., 2016). Thus, the following hypothesis is indicated:

H1: Perceived value has a significant impact on satisfaction.

2.2 Service Quality

Service quality is the relationship between individuals’ anticipation and cognition of service effect (McAllister, 2001). People’s perception of service determines the quality of service (Kim-Soon et al., 2014). The quality of service is very important for the analysis of consumer satisfaction. At the same time, high-quality service is also important to retain individual consumers and cultivate consumer groups (Yu et al., 2014). Chang and Chelladurai (2003) included service quality as a service environment, return promise, plan, human-computer interaction, task interaction, physical environment, other customer services, service failure, and repair. The higher the quality of service, the higher the customer satisfaction, as Muskat et al. (2019) reported. Seo et al. (2008) claimed that customer perception of service quality is important in determining satisfaction. Consequently, a hypothesis is proposed below:

H2: Service quality has a significant impact on satisfaction.

2.3 System Quality

System quality is regarded as the technical traits of the system, similar to the technical parameters such as adaptability, practicability, dependability, and usefulness. In contrast, information quality is connected to the content of the system (DeLone & McLean, 2003). Function, elasticity, data quality, mobility, integration, and significance are the criteria to measure the system's quality, and a high-quality system helps achieve the expected learning effect (Gorla et al., 2010; Wang & Liao, 2008). Just like the library technology of version 2.0, users’ general performance when interacting with the web version 2.0 system reflects system quality (Wang & Lin, 2011). In IS environment, scholars have found that system quality can be used to predict user satisfaction, which is a powerful predictor (Petter & McLean, 2009; Urbach & Müller, 2012). Pavlou et al. (2007) signified that the system function could help improve user experience and satisfaction. According to the model of DeLone and McLean (2003), the use of e-commerce and user satisfaction are positively affected by system quality. According to the literature review, a hypothesis is stated:

H3: System quality has a significant impact on satisfaction.

2.4 Perceived Usefulness

Perceived usefulness is the degree to which people believe a product can improve their performance. The

improvement of consumers' transaction performance by online shopping is defined as perceived usefulness, essentially a subjective belief of consumers (Chiu et al., 2009). Through the cognitive evaluation of how the Internet improves their shopping performance, people gradually form the intention to shop on the Internet, Davis (1989) put forward in his research center. This mechanism is usually defined as how product purchasing can be useful for their activities in the buyers' minds (Davis et al., 1989). The research results on marketing show that the key beliefs of customers toward products and their producers greatly affect their attitudes toward products and producers (Solomon, 2012). In this sense, perceived usefulness reflects people's key beliefs about purchasing products (Davis et al., 1989; Solomon, 2012). Many scholars have shown that perceived usefulness is the important evaluation method of users' satisfaction with information systems (Bhattacherjee, 2001; Calisir & Calisir, 2004; Landrum & Prybutok, 2004). Thus, a hypothesis is established based on this evidence:
H4: Perceived usefulness has significantly impact on satisfaction.

2.5 University Reputation

University reputation is "the complete worth, respect, and quality of a brand as seen or estimated" (Chaudhuri, 2002). Judgment of the valuable capabilities of distinct interest groups within an organization can be described as corporate reputation (Fombrun et al., 2000). The interaction of recruiters, organizational literature, and other sources has formed college students' understanding of the university's reputation (Nguyen et al., 2016). The difference between reputation and brand image lies in that, for a university, its reputation reflects the trust and doubt of stakeholders on whether a university can meet its anticipation. In contrast, the brand image represents the image of a university among its stakeholders (Nguyen & LeBlanc, 2001). Reputation is also a person's judgment of how others view and estimate a firm (Veloutsou & Moutinho, 2009). Through empirical research, Helm (2007) reported that corporate reputation plays a role in determining investor satisfaction and loyalty. In the past, many scholars have proved that the key factor determining trust and satisfaction is corporate reputation (Jin et al., 2008; Veloutsou & Moutinho, 2009). Thus, this study hypothesizes that:
H5: University reputation has significantly impact on satisfaction.

2.6 Trust

Trust comes from the confidence in having credible and deeply upright suppliers, expressed through consistency, ability, truthfulness, justice, accountability, assistance, and kindness (Chenet et al., 2010). Trust is the anticipation that the principal will act to maximize the principal's interests (Yousafzai et al., 2003). Trust could be thought of as "the purchaser tends to depend on another service supplier that the client believes in" (Moorman et al., 1993). Studies have proved that trust is key to evaluating consumer behavior (Büttner & Göritz, 2008). Trust is also one of the decisive factors affecting relationship marketing theory (Flavián & Guinalíu, 2006; Morgan & Hunt, 1994). Some other studies agree that customer satisfaction is the premise of trust (Kingshott et al., 2018). In addition, Gummerus et al. (2004) also found that a very significant positive relationship exists between trust and customer satisfaction. Ranaweera and Prabhu (2003) highlighted that customer retention is strongly influenced by trust and satisfaction. Delgado-Ballester et al. (2003) considered that satisfaction directly influences loyalty and affects loyalty through trust. Based on the assumptions, the following hypothesis is proposed:
H6: Trust has a significant impact on loyalty.

2.7 Satisfaction

Min et al. (2022) stated that satisfaction is "a measure of pleasant sentiments when the services meet or exceed the customers' expectations." In order to achieve customer satisfaction, suppliers must understand customers' needs and meet them as much as possible (Harris & Harrington, 2000). Satisfaction is the result of comparing the real property of a product or service with its expected performance of it (Churchill & Surprenant, 1982; Oliver, 1980). Mano and Oliver (1993) considered satisfaction a kind of emotion; it is far more complex than most people think. There are many causes and consequences behind this emotion. Satisfaction after certain anticipations is called evaluative satisfaction, while satisfaction generated by an irrational course is called emotional load (Bennett & Rundle-Thiele, 2004). A causal relationship exists between user satisfaction as a major factor and the motive to continue using an information system, which can be formed from previous use experiences (Bhattacherjee, 2001). Delgado-Ballester et al. (2003) considered that satisfaction directly influences loyalty and affects loyalty through trust. Accordingly, this study put forward a hypothesis:
H7: Satisfaction has significantly impact on loyalty.

2.8 Loyalty

Loyalty is defined as "the intent to exhibit a range of different conduct that indicates an incentive to make relation with a focused company continue, containing assigning a higher portion of type purse to a particular service supplier, spread active public praise, and rebuy" (Sirdeshmukh et al., 2002). In general, loyalty, in several aspects, involve the

extension of the relationship, the purpose of publicity, the motives of leaving behind, and the shortage of vicarious seeking behavior (Karjaluoto et al., 2012). Loyalty includes opinion, mental participation, an unfair favorite view, and a kind feeling towards certain goods or services (Kim et al., 2006). Loyal customers always are inclined to suggest some trade to other people, and impossible be sensitive to price (Reichheld & Schefter, 2000).

3. Research Methods and Materials

3.1 Research Framework

According to Figure 1, a conceptual framework comprises perceived value, service quality, system quality, usefulness, university reputation, trust, satisfaction, and loyalty. Four previous studies are reviewed to construct a research model, including Chang (2013), Ifinedo (2017), Swati et al. (2019), and Latif et al. (2021).

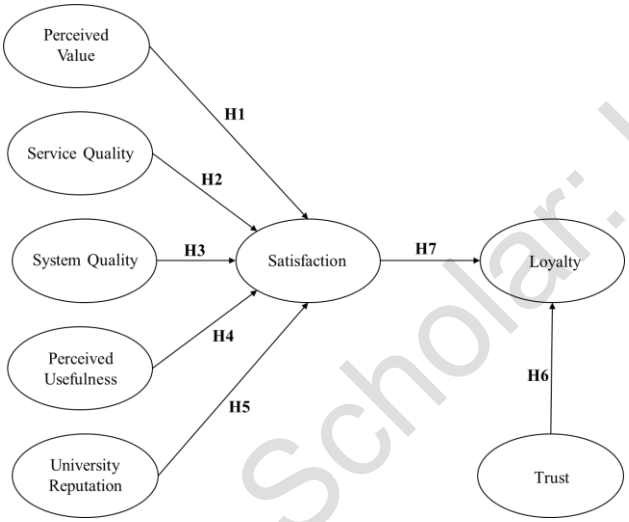

Figure 1: Conceptual Framework

H1: Perceived value has a significant impact on satisfaction.
H2: Service quality has a significant impact on satisfaction.
H3: System quality has a significant impact on satisfaction.
H4: Perceived usefulness has significantly impact on satisfaction.
H5: University reputation has significantly impact on satisfaction.
H6: Trust has a significant impact on loyalty.
H7: Satisfaction has significantly impact on loyalty.

3.2 Research Methodology

The quantitative method was conducted through questionnaire as a survey tool to examine 500 students at Southwest Jiaotong University. The questionnaire is designed into three parts; screening questions, measuring variables with the five-point Likert scale from strongly disagree (1) to strongly agree (5), and demographic information. The index of Item-Objective Congruence and Cronbach's Alpha reliability of the pilot test (n=50) was ensured before the data collection. The validity and reliability of the measurement model are analyzed by confirmatory factor analysis (CFA). Furthermore, structural model fitness and hypothesis testing results analyze the structural equation model (SEM).

The item-objective congruence (IOC) index results were scored by three experts and approved at a score of 0.60 or higher. Afterward, a pilot test of 50 respondents was conducted through Cronbach's Alpha coefficient values, which were approved at a score equal to 0.7 or higher (Taber, 2018). The CA's results are perceived value (0.838), service quality (0.860), system quality (0.877), perceived usefulness (0.971), university reputation (0.866), trust (0.911), satisfaction (0.920), and loyalty (0.914).

3.3 Population and Sample Size

The target population is 500 students at Southwest Jiaotong University, who have been experiencing online learning during COVID-19. According to Soper (2023), the researchers put all the necessary information into the calculator, which are the expected results size (0.2), the expected statistical power level (0.8), the number of potential variables (8), the number of observed variables (31), and the probability standard (0.05). As a result, the recommended minimum sample size is 444. Therefore, in order to get better statistical results, the researcher intends to collect 500 samples.

3.4 Sampling Technique

The sampling technique of this study is judgmental, stratified random, and convenience sampling. Firstly, judgment sampling was to select students at Southwest Jiaotong University who have been experiencing online learning during COVID-19. Second, stratified random sampling was used to proportionate the number of undergraduates and postgraduates, as shown in Table 1. Lastly, convenient sampling was conducted by distributing the questionnaire online method during January to March 2023.

Table 1: Sample Units and Sample Size

University name	Grade Year	Population Size Total=43900	Proportional Sample Size Total=500
Southwest Jiaotong University	Undergraduate	28900	329
	Graduate	15000	171

Source: Constructed by author

4. Results and Discussion

4.1 Demographic Information

In Table 2, demographic information was collected through 500 respondents, including gender, age, and a program of study. Among the respondents, 236 (47.2 percent) were female and 264 (52.8 percent) were male. For age, most respondents are 20 years old and below, accounting for 59.6 percent, followed by 21-25 years old at 22.4 percent, 26-30 years old at 11.2 percent, and 31 years old and above at 6.8 percent. In terms of study program, there are 329 undergraduate students, accounting for 65.8 percent, and 171 graduate students, accounting for 34.2 percent.

Table 2: Demographic Profile

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	236	47.2
	Female	264	52.8
Age	20 years old and below	298	59.6
	21-25 years old	112	22.4
	26-30 years old	56	11.2
	31 years old and above	34	6.8
Program	Graduate	171	34.2
	Undergraduate	329	65.8

Source: Constructed by author

4.2 Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) results can measure acceptable discriminant and convergent validity. Cronbach's Alpha coefficient values were approved at a score equal to 0.7 or higher (Taber, 2018). The acceptable threshold for factor load is a value of 0.5 or above (Hair et al., 2010). Additionally, the Composite or construct reliability (CR) and Average variance extracted (AVE) are reported together to increase the accuracy of the reliability test results. The CR results of this study were all above the threshold. CR and AVE values of 0.7 or higher, respectively, and 0.4 or higher are acceptable (Fornell & Larcker, 1981). In this case, the AVE is less than 0.4, between 0.305 and 0.605, but the composite reliability value ranges from 0.600 to 0.830 is adequate and significant. Thus, all estimates are significant to approve discriminant and convergent validity, as demonstrated in Table 3.

Table 3: Confirmatory Factor Analysis Result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
Perceived value (PV)	Chang (2013)	3	0.759	0.557-0.895	0.754	0.515
Service quality (SVQ)	Xu et al. (2021)	4	0.796	0.602-0.756	0.799	0.500
System quality (STQ)	Cheng (2012)	4	0.769	0.519-0.807	0.666	0.409
Perceived usefulness (PU)	Salimon et al. (2017)	5	0.783	0.614-0.758	0.786	0.425
University reputation (UR)	Clemes et al. (2013)	3	0.791	0.652-0.941	0.818	0.605
Trust (T)	Aurier and Séré de Lanauze (2012)	4	0.701	0.527-0.576	0.600	0.305
Satisfaction (S)	Mouakket (2020)	4	0.830	0.637-0.831	0.830	0.553
Loyalty (L)	Ul Haq and Awan (2020)	4	0.770	0.585-0.775	0.773	0.463

CFA can be used to assess the relevance of items within the underlying variables and to measure the model's fitness. According to Table 4, the measurement model has eight potential variables: perceived value, service quality, system quality, perceived usefulness, university reputation, trust, satisfaction, and loyalty. No modification of the measurement model is required in this study, as the original measurement model already presents a model fit. Acceptable values of the goodness of fit indicators represent model fit. The statistics of each indicator are compared with acceptable standards. Where, CMIN/DF = 3.123, GFI = 0.857, AGFI = 0.825, NFI=0907, CFI = 0.859, TLI = 0.838, RMSEA = 0.065.

Table 4: Goodness of Fit for Measurement Model

Index	Acceptable Values	Statistical Values
CMIN/DF	< 5.00 (Al-Mamary et al., 2015; Awang, 2012)	1267.956/406 or 3.123
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.857
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.825
NFI	≥ 0.80 (Wu & Wang, 2006)	0.807
CFI	≥ 0.80 (Bentler, 1990)	0.859
TLI	≥ 0.80 (Sharma et al., 2005)	0.838
RMSEA	< 0.08 (Pedroso et al., 2016)	0.065
Model summary		**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = Goodness-of-fit index, AGFI = Adjusted goodness-of-fit index, NFI = Normed fit index, CFI = Comparative fit index, TLI = Tucker–Lewis index, and RMSEA = Root mean square error of approximation.

The discriminant validity is assured when the square root of AVE is greater than the coefficient of any correlated structure (Fornell & Larcker, 1981). As shown in Table 5, the square root of AVE for all structures on the diagonal is greater than the inter-scale correlation. Therefore, the discriminant validity is guaranteed.

Table 5: Discriminant Validity

	PV	SVQ	STQ	PU	UR	T	S	L
PV	**0.718**							
SVQ	0.412	**0.707**						
STQ	0.396	0.364	**0.640**					
PU	0.539	0.426	0.415	**0.652**				
UR	0.426	0.327	0.366	0.391	**0.778**			
T	0.492	0.142	0.251	0.315	0.278	**0.552**		
S	0.595	0.516	0.461	0.483	0.475	0.324	**0.744**	
L	0.625	0.362	0.350	0.442	0.401	0.363	0.516	**0.680**

Note: The diagonally listed value is the AVE square roots of the variables
Source: Created by the author.

4.3 Structural Equation Model (SEM)

In this study, structural equation models were used to evaluate the structural model to determine the fit of the model, the causal relationship between variables, and factors that affect online education satisfaction and loyalty. Table 6 shows the structural model before and after modification to ensure the fitting of the model. Accordingly, the results of the statistical fit values are CMIN/DF=3.373, GFI=0.855, AGFI=0.817, NFI=0.801, CFI=0.845, TLI=0.809, and RMSEA=0.074.

Table 6: Goodness of Fit for Structural Model

Index	Acceptable Values	Statistical Values Before Adjustment	Statistical Values After Adjustment
CMIN/DF	< 5.00 (Al-Mamary et al., 2015; Awang, 2012)	1889.487/370 or 5.107	1235.643/331 or 3.733
GFI	≥ 0.85 (Sica & Ghisi, 2007)	0.764	0.855
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.722	0.817
NFI	≥ 0.80 (Wu & Wang, 2006)	0.696	0.801
CFI	≥ 0.80 (Bentler, 1990)	0.739	0.845
TLI	≥ 0.80 (Sharma et al., 2005)	0.713	0.809
RMSEA	< 0.08 (Pedroso et al., 2016)	0.091	0.074
Model summary		**Unacceptable Model Fit**	**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = Goodness-of-fit index, AGFI = Adjusted goodness-of-fit index, NFI = Normed fit index, CFI = Comparative fit index, TLI = Tucker–Lewis index, and RMSEA = Root mean square error of approximation.

4.4 Research Hypothesis Testing Result

The regression coefficient or standardized path coefficient measures the correlation between the independent and dependent variables proposed in the hypothesis. Consequently, the significant level is measured at $p<0.05$. As shown in Table 7, seven of the eight hypotheses presented were supported. Loyalty to online education is strongly influenced by satisfaction rather than trust. The satisfaction of using online education is significantly driven by perceived value, service quality, system quality, perceived usefulness, and university reputation, respectively.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-Value	Result
H1: PV→S	0.649	7.704*	Supported
H2: SVQ→S	0.311	5.804*	Supported
H3: STQ→S	0.272	4.975*	Supported
H4: PU→S	0.138	3.392*	Supported
H5: UR→S	0.249	5.538*	Supported
H6: T→L	0.162	2.572	Not Supported
H7: S→L	0.551	7.272*	Supported

Note: * $p<0.05$
Source: Created by the author

According to Table 7, the hypothesis results of the structural equation modeling are discussed as follows:

The strongest influence on satisfaction is perceived value. The relationship between service quality and perceived usefulness has a standardized path coefficient of 0.649 and a t-value of 7.704 in H1. This supports previous research by Tam (2004) and DeLone and McLean (2003) that service quality significantly affects user satisfaction.

Secondly, service quality has a significant impact on satisfaction. The standardized path coefficient of H2 is 0.311, and the t-value is 5.804. This finding is consistent with previous studies by Chang (2006) and Parasuraman et al. (1988), emphasizing the role of service quality and customer satisfaction.

Another important factor affecting satisfaction is the system quality, whose standardized path coefficient is 0.272 and t-value is 4.975 (H3). This supports previous studies by Petter and McLean (2009) and Wu and Wang (2006), who believed that system quality is a powerful predictor of user satisfaction.

In contrast, perceived usefulness has less impact on satisfaction, with a standardized path coefficient of 0.138 and a t-value of 3.392 (H4), But it also has an important impact on satisfaction. Bhattacherjee (2001) agreed that perceived usefulness is positively correlated with satisfaction in a learning environment.

University reputation also has a significant impact on satisfaction. The standardized path coefficient of H5 is 0.249, and the t-value is 5.538. This supports previous studies by De La Fuente Sabaté and De Quevedo Puente (2003) and Mudambi et al. (1997). University reputation is a broader structure than brand image, so it is more likely to impact student satisfaction strongly.

When the standardized path coefficient is 0.162, and the t-value is 2.572, the impact of trust on loyalty is not significant, so H6 is not valid. This finding contradicts previous studies by Büttner and Göritz (2008) and Flavián and Guinalíu (2006), confirmed that in terms of student loyalty if students trust or find this learning style reliable, they will be loyal to it.

Satisfaction has a significant direct impact on loyalty, with a standardized path coefficient of 0.551 for H7 and a t-value of 7.272, consistent with the studies of Cronin et al. (2000), Bhattacherjee (2001), and Delgado-Ballester et al. (2003). Satisfaction is influenced by perceived value, which should be a direct prerequisite for satisfaction. Satisfaction is an important factor in measuring the effectiveness and future use of e-learning.

5. Conclusion and Recommendation

5.1 Conclusion and Discussion

With the rapid development of information technology today, online learning has become one of the main ways of learning. Students can understand their shortcomings in online learning through other students' views on online learning and timely adjust their learning methods and status. Thus, the findings of this study serve the purpose of identifying the key antecedents of satisfaction and loyalty of college students toward online learning in Chengdu, Sichuan province, China, during the current COVID-19 epidemic. Based on the data analysis of Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM), the results show that perceived value, service quality, system quality, usefulness, and university reputation significantly impact satisfaction. Satisfaction significantly impacts loyalty. Nevertheless, trust has no significant impact on loyalty.

Perceived value strongly influences whether customers are satisfied, as confirmed by numerous scholars (Cronin et al., 2000; Tam, 2004; Vanderley et al., 2016). This implies that students perceived the value of online learning for their continuance learning during the pandemic and were satisfied with such a method. Service quality, as the relation between students' anticipation and cognition of online learning provided by a university, can determine their satisfaction level (Kim-Soon et al., 2014; McAllister, 2001; Yu et al., 2014). The selection of the system and its quality has a great impact on students' measurement and satisfaction. Thus, a high-quality system helps to achieve the expected learning effect (Gorla et al., 2010; Wang & Liao, 2008).

Additionally, the results of this study aligned with considerable research that the important evaluation method of users' satisfaction with information systems is perceived usefulness (Bhattacherjee, 2001; Calisir & Calisir, 2004; Landrum & Prybutok, 2004). Students' judgment of the university's reputation enables student satisfaction with online learning (Fombrun et al., 2000; Nguyen et al., 2016). Then, satisfaction as a collective assessment is a motive to establish student loyalty (Bhattacherjee, 2001; Delgado-Ballester et al., 2003). Nevertheless, trust has no significant impact on loyalty, which contradicts previous studies (Gummerus et al., 2004; Kingshott et al., 2018; Ranaweera & Prabhu, 2003), which requires qualitative assessment to define this insignificance.

5.2 Recommendation

The COVID-19 pandemic forced a rapid shift towards online learning as educational institutions worldwide were forced to close their doors to prevent the spread of the virus. This unprecedented situation accelerated the evolution of online learning, resulting in significant changes and advancements in how education is delivered. This study concludes by determining which variables significantly impact students' satisfaction and loyalty to online learning. The results of this study have certain reference values for online learning development companies, universities, teachers, and even students. Student satisfaction and loyalty have gained wide attention among scholars during COVID-19. Subsequently, future scholars could consider studying the continuance usage in the post-epidemic or how hybrid learning and other forms would replace traditional learning.

For higher education sectors, this study recommends enhancing student satisfaction and loyalty by implementing hybrid education—one of the key evolutions in online learning after COVID-19 is the emergence of hybrid learning models. Institutions have adopted a blended approach that combines online and in-person instruction. This allows for more flexibility, as students can attend classes in person or remotely, depending on their needs and circumstances. Hybrid learning has become a popular option, offering the best of both worlds, with the convenience of online learning and the benefits of face-to-face interaction.

The use of VR and AR in online learning has gained momentum after COVID-19. These technologies provide immersive and interactive learning experiences, allowing students to explore virtual environments, conduct experiments, and participate in simulations. Online learning has evolved to incorporate more opportunities for

collaboration and social learning. Virtual group projects, discussion forums, and social media platforms have been integrated into online courses, allowing students to collaborate, network, and learn from their peers. This has fostered community and engagement among online learners, enhancing the overall learning experience.

In conclusion, online learning has evolved significantly after the COVID-19 pandemic, transforming the education landscape. One of the key areas where online learning has seen significant advancements are hybrid learning models, enhanced virtual classrooms, personalized learning, VR/AR, increased access to education, collaboration and social learning, and professional development for educators. These changes have made online learning more accessible, engaging, and effective and are likely to continue shaping the future of education beyond the pandemic.

5.3 Limitation and Further Study

Future study could exploit the limitations of this study to develop the future research. First, the sample group of this study are students of Southwest Jiaotong University, who have been experiencing online learning during COVID-19. Therefore, future research should extend to other regions or countries. Second, the conceptual framework was scoped to some variables: perceived value, service quality, system quality, perceived usefulness, university reputation, trust, satisfaction, and loyalty. More or other variables can be asserted in the next study, such as perceived ease of use, attitude, behavioral intention, etc. Last, the qualitative method is suggested to provide a clearer interpretation of the results.

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