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RESEARCH ARTICLE

An Analysis of how Customer Value, Service Innovation, and Brand Image Influence Chinese Online Travel Agency Customer Satisfaction and Loyalty

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ABSTRACT

This study examines the relationships between customer value (CV), service innovation (SI), OTA brand image (IM), e-customer satisfaction (ECS), and e-customer loyalty (ECL) in the online travel industry. From February to March 2023, the authors collected and analyzed opinions from 361 Chinese online travel agency (OTA) users via confirmatory factor analysis (CFA) and partial least squares structural equation modeling (PLS-SEM) with AMOS Version 22. SPSS for Windows Version 24 was employed for descriptive statistics. The analysis revealed positive direct effects of CV (0.45), SI (0.60), and IM (0.35) on ECS, highlighting their importance in shaping customer satisfaction. ECS also had a strong direct effect on ECL (0.75), emphasizing its role in driving loyalty. Additionally, CV and IM had indirect impacts on the ECL through the ECS (0.34 and 0.26, respectively). The model explains 82% of the variance in ECS and 89% in ECL. These findings offer strategic insights for OTAs, stressing the importance of enhancing CV, SI, and IM to improve ECS and ECL. The study discusses theoretical and practical implications, highlighting the importance of a customer-centric approach in the online travel industry.

INTRODUCTION

The global travel and tourism industry has undergone significant changes during and after the global COVID-19 pandemic (Gu et al., 2021), quickening the pace of the digital transformation that had already been underway (Doorly, 2020; Wu, 2023). Amid this upheaval, online travel agencies (OTAs), such as Airbnb, Expedia, and Trip.com, have solidified their position as key players, revolutionizing how travelers research, plan, and book their journeys (Pencarelli, 2020). The Chinese market, with its vast middle-class population and high digital literacy (Chu, 2023), represents a unique opportunity for OTA growth and innovation (Hollebeek & Rather, 2019).

The introduction of OTAs in October 1996 by Microsoft (Expedia Travel Services) marked the beginning of significant e-intermediation in the travel and tourism sector worldwide (Competition Commission South Africa, 2023), which forced traditional brick-and-mortar agencies to innovate and adapt their business models rapidly (Granados et al., 2008). By offering a centralized, one-stop platform for accommodations, tours, transportation, and comprehensive travel planning, OTAs have fundamentally transformed how consumers access and engage with travel services.

In the post pandemic era, marked by intense competition and increasingly cautious tech-savvy travelers (Talwar et al., 2020; Thompson & Turner, 2023), understanding the relationships among service innovation (SI), customer value (CV), e-customer satisfaction (ECS), OTA brand image (IM), and e-customer loyalty (ECL) has become essential for OTA success and sustained competitive advantage (Chen & Lin, 2020; Hollebeek, & Rather, 2019; Huang et al., 2020). Customer value is also key in connecting the SI to build a strong ECL. When OTAs provide value through convenience (Srivastava & Kaul, 2014), affordability (Kracht & Wang, 2010), reliability (Fu et al., 2016), and personalized experiences, they can develop loyal customers who remain beyond just single transactions.

Service innovation is not just about technological advancements (Xie et al., 2020), as it involves rethinking the entire customer journey, focusing on creating value, and putting the customer first (Lins et al., 2021). For OTAs in China, this means not only using the latest technologies to make processes smoother but also offering highly personalized experiences that recognize the needs, preferences, and cultural uniqueness of Chinese consumers (Dhananja, 2021; Samara et al., 2020).

In today's highly competitive market, where consumer behaviors are changing quickly and expectations for seamless, digital services are high, SI has become crucial for success in any industry (Binheem et al., 2021; Lins et al., 2021). The recent global pandemic has sped up the adoption of digital technologies, increasing the need for self-service options and raising the bar for personalized, hassle-free customer experiences. In particular, Trip.com and other OTAs leverage Big Data and deep learning to generate client-specific suggestions on the basis of their interests (Chang et al., 2023). The suggestion method, which is growing in popularity in e-commerce, expedites the decision-making process for Trip's clients and fosters customer loyalty (Mu et al., 2021).

Given these significant changes, this paper investigates which factors influence OTA adoption and use and how each OTA can increase customer loyalty among Chinese consumers in the post pandemic era. By combining theoretical insights with empirical research, this study explores how SI impacts the ECL within the Chinese OTA market. Using a structured approach based on thorough literature reviews and detailed empirical analyses, this paper provides valuable insights for industry stakeholders, policymakers, and researchers, offering a deeper understanding of these aspects of the online travel industry.

LITERATURE REVIEW

Customer Value (CV)

In a study by Yang et al. (2014) on CV and social media use, the authors reported that CV is created during all the phases of a purchase decision, with CV now expanded to include the online user as well. Similarly, Srivastava and Kaul (2014) reported that social interaction and convenience can influence customer satisfaction and experience. Moreover, as Grissemann and Stokburger-Sauer (2012) explained, when customers participate in creating value, their satisfaction increases.

In another examination of OTA customer e-service quality, e-trust, and brand image, the authors noted their critical importance for OTA customer ECS and ECL (Wilis & Nurwulandari, 2020). Further support for this importance comes from Ukpabi (2020), who reported on the significance of customer engagement in creating perceived value. Furthermore, Kourtesopoulou et al. (2019) reported that OTA web service quality, which is a key part of CV, directly affects ECS, strengthening the link between CV and ECS.

Therefore, CV has become essential in consumer behavior research in addition to perceived value, satisfaction, commitment, and trust (Octavia & Tamerlane, 2017; Ponte et al., 2015). Both the practical and emotional aspects of perceived value have significant effects on customer satisfaction and loyalty, which highlights the importance of OTAs offering high-quality service and products (Oh & Kim, 2017) and creating sustainable CVs to achieve ECS (Mbango, 2019). Therefore, the authors offer these two conceptualized hypotheses for investigation.

H1: Customer value (CV) directly influences e-customer satisfaction (ECS).

H2: Customer value (CV) directly influences e-customer loyalty (ECL).

Service innovation (SI)

Service innovation has been recognized as an essential component for organizations to maintain a sustainable competitive advantage in the OTA market (Si et al., 2020). Chubchuwong (2018) added that the effective management of SI can help OTAs adapt to consumer needs and advancements in technology. This is consistent with the precepts of the theory of disruptive innovation, in which continuously evolving services are seen as greatly improving CV (King & Baatartogtokh, 2015).

Service innovation enhances customer value for OTAs by integrating new technologies and improving service delivery processes. This not only meets but also reshapes customer expectations and value perceptions (King & Baatartogtokh, 2015). D'Emidio et al. (2015) highlight that digital advancements in SI are vital for increasing CV. Fu et al. (2018) support this view, showing that SI directly impacts customer loyalty by enhancing perceived value. Additionally, other studies have confirmed that SI leads to improved customer value by providing more personalized (Dhananja, 2021; Samara et al., 2020), efficient, and cost-effective travel solutions (Kracht & Wang, 2010; Singh & Ranjan, 2019). Therefore, the authors offer these three conceptualized hypotheses for investigation.

H3: Service innovation (SI) directly influences customer value (CV).

H4: Service innovation (SI) directly influences e-satisfaction (ECS).

H5: Service innovation (SI) directly influences OTA image (IM).

OTA Brand Image (IM)

OTA brand image plays an essential role in influencing ECS and ECL, with a strong, positive IM having the ability to increase ECS and, in turn, increasing OTA ECL (Da Silva & Syed Alwi, 2008; Lahap et al., 2016; Mohammed & Rashid, 2018). Therefore, a positive OTA brand image, which reflects reliability, quality, and a customer-focused approach, is a key predictor of ECS. Research by Kwon and Lennon (2009) and Da Silva and Syed Alwi (2008) has shown that a respected brand directly impacts ECS and ECL. Further studies by Lahap et al. (2016) and Mohammed & Rashid (2018) support this, indicating that a strong IM meets customer expectations and builds trust (Ponte et al., 2015), thereby increasing satisfaction. Additionally, Octavia and Tamerlane (2017) emphasize the importance of website quality, an aspect of the OTA's image, in influencing customer satisfaction. Their findings suggest that a positive brand image leads to higher levels of trust and satisfaction. Therefore, the authors offer the following conceptualized hypothesis for investigation.

H7: OTA image (IM) directly influences e-customer loyalty (ECL).

E-customer Satisfaction (ECS)

OTA success is reliant on ECS, with research showing that higher ECS leads to greater ECL and future business profitability (Srivastava & Kaul, 2014). According to expectation–disconfirmation theory, e-satisfaction results from the comparison of perceived performance with expectations (Grissemann & Stokburger-Sauer, 2012).

E-customer satisfaction is also an important element of ECL in the OTA market, with satisfied customers reporting greater loyalty (Huang & Lan, 2021). Customers are also likely to make repeat purchases and spread positive word-of-mouth. This finding is consistent with the Satisfaction–Loyalty Theory, which suggests that satisfaction from high service quality and positive customer experiences strongly influences loyalty (Fu et al., 2018). It has also been reported that satisfaction with cocreated travel services increases loyalty (Grissemann & Stokburger-Sauer, 2012), with online reviews potentially contributing to ECS and ECL (Xiang et al., 2017). Additionally, Kourtesopoulou et al. (2019) and Srivastava and Kaul (2014) emphasize the direct link between ECS and ECL, underscoring the importance of OTAs prioritizing

strategies that increase customer satisfaction to build loyalty. Therefore, the authors offer the following conceptualized hypothesis for investigation.

H8: E-customer satisfaction (ECS) directly influences E-customer loyalty (ECL).

E-customer Loyalty (ECL)

Numerous authors have noted that in a rapidly evolving digital environment, the ECL has become a critical OTA success determinant (Jasni et al., 2020). Moreover, the importance of the ECL in the Chinese market is reflected by its rapid growth in digital tourism and high digital engagement among Chinese consumers (Ai et al., 2022). According to the Economist Intelligence Unit (2024), in 2019, before the global pandemic, 168.2 million Chinese people had made cross-border trips (Figure 1). However, after the pandemic in 2023, this number only climbed back to 101 million, representing 60% of the 2019 high. Even at 101 million, many travelers have become increasingly reliant on OTAs for booking flights, hotels, and travel experiences.

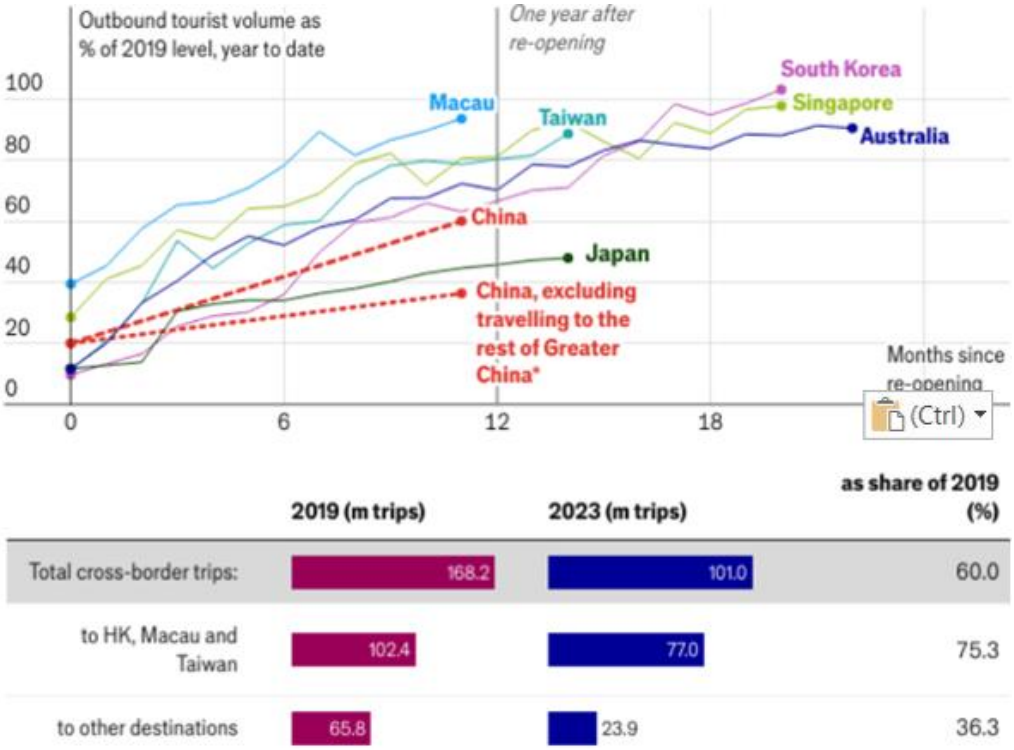

Figure 1: Chinese outbound tourism from 2019--2024. Source: Economist Intelligence Unit (2024)

Another important aspect affecting OTA ECL in China is the use of various technologies to improve customers' experience. For example, the application of big data analytics and artificial intelligence (AI) makes it possible to offer unique online experiences, integrating seamless reservation services and instant services to travelers, which then improves ECS and ECL (Tongdara & Heck, 2020; Prentice et al., 2020). Additionally, for convenience and efficiency, OTA platforms should be compatible with smartphones and function easily (Alom et al., 2024), with AI and big data analytics enabling personalized recommendations (Dhananja, 2021; Farheen et al., 2024; Samara et al., 2020). Moreover, mobile compatibility and the seamless functionality of OTA platforms on smartphones are critical (Alom et al., 2024), given the smartphone penetration rate of China's 72% in 2024 (approximately 1 billion users), which is expected to increase to 83% by 2027 (Slotta, 2023).

Trust, security, and safety are also crucial in creating ECL among Chinese tourists (Ponte et al., 2015). Other studies have reported the critical importance of health and safety issues to Chinese travelers (Chen et al.,

2023; Liang & Xue, 2021; Peng et al., 2023; Rapti & Zouni, 2024). OTAs that prioritize these concerns as well as data security, transparent pricing, and reliable service are more likely to gain and retain loyal customers, as studies report that trust significantly influences the loyalty intentions of Chinese e-customers (Rasheed & Abadi, 2014), as they are particularly cautious about online transactions due to concerns about fraud and misinformation (Rahman & Lili, 2011).

Furthermore, the cultural aspect of relationship-building, known as "guanxi," is integral to understanding ECL in the Chinese context (Dhananja, 2021). OTAs that successfully engage with customers through personalized communication, loyalty programs, and after-sales services are more likely to build strong, enduring relationships. The concept of guanxi emphasizes the importance of personal connections and trust, which in turn fosters customer loyalty (Aslam et al., 2020).

In other OTA research from Malaysia, Jasni et al. (2020) researched the influences of a brand's image and e-service quality (ESQ) on customer satisfaction and customer loyalty and confirmed that ESQ positively affects customer satisfaction and OTA loyalty. However, the authors noted that IM did not influence ECL even though IM significantly influenced ECS. Therefore, embracing ECL becomes essential for OTAs aiming to capture and retain a share of this lucrative market.

Therefore, the ECL is a vital component of OTAs that target the tourist market. By using advanced technologies, ensuring trust and security, and creating strong customer relationships (Octavia & Tamerlane, 2017; Wilis & Nurwulandari, 2020), OTAs can increase their appeal and secure a loyal consumer base. As the digital travel market continues to expand, the ability to foster and maintain ECL will remain a key competitive advantage for OTAs.

Problem Statement and Research Gap

In the rapidly evolving and highly competitive online travel sector, understanding the relationships among key factors such as service innovation (SI), interactive marketing (IM), electronic customer satisfaction (ECS), and electronic customer loyalty (ECL) represents a critical area of investigation (Gu et al., 2021; Hollebeek & Rather, 2019). Despite the acknowledged importance of these factors, particularly after the COVID-19 pandemic, empirical studies specifically examining their dynamics within the online travel industry remain scarce. The pandemic has significantly altered consumer behavior and expectations, shifting customer value beyond cost to include quality, convenience, and safety (Fu et al., 2016; Huang et al., 2020), all of which are pivotal in driving ECS and ECL.

Moreover, service innovation through digital enhancements and personalized offerings has become essential for online travel agencies (OTAs) to remain competitive. Brand image, trust, and reliability are increasingly important in influencing consumer decisions regarding OTAs. As such, this study aims to investigate and construct a comprehensive causal model that examines both the direct and indirect relationships among these critical factors, with a particular focus on how IM enhances ECS and ECL. This exploration is vital for understanding the broader implications for the success of OTAs in the post pandemic landscape.

Research Objectives (ROs)

The research objectives are twofold:

RO1. To investigate the causal connections between SI, CV, IM, ECS, and ECL.

RO2. To construct and examine a partial least squares structure equation model (PLS-SEM), AMOS Version 22 software was used to examine these relationships in depth (Figure 2).

Research Questions (RQ)

To address the research objectives and fill the identified gap in the literature, the authors formulated the following four RQs:

RQ1. How does the CV influence the ECS and ECL?

RQ2. What is the impact of the SI on the CV, ECS, and IM?

RQ3. How does the IM affect the ECS and ECL?

RQ4. To what extent does ECS mediate the relationships among CV, SI, and ECL?

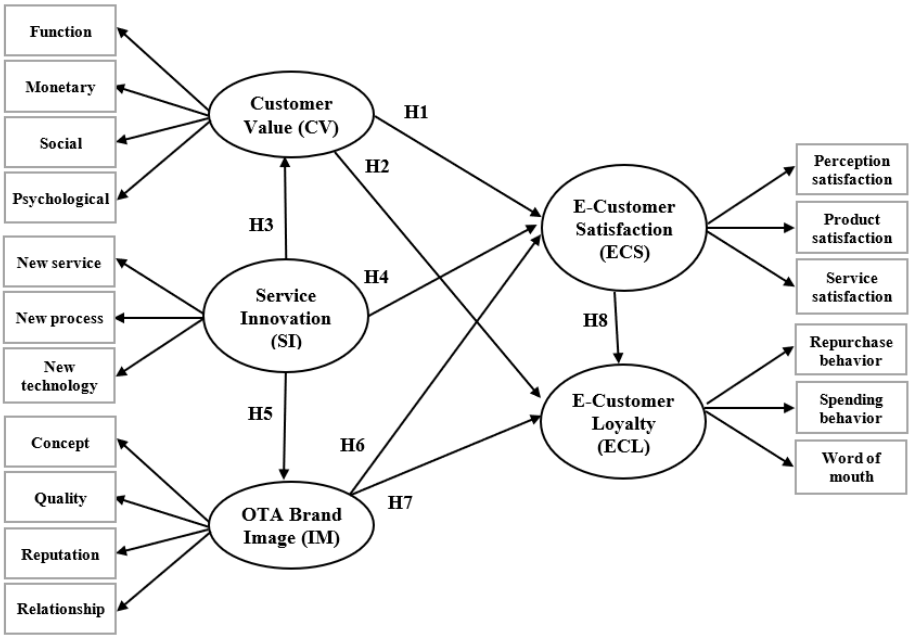

Figure 2: Proposed conceptual model. Source: The authors.

MATERIALS AND METHODS

Population and Sample

The population for the study included Chinese Trip.com users who had or were in the process of booking a holiday to Thailand. For sample size, many scholars recommend using a sample that is 10–20 times the number of indicators in the study, which is a common guideline for SEM (Pimdee et al., 2023). Moreover, Hair et al. (2016) suggested that CFA and SEM papers should contain 200–400 participants. However, the actual sample size is dependent on the number of indicators and the model's complexity. On the basis of these recommendations and the study's 17 indicators (Table 1), a sample of 361 participants was deemed sufficient for the statistical analysis.

Research Tools

This study used PLS-SEM via AMOS Version 22 software to analyze the relationships between CV, SI, IM, ECS, and ECL within OTAs. SEM was chosen because it can handle complex models involving multiple independent and dependent variables, allowing for the simultaneous examination of both direct and indirect effects (Hair et al., 2016).

Research Instrument

A structured questionnaire was designed to collect quantitative data reflecting the constructs within the SEM framework (Table 1). The reliability and validity of the questionnaire were ensured by an expert panel of five academics with PhDs and expertise in e-commerce research and survey design (Nantha et al., 2024).

Table 1: Questionnaire constructs, observed variables, items, and supporting theory

Constructs	Observed variables (17)	51 Items	Supporting theory
Customer Value (CV)	Function Monetary Social Psychological	3 3 3 3	(Fu et al., 2016; Grissemann & Stokburger-Sauer, 2012; Kourtesopoulou et al., 2019; Mbango, 2019; Octavia & Tamerlane, 2017; Oh & Kim, 2017; Ponte et al., 2015; Srivastava & Kaul, 2014; Ukpabi, 2020).
Service Innovation (SI)	New service New process New technology	3 3 3	(Chubchuwong, 2018; D'Emidio et al., 2015; Fu et al., 2018; Hollebeek & Rather, 2019; King & Baatartogtokh, 2015; Kracht & Wang, 2010; Singh & Ranjan, 2019).
OTA Brand Image (IM)	Concept Quality Reputation Relationship	3 3 3 3	(Da Silva & Syed Alwi, 2008; Fu et al., 2016; Kwon & Lennon, 2009; Lahap et al., 2016; Mohammed & Rashid, 2018; Octavia & Tamerlane,2017; Ponte et al., 2015).
E-Customer Satisfaction (ECS)	Product Satisfaction Service Satisfaction Perception Satisfaction	3 3 3	(El-Adly, 2019; Fu et al., 2018; Grissemann and Stokburger-Sauer, 2012; Hayati et al., 2020; Kourtesopoulou et al., 2019; Srivastava & Kaul, 2014; Xiang et al., 2017).
E-Customer Loyalty (ECL)	Repurchase Behavior Spending Behavior Word of month	3 3 3	(Ai et al., 2022; Alom et al., 2024; Aslam et al., 2020; Dhananja, 2021; Economist Intelligence Unit, 2024; Octavia & Tamerlane, 2017; Ponte et al., 2015; Prentice et al., 2020; Rahman & Lili, 2011; Rasheed & Abadi, 2014).

Reliability and Validity Assessment

The study utilized a questionnaire to assess the research variables, focusing on the appropriateness of the five latent variables and their 17 observed variables. A 5-point Likert scale was used to assess each OTA user's opinions, which included '5' (4.21–5.00) indicating 'strongly agree', '4' (3.41–4.20) indicating 'agree', '3' (2.61–3.40) indicating 'no opinion', '2' (1.81–2.60) indicating 'disagree' and '1' (1.00–1.80) indicating 'strongly disagree'.

However, before the online survey was distributed, five academic experts in business, logistics, and culture/social development reviewed the survey items. As is typical during this stage of questionnaire assessment, the authors used the index of item-objective congruency (IOC) as a numerical tool to determine 1) each item's importance to the questionnaire's objectives; 2) the item's clarity; and 3) the item's comprehensiveness, completeness, significance and meaningfulness (Ruenphongphun et al., 2021). In the IOC assessment phase, items that had evaluations of ≤0.50 were revised or deleted. After this, the IOC assessment outcome returned questionnaire item values of 0.60–1.00.

Furthermore, to ensure the questionnaire's accuracy, reliability, and usability, the researchers conducted a pretest (pilot test) with 30 Chinese OTA users who were not part of the final study (Pimdee, 2020). They evaluated the questionnaire's usefulness, format, and research items. While there is some debate about what constitutes 'adequate reliability',' many scholars suggest that a Cronbach's α value of ≥ 0.8 is

preferable (Cheung et al., 2023; George & Mallery, 2019). The results from the pilot test indicated that the latent variable questionnaire items had an average Cronbach's α of 0.88.

Data Collection

Data were collected through an online survey targeting Chinese internet users that utilized the platform Trip.com and nonprobability sampling (Fülöp et al., 2023) in conjunction with purposive sampling (Adebayo & Ackers, 2021). Trip.com Group, the leading Chinese OTA, which had 66.35 million page visits in the first quarter of 2024, was selected for the sample because it is the largest OTA in the Chinese market with a significant user base, which has grown alongside the expanding Chinese middle class (Textor, 2024). Despite challenges from the COVID-19 pandemic, Trip.com has shown resilience and strong recovery, making it a relevant and insightful source for studying online travel behavior among Chinese internet users. This focus allows the study to tap into a substantial and representative segment of the target population.

The data collection period spanned two months (February–March 2023), allowing sufficient time to gather a dataset from participants across China. This timeframe ensured that the responses reflected diverse experiences and perceptions regarding online travel services. Additionally, nonprobability sampling was selected because of its ability to target users who were accessible through Trip.com, allowing only those who used or visited Trip.com during the survey period to be potentially surveyed. This survey method is also easier, quicker, and cost-effective in gathering data, especially when dealing with a large population (Lehdonvirta et al., 2021). Purposive sampling, on the other hand, is a type of nonprobability sampling where the researcher selects subjects on the basis of specific characteristics or criteria. The goal was to obtain a sample that was particularly informative and relevant to the study.

Data Analysis

The analysis comprised two primary stages, including the use of a preliminary assessment CFA followed by SEM. First, the CFA was used to validate the measurement model, ensuring that the survey items accurately measured the intended constructs. CFA is an essential first step in establishing construct validity. After validation, SEM was applied to test the hypothesized relationships within the structural model. This analysis provided insights into the direct and mediated effects among the constructs (Hair et al., 2016).

RESULTS AND DISCUSSION

Chinese OTA User Characteristics

Table 2 details the characteristics of the 361 Chinese OTA users who participated in the study. First, analysis revealed that there were more female participants (60.47%) than male participants (39.28%). Additionally, the majority of respondents fell within the 20–30 age bracket (55.55%), followed by the 31–40 age bracket (42.29%). This skew toward younger age groups is noteworthy and may indicate a higher level of OTA usage among younger demographics. Educational background responses revealed that the majority of respondents reported having only a secondary education (68.06%), with the remaining respondents indicating that they had an undergraduate degree or higher (31.94%). The income distribution among the respondents indicated that the majority reported incomes under 6,000 CNY ($828) (85.62%), with a smaller group falling into higher income brackets. This included 13.02% of the respondents reporting incomes between 6,001 and 10,000 CNY ($828-$1,380).

Furthermore, Table 2 provides insights into the number of OTA brands used by respondents. The majority reported using one (22.40%) or two (39.78%) OTA brands, with smaller proportions using three (24.04%), four (3.87%), five (0.83%), six (0.28%), or eight (0.28%) brands. Finally, the preferred booking method among respondents is detailed in the table. The majority indicated using OTAs (89.47%), whereas smaller proportions preferred booking through hotel websites (7.47%), both methods (1.94%), or reporting using none (0.83%). Again, there was only one missing response in this category. This distribution underscores the significant reliance on OTAs for travel bookings among the sampled population.

Table 2: Chinese OTA user demographics (*n*=361)

Characteristic	Category	OTA Users	Percent
Gender	Female	219	60.47%
	Male	142	39.28%
Age Group	20-30	201	55.55%
	31-40	153	42.29%
	41-50	5	1.38%
	Above 51	2	0.55%
Educational Background	Secondary education	246	68.06%
	Undergraduate degree or higher	62	31.94%
Income Level in CNY	Under 6,000 ($828)	310	85.62%
	6,001-10,000 ($828-$1,380)	47	13.02%
	10,001-20,000 ($1,380-$2,760)	3	0.83%
	Over 30,001 ($4,139)	1	0.28%
Number of OTA Brands Used	0	27	7.47%
	1	81	22.40%
	2	144	39.78%
	3	87	24.04%
	4	14	3.87%
	5	3	0.83%
	6	1	0.28%
	8	1	0.28%
Preferred Booking Method	Both	7	1.94%
	Hotel Website	27	7.47%
	None	3	0.83%
	OTA	323	89.47%

Convergent validity (CV)

Table 3 details the factor loadings, composite reliability (CR), and average variance extracted (AVE) for the latent variables and their corresponding observed variables in the study (Cheung et al., 2023). These metrics are essential for assessing the validity and reliability of the constructs.

Table 3: Factor loadings, CR, and AVE

Latent Variable	Observed Variables	Symbols	Loadings	CR	AVE
Customer Value (CV)	Function	CVF	0.80**	0.89	0.70
	Monetary	CVM	0.82**	0.90	0.72

	Social	CVS	0.78**	0.88	0.68
	Psychological	CVP	0.79**	0.88	0.69
Service Innovation (SI)	New Service	SINS	0.81**	0.89	0.71
	New Process	SINP	0.80**	0.89	0.70
	New Technology	SINT	0.83**	0.91	0.74
OTA Brand Image (IM)	Concept	IMC	0.84**	0.92	0.75
	Quality	IMQ	0.85**	0.93	0.76
	Reputation	IMR	0.86**	0.93	0.77
	Relationship	IMRL	0.87**	0.94	0.78
E-Customer Satisfaction (ECS)	Repurchase Behavior	ECSRB	0.91**	0.96	0.83
	Spending Behavior	ECSSB	0.92**	0.97	0.84
	Word of Mouth	ECSWM	0.93**	0.97	0.85
E-Customer Loyalty (ECL)	Product Satisfaction	ECLP	0.88**	0.95	0.79
	Service Satisfaction	ECLS	0.89**	0.95	0.80
	Service Satisfaction (Perception)	ECLSP	0.90**	0.96	0.81

All observed variables for the CV had high factor loadings (0.78 to 0.82), indicating that they are good indicators of the construct. The CR values (0.88 to 0.90) suggest excellent internal consistency, as the AVE values of 0.68 to 0.72 are higher than the suggested theory threshold of 0.50, confirming the CV.

The SI factor loadings are also strong (0.80--0.83), with CR values ranging from 0.89--0.91, indicating high reliability. Additionally, the AVE values (0.70--0.74) demonstrated that a substantial amount of variance is captured by the indicators. IM's observed variables had high factor loadings (0.84 to 0.87), indicating a strong representation of the construct. The CR values (0.92 to 0.94) confirmed high reliability, and the AVE values (0.75 to 0.78) ensured good convergent validity. The ECS indicators exhibited very high factor loadings (0.88 to 0.90), suggesting that they are strong measures of the construct. The CR values (0.95 to 0.96) indicated excellent internal consistency. AVE values (0.79 to 0.81) further validated the CV. ECL factors had the highest loadings (0.91 to 0.93), reflecting their strong association with the construct. The CR values (0.96 to 0.97) showed exceptional reliability, and the AVE values (0.83 to 0.85) confirmed excellent CVs.

Therefore, all the factor loadings for the observed variables were well above the acceptable threshold of 0.80, indicating strong correlations with their respective latent variables. The CR values for all the constructs exceeded the recommended value of 0.80, indicating excellent internal consistency. The AVE values were all above 0.50 (Cheung et al., 2023), indicating that the constructs captured a substantial amount of variance from their indicators, confirming the CV. This finding suggests that the measurement model was reliable and valid for further analysis.

Standard Coefficient of Influence Analysis

Table 4 presents the correlations between the latent variables and other performance indices, which provide insight into the relationships and validity of the constructs in this study. The diagonal and off-diagonal elements (0.85, 0.88, 0.90, etc.) represent the correlations between the latent variables. The 'Average R^2' represents the average coefficient of determination across the constructs (Chicco et al., 2021). It indicates the proportion of variance in the latent variables that can be explained by the model. The 'Average Communality' indicates the average shared variance among the indicators of a latent construct. Higher values suggest that the indicators are well represented by the latent variable. The 'Average Redundancy' reflects the extent to which the variance in the dependent latent variable can be explained by the independent latent variable. It combines R^2 and communality to measure the effectiveness of the predictive model.

Table 4: Decomposition of the correlation matrix

Latent Variables	CV	SI	IM	ECS	ECL	Average R^2	Average Communality	Average Redundancy
CV	0.85					0.75	0.78	0.70
SI	0.88	0.84				0.78	0.81	0.73
IM	0.90	0.87	0.85			0.81	0.84	0.76
ECS	0.92	0.89	0.87	0.85		0.84	0.87	0.79
ECL	0.94	0.91	0.89	0.87	0.97	0.87	0.90	0.82

Correlation Relationships

Furthermore, when correlations are close to '1', this can indicate a strong relationship between the latent variables, which is good if it shows expected relationships, but it could be a problem, as it might indicate multicollinearity issues if the correlations are too high (Smith, 2015). However, correlations between 0.5 and 0.7 suggest moderate relationships. This is often desirable because it shows that the variables are related but not redundant. Finally, correlations closer to 0 indicate weak relationships, which might suggest that the latent variables measure different constructs.

Average R^2

A high R^2 (above 0.75) indicates that a large proportion of variance in the latent variables is explained by the model, suggesting a good model fit. A moderate R^2 (0.5 to 0.75) suggests a reasonable fit, with some variance unexplained. A low R^2 (≤ 0.5) implies poor model fit, indicating that the model does not explain much of the variance in the latent variables.

Average Communality

High communality (≥ 0.7) suggests that the indicators are well represented by their latent constructs, indicating good construct validity. Moderate communality (0.5 to 0.7) indicates moderate representation, which might be acceptable but warrants further investigation. Low communality (≤ 0.5) suggests poor representation.

Average Redundancy

High redundancy (≥ 0.7) implies that the model has good predictive relevance. Moderate redundancy (0.5 to 0.7) indicates acceptable predictive relevance but may require improvement. Low redundancy (≤ 0.5) suggests poor predictive relevance, indicating that the model does not effectively predict the dependent latent variables. Finally, the correlation values are high (0.85--0.97), indicating strong relationships between the latent variables. The average *R* values ranged from 0.75--0.87, indicating that a good proportion of the variance was explained by the model. The average communality values ranged from 0.78-

-0.90, suggesting good construct validity. The average redundancy values ranged from 0.70--0.82, indicating good predictive relevance.

Parameter Estimates

Table 5 details the SEM analysis parameter estimates, which are the relationships between the observed variables and the latent constructs. The columns indicate the following:

Variable: The dependent variable in the relationship being modeled.

Estimate: The estimated value of the parameter linking the dependent variable to the independent variable (latent construct).

S.E. (Standard Error): The standard error of the estimate, which measures the precision of the estimate.

C.R. (Critical ratio): The critical ratio is the estimate divided by its standard error (similar to a t value in regression). This indicates the statistical significance of the parameter.

p: *p* value for the statistical test of the parameter estimate. A *p* value less than 0.01 (denoted by **) indicates that the parameter is statistically significant at the 1% level.

Table 5: Estimated SEM relationships between the constructs and observed variables

Variable			**Estimate**	**S.E.**	**C.R.**	***p***
Psychological	<---	CV	1.00			
Social	<---	CV	1.19	.06	18.34	**
Monetary	<---	CV	1.08	.06	18.19	**
Function	<---	CV	.91	.06	16.11	**
New Technology	<---	SI	1.00			**
New Process	<---	SI	1.05	.06	18.31	**
New Service	<---	SI	.99	.06	17.89	**
Relationship	<---	IM	1.00			**
Reputation	<---	IM	.92	.05	17.56	**
Quality	<---	IM	.89	.05	17.89	**
Concept	<---	IM	.84	.05	17.61	**
Perception Satisfaction	<---	ECS	1.00			**
Service Satisfaction	<---	ECS	1.06	.06	18.72	**
Product Satisfaction	<---	ECS	1.06	.06	18.67	**
Word-of-mouth	<---	ECL	1.00			**
Spending Behavior	<---	ECL	1.01	.07	13.75	**
Repurchase behavior	<---	ECL	.91	.07	13.87	**

Note: ** = $p \leq 0.01$

Moreover, the parameter estimates show the strength and direction of the relationship between the latent construct and the observed variable. For example, the estimate of 1.178 for the relationship between Social and CV indicates that for every unit increase in CV, Social increases by 1.178 units, assuming that other variables are constant.

The *p* values (with ** indicating p ≤ 0.01) show that all the parameter estimates are statistically significant, meaning that there is strong evidence that the latent constructs influence the observed variables.

The SEs provide information on the reliability of the estimates. Smaller S.E.s indicate more precise estimates. The critical ratios (C.R.) provide a measure of how many S.E.s the estimate is away from zero. Higher C.R. values indicate a more significant relationship.

Understanding Table 5 is essential for several reasons, as it helps in validating the SEM by showing which relationships between latent constructs and observed variables are significant. It provides insights into the strength and nature of the relationships between constructs in the model, helping to confirm or refute theoretical assumptions. Knowing which factors significantly impact customer value, service innovation, brand image, satisfaction, and loyalty can guide managerial decisions and strategic planning.

Standardized Direct Effects

The analysis in Table 6 revealed that 82% of the variance in ECS and 89% of the variance in ECL are explained by the model's R^2 value (Table 6). Furthermore, direct effects (DE) for CV, SI, and IM have significant direct effects on ECS, with standardized coefficients (β) of 0.45, 0.60, and 0.35, respectively. The total effects (TE) for CV, SI, and IM on ECS are equivalent to their direct effects (0.45, 0.60, and 0.35), confirming the absence of mediating variables in the relationship between these constructs and ECS.

Table 6: Standardized direct effects

	R^2	Effect	CV	SI	IM	ECS
ECS	0.82	DE	0.45*	0.60*	0.35*	-
		IE	-	-	-	-
		TE	0.45*	0.60*	0.35*	-
ECL	0.89	DE	-	-	-	0.75*
		IE	0.34*	-	0.26*	-
		TE	0.34*	-	0.26*	0.75*

Note: *=$p < 0.05$

Interpretation

(1) Psychological <--- CV: The parameter estimate for Psychological is set to 1.00, indicating that it is a reference variable for the CV latent construct. This is also the case for the other latent variables' first observed variables, all of which are set to 1.00 for reference purposes.

(2) Social <--- CV: The estimate is 1.178 with a standard error of 0.06, a critical ratio of 18.39, and a *p* value < 0.01. This indicates a strong and significant relationship between the latent variable CV and its observed variable Social.

(3) Monetary <--- CV: Similarly, Monetary has an estimate of 1.08, showing that it also has a significant relationship with the CV. This pattern continues for all latent constructs and their associated observed variables, with significant relationships indicated by the high critical ratios and low *p* values.

Concerning the ECL, the R^2 value was 0.89, suggesting that 89% of the variance in the EL is accounted for by the model, emphasizing the significant explanatory power of the factors considered. ECS exerts a substantial direct effect on EL, with a standardized coefficient of 0.75, indicating that higher customer satisfaction leads to greater customer loyalty. The CV and IM indirectly influence the ECL via the ECS, with β = 0.34 and β = 0.26, respectively. These indirect effects illustrate that the influence of CV and IM on ECL is mediated through ECS, emphasizing the importance of customer satisfaction as an intermediary factor. The TE values of CV and IM on the ECL, including both direct and indirect influences, are 0.34 and 0.26,

respectively, whereas the TE of ECS on the ECL remains at 0.75. This cumulative influence highlights the complex interrelationships and the cascading effect of customer value and image from satisfaction to loyalty.

Importance

The direct and indirect effects of CV, SI, and IM on ECS and ECL provide specific details on which OTAs can focus on improving overall customer satisfaction and loyalty. Specifically, the significant influence of ECS on ECL (with an R^2 of 0.89) underscores the critical role of ECS in fostering ECL. This insight can guide OTAs to prioritize customer satisfaction initiatives as a means to increase their loyalty and, ultimately, business performance.

Hypothesis Testing Results

Table 7 and Figure 3 detail the results from the eight hypotheses tested (Gross, 2015), from which all the hypotheses were found to be supported.

Table 7: Hypothesis testing results.

	Expected Direction	**Result**
H1: Customer Value (CV) directly influences E-Customer Satisfaction (ECS).	16.24	Accept
H2: Customer Value (CV) directly influences E-Customer Loyalty (ECL).	3.28	Accept
H3: Service Innovation (SI) directly influences Customer Value (CV).	17.25	Accept
H4: Service Innovation (SI) directly influences E-Customer Satisfaction (ECS).	3.41	Accept
H5: Service Innovation (SI) directly influences OTA Brand Image (IM).	2.99	Accept
H6: OTA Brand Image (IM) directly influences E-Customer Satisfaction (ECS).	4.54	Accept
H7: OTA Brand Image (IM) directly influences E-Customer Loyalty (ECL).	3.52	Accept
H8: E-Customer Satisfaction (ECS) directly influences E-Customer Loyalty (ECL).	4.10	Accept

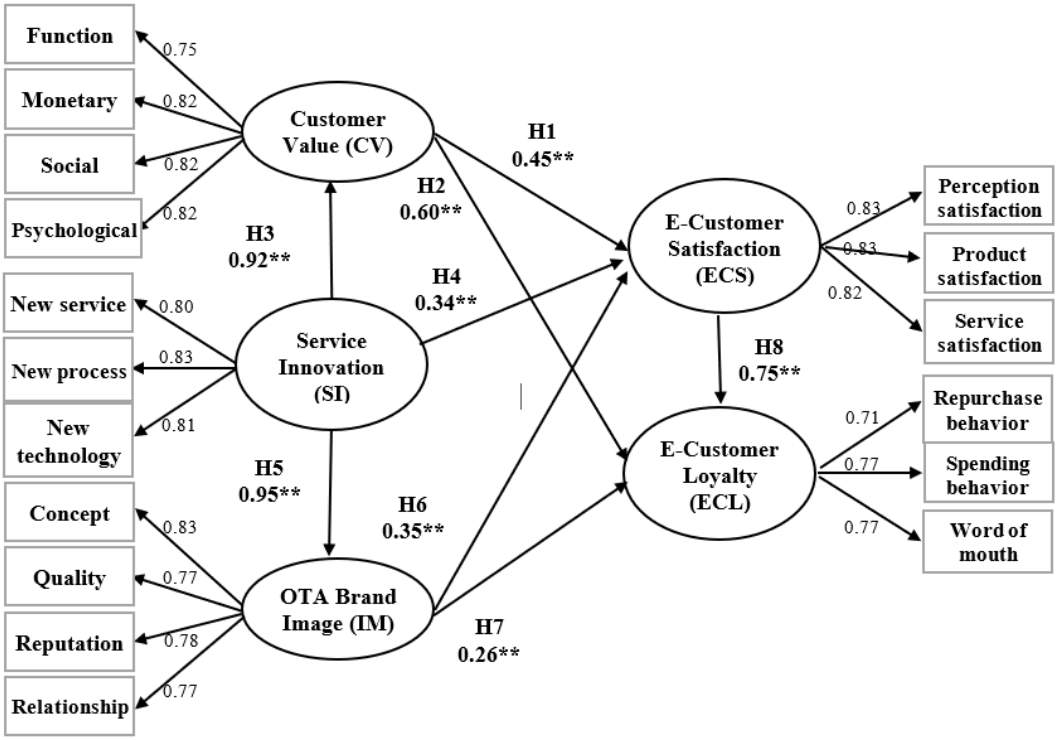

Figure 3: Final model

CONCLUSION

This study explored the relationships among customer value, service innovation, OTA brand image, e-customer satisfaction, and e-customer loyalty within online travel agencies (OTAs) (Jasni et al., 2020), revealing significant findings. Our finding that CV directly impacts ECS is consistent with Oh and Kim's (2017) research, underscoring the importance of value in enhancing customer satisfaction. The study also highlights the strong influence of an OTA's brand image on ECS and ECL, which is consistent with the findings of Kwon and Lennon (2009), who emphasized the essential role of brand perception in the digital marketplace.

Moreover, the study contributes to the academic literature by empirically validating the relationships between CV, SI, IM, ECS, and ECL within the online travel context. This finding supports the theory that customer satisfaction mediates the relationship between customer value/image and loyalty (El-Adly, 2019; Hayati et al., 2020). By quantifying the impact of various constructs on ECSs and ECLs, the findings offer practical guidelines for OTAs to allocate resources effectively. For example, investments in SI and enhancing the agency's image are likely to yield significant improvements in ECS and ECL.

IMPLICATIONS

In terms of practical implications, SEM analysis provides strategies for OTAs seeking to increase customer loyalty and satisfaction. It suggests innovating service offerings by integrating AI for personalized recommendations, virtual reality for previews, and chatbots for support (Farheen et al., 2024). Additionally, crafting a distinctive brand narrative emphasizing reliability and customer focus, optimizing the user interface for seamless booking experiences, and leveraging data analytics for customer insights are deemed crucial. Moreover, fostering an engaged community where travelers can share experiences and feedback can significantly elevate increase service quality and customer loyalty.

LIMITATIONS

However, the study faces limitations due to sample size and potential self-reporting bias, underscoring the need for cautious interpretation of the findings. As nonprobability sampling was used, the sample may not be representative of the entire population of Chinese internet users, which can introduce bias and limit the generalizability of the results. Expanding the dataset by including additional variables or data sources beyond Trip.com could introduce new dimensions to the study of loyalty and satisfaction.

Declarations

Author Contribution Statements - Lei Sun (LS), Wawmayura Chamsuk (WC), Amnuay

Saengnoree (AS) and Puris Sornsaruht (PS)

Conceptualization, LS and WC; Software, LS and PS; Validation, WC and AS; Formal analysis, LS and AS; Investigation, LS and WC; Resources, LS and PS; Writing—original draft preparation, LS and WC; Writing—review and editing, WC and AS; Supervision, LS and PS. All the authors have read and agreed to the published version of the manuscript.

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The authors declare no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

Informed Consent Statement

Informed consent was obtained from all individual participants included in the study.

Disclosure Statement

The authors declare that they have no conflicts of interest.

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