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Cross-Validating the Measurement Scale for Consumers' Experience with Hospitality and Tourism Technology: A Multi-sector Approach

Purpose

This research aims to cross-validate the TE scale and examine the potential differences in consumer TE across three different sectors.

Design/methodology/approach

Across three separate studies, the TE scale and its psychometric properties and consequences were examined across three distinctive H&T sectors: accommodations (n=640), F&B (n=615), and tourism (n=592).

Findings

The findings consistently show that TE is a second-order formative construct with nine dimensions. Furthermore, the factor structure of consumer TE is consistent across the focal sectors, enhancing the TE scale's generalizability. While the dimensions consisting of TE were identical across the three sectors, the composites of TE were formed differently across the sectors, demonstrating the differences in consumers' TE across the three sectors.

Practical Implications

This research offers practical implcations to the H&T industry regarding the different impacts of various TE dimensions on consumers' overall experiences, thereby creating overall satisfactions and behavioral intentions.

Originality/value

This research was the first attempt to examine the differences in consumers' TE across the sectors of the H&T industry. By identifying the different impacts of TE dimensions on consumers' overall experience, this research provides theoretical and practical contributions, by confirming the distinct characteristics of the sectors under the H&T industry.

Introduction

As the hospitality and tourism (H&T) industry has been significantly transformed by recent and substantial developments of technology, more technologies have been introduced in the industry to improve guest experience (Shin *et al*., 2023). Due to the experiential nature of the industry, a key business priority of H&T organizations is to offer a consistently high-quality consumer experience in line with technology implementation. As an increasing number of H&T products/services are being provided on technological platforms, the volume of interactions between consumers and technologies is also dramatically increasing. Accordingly, much attention has been given to consumer behavior regarding H&T technologies, such as technology adoption behavior (Chi *et al.*, 2022) or post-evaluation of technology adoption (Hao and Chon, 2022). However, despite the significant importance of customer experiences with technologies, the literature lacks empirical research that investigates the differences among industry sectors. Given the industry's accelerated technology adoption, together with the emerging technological innovations in the H&T domain, the need for a comprehensive understanding of consumer experience with technologies (TE) has become imperative.

To address this gap in the literature, Shin *et al.* (2022) conceptualized TE and subsequently developed and validated the TE scale. However, despite their rigorous scale development procedure and demonstration of the strong psychometric properties thereof, to ensure scale generalizability, additional assessments and/or replications of the scale are required to show its economic feasibility and validity across multiple and disparate settings (Badenes-Ribera *et al.*, 2020). Moreover, regardless of the field of research, researchers have argued that it is important to develop, enhance, and refine the conceptual and psychometric foundation of a construct and its measurement items for the sound growth of knowledge (Furlong *et al.*, 2007). This is particularly critical in behavioral science, where constructs are often measured with interval items, making it difficult for researchers to evaluate mean scores (Netemeyer *et al.*, 2003). Furthermore, the quality of inferences drawn in research depends heavily on the reliability and validity of the adopted measurement items in analyses (Churchill, 1979). Accordingly, researchers have emphasized that cross-validating scales and developing norms are key steps in the scale development process (e.g., Churchill, 1979; MacKenzie *et al.*, 2011; Netemeyer *et al.*, 2003). Similarly, Hunt (2014) and Bass (1995) also highlighted the critical role of empirical generalization in science and knowledge development. H&T scholars have also conducted research to cross- and/or further- validate published measurement scales (e.g., Hosany *et al.*, 2015; Kim *et al*., 2014; So *et al.*, 2021). Therefore, it is crucial to cross-validate the TE scale in different new contexts by comprehensively assessing the psychometric properties with a new, representative sample (MacKenzie *et al.*, 2011).

As the hospitality industry and tourism industry are intertwined, they are often referred to as the H&T industry and treated as a single industry. However, it should be noted that the H&T industry is an umbrella industry which distinctive, yet inter-related sectors collectively represent, such as the lodging sector, food and beverage (F&B) sector, tourism, and events (Walker, 2021). Despite their similar characteristics and interconnections, it is conceptually unreasonable to assume that the different sectors in the H&T industry are identical. Rather, the distinct characteristics of the sectors in the H&T industry (Pizam, 2009; Singal, 2015) should be considered, as consumers' want and expectations are not the same (Keiser, 1998; Veloso and Gomez-Suarez, 2023); the distinct characteristics of each sector may also cause external validity issues (Ottenbacher *et al.*, 2009). Accordingly, focusing on a specific sector in the H&T industry

has been recommended (Ottenbacher *et al.*, 2009). Thus, consumer TE should be examined considering the unique charateristics of each sector.

However, the TE scale (Shin *et al.*, 2022) was originally developed in a broader sense, whereby the differences among industry sectors were not explicitly accounted for or formally tested. Hence, it remains unclear whether TE is context-dependent. Since the types and patterns of technology adoption often vary across industry sectors, understanding the potential differences in consumer TE across various sectors within the industry is vital. As the primary purposes, as well as the functions, of technologies might vary by sector, it is important to contrast and compare consumer TE in different sectors to thereby further support the applicability of the TE scale and establish an important foundation for future studies on TE. This research, across three studies, focuses on the three most representative H&T services for contextual examination and validation (i.e., accommodations, F&B, and tourism) (Parsa, 1995). Given that these three focal services are known groups, the norms for the TE scale are established by comparing the scale scores across consumer groups in the H&T industry (Netemeyer *et al.*, 2003).

Specifically, this research aims (1) to cross-validate the TE scale, thereby further establishing its validity and reliability and (2) to identify potential differences in consumer TE among three different industry sectors across multiple stages of investigation. By achieving these objectives, this research offers an in-depth understanding of TE and the potential contextual differences in TE across sectors. The findings can help H&T industry practitioners understand which dimensions of TE are key contributors to consumers' overall experience (OE) in their specific sector, thereby increasing their overall satisfaction (OS) and behavioral intention (BI). Additionally, they can diagnose their current performance in TE creation and identify specific dimensions for enhancing TE, OE, OS, and BI.

Literature Review

Consumer Experience with Technology (TE)

Coined by Hirschman and Holbrook (1982), consumer experience, defined as consumers' subjective responses to stimuli by actors/products/services during their consumption journey, has been central in consumer research (Kim and So, 2022). Recognizing the importance of consumer experience, many researchers have defined it via core products/services in various settings, such as memorable tourism experience (Kim *et al*., 2012) and dining experience (Bao *et al*., 2022). To provide a comprehensive understanding of TE, researchers (Hao and Chon, 2022; Hwang *et al*., 2021) have also conducted studies on consumer behavior and technology.

On the other hand, amid the growing popularity of technology in the H&T industry, some researchers have focused on consumer experience in terms of technology, such as VR (Merkx and Nawijn, 2021), and robots (Huang *et al.*, 2021). However, most studies have focused on consumer experience with a specific type of technology rather than providing a general and broader understanding of TE. In contrast to studies focused on consumer experience with a specific technology, Shin *et al.* (2022) generally conceptualized TE, defining TE as "a unique type of experience that arises from the interplay between consumers and technologies, and consumer's holistic assessment of their complex interactions with technologies." Given its multi-faceted nature, TE was developed as a hierarchical construct comprising nine dimensions: sensorial, cognitive, pragmatic, emotional, relational, unique, familiar, controllable, and economical experiences (Shin *et al.*, 2022).

Sensorial experiences (SEs) represent consumers' experiences evoked by sensory stimuli in their interactions with technologies (Buhalis *et al.*, 2019). However, the use of dominant and advanced technologies differs sustantially across sectors within the H&T industry. In the context of restaurants, technologies such as AR and 360-degree images, via tabletop tablets, can help consumers who are not familiar with menus visualize menu items and drives SE. Setting their hotel room at their preferred temperature with an aroma diffuser using a smart room controller can also stimulate hotel consumers' SEs. In the tourism context, wearable AR technologies allowing travelers to interact with tourism resources using their senses also produce tourists' SEs (Tussyadiah *et al.*, 2018).

When consumers are involved in mental processes such as processing and applying information, a *cognitive experience* (CE) occurs (Shin *et al.*, 2022). Travel guide apps providing travelers with in-depth information about their destination, such as its history, uniqueness, culture, and recommended activities, help travelers learn more and become immersed in their destination, producing CEs. In the context of restaurants, if a virtual sommelier helps consumers pair wines based on their menu and occasion, this generates CEs, as they develop better knowledge about wines and wine pairings.

Pragmatic experiences (PE) are closely related to the utilitarian benefits of using technologies (Shin *et al.*, 2022). For example, if hotel guests can save their time for check-in/out by using facial recognition or biometric technologies, they would feel the efficiency of the technology, which in turn generates PEs. Similarly, table-top tablets to place orders or request services would save consumers' time waiting for a server to notice their needs, creating PEs.

When their use of technologies triggers consumers' emotional responses, *emotional experiences* (EEs) occur (Shin *et al.*, 2022). For example, if a travel guide app plays sad music when it illustrates a tragedy at a dark tourism site, making travelers sorrowful, to generates EEs. On the other hand, if a service robot in a hotel greets guests with a smiley face and handwaving gestures with welcoming words, they might find it very interesting and delightful, thereby generating EEs.

Although there are conflicting views on whether technologies can replace human employees (Bowen and Whalen, 2017), they can serve as a platform for social connections, generating *relational experiences* (REs) (Shin *et al.*, 2022). Travelers can share their experiences with others through online review sites and travel communities or even find someone online to try a restaurant together. Thus, using technologies, consumers can reach and interact with others, creating REs.

When consumers use technologies in a novel and different manner compared to their typical use thereof, *unique experiences* (UE) are generated (Shin *et al.*, 2022). Given that some types of technologies are in their early diffusion stages (e.g., nonfungible tokens, AI, robots), are expensive (e.g., robots), and/or are not perceived as necessary in consumers' daily lives (e.g., blockchain), consumers might perceive the use of these technologies to be unique and novel, creating UEs. For example, if a consumer is surprised by facial recognition technology during check-in/out and room opening, using this technology creates an UE.

In contrast to UE, *familiar experiences* (FEs) occur when consumers perceive the use of technologies similar to their daily usage thereof (Shin *et al.*, 2022). Considering the popularity of travel and local mobile apps, consumers are unsurprisingly familiar their use. For instance, consumers use mobile apps to check reviews of a restaurant they want to try, not only in their place of residence but also in destinations, generating FE. Likewise, in local areas, consumers may use map applications such as Waze to ensure that there is not much traffic, whereas they

may also use the app to find the route to a specific attraction they want to visit at their destination, creating FEs.

Controllable experiences (CTEs) occur when consumers can gain flexibility in and more control over their planning by using technologies. With the development of the Internet of Things (IoT) and cloud computing, consumers can interact with technological platforms or other users, regardless of where they are and the time of day (Jovicic, 2019). In other words, consumers can obtain real-time information, which helps them adjust their travel itinerary based on changing situations. Accordingly, consumers can perceive a high level of control over their travel, as they can alter their plans according to their situation using technologies, generating CTEs.

To ensure their return on investment, H&T businesses often encourage consumers to use technologies by providing them with various deals, such as discounts. Thus, using technologies brings economic benefits to consumers, creating *economical experiences* (ECE) (Shin *et al.*, 2022). As consumers do not expect to tip technologies, using them reduces expenditures, resulting in ECEs. Although Shin *et al.* (2022) confirmed that TE is a formative construct with nine dimensions, they tested the composition thereof in a general H&T context. However, given the distinct characteristics of and variation in technology implementation/adoption, the composition of TE might vary by sector. Thus, it is imperative to test the factor structure of TE.

H1: TE is a formative second-order construct consisting of SE, CE, PE. EE, RE, UE, FE, CTE, and ECE.

Consequences of TE

Lemon and Verhoef (2016) suggested that the concept consumer journey involves numerous interactions between a consumer and a company through multiple touchpoints and that these touchpoints include service encounters. The H&T industry consists of a variety of sectors that provide different products/services (Zabel, 2003), where consumers' experiences include their responses to interactions with stimuli via actors/products/services (Kabadayi *et al.*, 2019; Kim *et al*., 2023). Accordingly, overall experience (OE) is the composites of their experiences with multiple products/services at a hotel, restaurant, or destination. Thus, a consumer's OE is affected by his/her experiences with accommodation (Bao *et al.*, 2022), dining (Karamustafa and Ülker, 2020), technology (Shin *et al.*, 2022), etc. As core products/services in the industry, many researchers have found significant effects of various experiences on OE. However, while technologies are not core services, TE has a notable impact on OE because of increasing consumer–technology interactions found in the H&T industry.

Expectation-confirmation theory (Oliver, 1977) suggests that satisfaction occurs when products/services outperform the expectations of consumers, while balance theory holds that consumers are likely to reinforce or change their post-experience evaluations to maintain consistency in their minds. Moreover, behavioral intention (BI) has been commonly used as a key construct in predicting consumers' actual behaviors; many studies have also confirmed the mediating role of overall satisfaction (OS) in the relationship between OE and BI (Hwang *et al.*, 2021; Kim and So, 2022).

H2: TE positively influences OE.

H3: OE positively influences OS.

H4. OS positively influences BI.

Potential Differences in TE across Various Sectors

While the hospitality industry and tourism industry are often used interchangeably (Pizam, 2009), these two industries are not completely identical, as consumers' purposes and expected services therein are divergent (Keiser, 1998). Although the sectors in the H&T industry are inter-related (Walker, 2021), researchers have emphasized that their distinct characteristics (Pizam, 2009; Singal, 2015). Particularly, the products/services provided in the H&T industry are complex and vary by sector. Accordingly, each sector has distinct characteristics, even if they all fall under the overall umbrella of the H&T industry (Abbasi, 2022; Ottenbacher *et al.*, 2009). Although the entire H&T industry is collectively considered experiential in nature, the degree to which the pure experiential components relative to the overall experience differs by sector. For instance, the products/services in the tourism sector provide highly experiential and hedonic value (a higher level of needs in Maslow's hierarchy). The F&B sector is closely related to 'necessary consumption' in which utilitarian values are critical (Ryu *et al.*, 2010). Given the importance of utilitarian values in the F&B sector, its technologies may focus more on increasing utilitarian values, such as functionality and cognitive aspects.

As each sector has its own characteristics (Ottenbacher *et al.*, 2009), the types and purposes of technologies they use and their areas of technology implementation differ accordingly. Therefore, consumers expectations for technologies are differnent across the sectors even within the H&T industry. For example, restaurants have heavily utilized in-store technologies to provide efficient services, such as tabletop tablets and self-service kiosks equipped with contactless payment systems. Whereas, hotels tend to focus more on technologies accessible through guests' own mobile devices, such as mobile apps with remote check-in/out, digital room keys, and smart room services. In the tourism industry, more diverse technologies have been used, including digital services via mobile apps (e.g., travel guide apps), on-site technologies (e.g., AR Glasses in museums), and virtual trips. Furthermore, given the different degrees of interaction in these three sectors (Schmenner, 1986), their degrees of technology utilization differ substantially, creating different TEs with their associated impacts. In the F&B sector, transactional technologies, such as self-service kiosks, are commonly and mostly used once during the consumption journey and typically provide utilitarian benefits, highlighting the importance of PE. In sum, TEs are likely to vary by sector because consumers' purposes and expectations of the services in each sector are different (Keiser, 1998; Veloso and Gomez-Suarez, 2023). Moreover, their purposes, types, areas of using technologies, and types of technologies they interact with vary across these three sectors. Given that consumer experience refers to a consumer's responses to products/services, it is critical to examine how these sectors differentiate TE. Thus, this research aims to investigate the potential differences in consumer TE across accommodations, F&B, and tourism sectors (see Figure 1).

H5: There is a difference between the three sectors in the proposed relationships.

[Figure 1]

Methodology

To cross-validate the TE scale (Shin *et al.*, 2022) and to examine if there are any differences in consumer TE across the different sectors in the H&T industry, a multi-study approach was employed: Study 1 (accommodations), Study 2 (F&B), and Study 3 (tourism) (Figure 2).

[Figure 2]

Data Collection and Analysis

Three online self-administered surveys were developed on Qualtrics by targeting accommodation (Study 1), F&B (Study 2), and tourism (Study 3). As this research aimed to contrast and compare the three sectors, a consistent data collection and analysis procedure was followed. A nation-wide sampling with quotas was used by working with Qualtrics. The qualifying respondents were those who lived in the U.S., were consumers of accommodation (Study 1), F&B (Study 2), and tourism (Study 3) sectors, and had used H&T services and technologies in the respective sector in the U.S. in the past 12 months. To prevent potential bias, Qualtrics ensured no respondent could participate in more than one study. Further requests were made for the samples to better represent the population of interest, such as gender, age generation, and household income.

Each survey consisted of five sections. The first section included a brief introduction of this research, a consent form, and a quality commitment. The second section provided the respondents with an explanation and examples of various sectors in the H&T industry, descriptions and examples of technologies, a series of screening questions to identify qualified responses (e.g., types of technologies used), and questions asking respondents' usage of various technologies (frequency and purposes). The measurement items for the nine dimensions of TE were included in the third section, whereas the fourth section included measurement items for the consequences of TE. To ensure the respondents know in what context and which technologies they evaluated for each construct, the technologies and contexts were given as instruction and in the measurement. The survey ended with a section asking respondents about their socio-demographic information.

All constructs were measured with multiple items on either a 7-point Likert or semantic differential scale. TE was measured with 36 items from Shin *et al.* (2022). Four items for OE and three items each for OS and BI were adopted from Jeong and Shin (2020). To prevent respondents' fatigue and common method bias, the measurement items were arranged in a way the same scale type was not coming consecutively. The minimum sample size was determined by following Hair *et al*. (2011) and considering the complex nature of TE. Partial least squares structural equation modeling (PLS-SEM) was also used, as TE is a second-order formative construct. While PLS-SEM is does not require distributional assumptions (Hair *et al.*, 2011), normality tests were conducted before performing the main analysis. Next, the two-step approach (Anderson and Gerbing, 1988) was employed. The measurement model was evaluated by examining the standardized factor loading (measurement items for first-order constructs), standardized factor weight (TE dimensions), and significance of parameters. Average variance explained (AVE), construct correlation, Cronbach's alpha, and composite reliability (CR) were evaluated. The structural model was assessed for path coefficients and path significance using

the bootstrapping technique (N=5000). All data analyses were conducted first with R and crossed-checked with SmartPLS 4.

Results and Discussion

Study 1: Accommodations

A total of 640 complete responses were collected. About 56% of the respondents were female. Approximately 51% of the respondents were born between 1965 and 1994, followed by Baby Boomers (37%). More than a half (53%) of the respondents had household income below $70,000, and 85% of the respondents were Caucasian. About 46% of the respondents held an Associate or Bachelor's degree, whereas 47% were working full-time (Appendix A).

The skewness and kurtosis fell within the acceptable range (Kim, 2013), and VIF statistics were less than 5, except for one item (RE_2: 5.28), indicating multicollinearity was not a major an issue (Witten and James, 2013). The standardized factor loadings were greater than or equal to .77, and the smallest AVE was .69, supporting convergent validity (Fornell and Larker, 1981) (Table 1). Cronbach's alpha and CR estimates were greater than the threshold of .80, indicating sufficient internal consistency (Nunally, 1967). The correlation between any constructs was smaller than the square root of the construct's AVE, and the confidence interval of HTMT did not include 1, at both first level and second level constructs, demonstrating discriminant validity (Fornell and Larker, 1981; Henseler *et al.*, 2015) (Table 2). The inner weights of the nine dimensions of TE were significant, demonstrating TE was a second-order formative construct composed of nine dimensions (Table 3), supporting H1. There was no presence of common method bias as the variance explained by one factor (40%) was smaller than the threshold of 50% (Eichhorn, 2014).

Substantial variance in endogenous constructs was explained by the proposed research model (adj-R^2_{OE}=.66, adj-R^2_{OS}=.63, adj-R^2_{BI}=.48). TE positively affected OE (β=.81, t=49.49, p<.001, f^2=1.86), supporting H2 (Table 4). All nine dimensions of TE positively influenced OE: SE (β=.09, t=2.52, p<.01), CE (β=.10, t=2.36, p<.01), PE (β=.06, t=1.72, p<.05), EE (β=.30, t=7.24, p<.001), RE (β=.09, t=2.54, p<.01), UE (β=.12, t=4.70, p<.001), FE (β=.19, t=4.73, p<.001), CTE (β=.11, t=2.75, p<.01), ECE (β=.07, t=1.95, p<.05). The effect of EE on OE was noteworthy (f^2=.12). OE positively influence OS (β=.80, t=41.93, p<.001, f^2=1.72), supporting H3. BI was significantly influenced by OS (β=.69, t=23.42, p<.001, f^2=.93), supporting H4.

[Tables 1, 2, 3, & 4]

Study 2: F&B

A total of 615 complete responses were collected, of which approximately 60% were female. About 35% of the respondents were Millennials. More than half (58%) of the respondents had a household income less than $70,000. Four-fifths (82%) of the respondents were Caucasian, whereas 64% of the respondents held an Associate degree or higher. Approximately 49% of the respondents were full-time employees (Appendix A).

The skewness and kurtosis values indicated the data were normally distributed, and VIF statistics were not greater than 6, suggesting the absence of multicollinearity. The standardized factor loading ranged from .74 to .95, and AVE was equal to or greater than .67. Therefore, convergent validity was established (Fornell and Larker, 1981). Cronbach's alpha (≥.84), and CR

(≥.89) showed sufficient internal consistency (Nunally, 1967) (Table 1). Fornell and Larker's (1981) criterion and HTMT were satisfactory in establishing discriminant validity both at the first-order and second-order (Henseler *et al.*, 2015) (Table 2). SE, CE, PE, EE, RE, UE, FE, CTE, and ECEs were true dimensions of TE (Table 3), confirming H1. There was no existence of common method bias when employing Harman's single factor model test (explained variance by one factor: 43% < 50%) (Eichhorn, 2014).

The proposed model showed good explanatory power (adj-R^2_{OE}=.63, adj-R^2_{OS}=.68, adj-R^2_{BI}=.56). Second-order TE positively influenced OE (β=.79, t=24.46, p<.001, f^2=1.64), supporting H2 (Table 4). Among the nine dimensions of TE, pragmatic (β=-.04, t=-1.00, p>.05) and controllable (β=.06, t=1.35, p>.05) experiences had no significant impact on OE. Whereas, SE (β=.10, t=2.84, p<.01), CE (β=.11, t=2.49, p<.01), EE (β=.33, t=6.89, p<.001), RE (β=.08, t=2.02, p<.05), UE (β=.09, t=2.70, p<.01), FE (β=.17, t=3.71, p<.001), and ECE (β=.13, t=3.60, p<.001) had positive impacts on OE. The effect of EE on OE was strongest (f^2=.10). OE positively influenced OS (β=.82, t=50.47, p<.001, f^2=2.11), supporting H3. OS was a significant antecedent of BI (β=.75, t=27.41, p<.001, f^2=1.28), supporting H4.

Study 3: Tourism

A total of 592 qualified and complete responses were collected. About 56% of the respondents were female, and 54% were born in or after 1980. Approximately 83% of the respondents were Caucasian. About half (49%) of the respondents had a household income below $70,000. About 57% held a Bachelor's degree or higher, and were employed full-time (Appendix A).

The skewness, kurtosis, and VIF statistics fell into the threshold values, indicating that there were no major issues regarding the normality of distribution and multicollinearity. The standardized factor loading was greater than .71, and AVE was not less than .63, establishing convergent validity (Fornell and Larker, 1981). Cronbach's alpha and CR were greater than the threshold, showing satisfactory internal consistency (Nunally, 1967) (Table 1). The correlation between any two constructs (both first-order and second-order) was less than the square root of the AVE of the two constructs (Fornell and Larker, 1981) (Table 2). The HTMT confidence interval did not include 1 for both the first-order and second-order. Thus, discriminant validity was established (Henseler *et al.*, 2015). All nine dimensions were significant dimensions of TE, supporting H1 (Table 3). The one-factor model confirmed there was no common method bias, given the explained variance by the single factor (.41) was less than the threshold of .5 (Eichhorn, 2014).

The explanatory power of the proposed model was notable (adj-R^2_{OE}=.70, adj-R^2_{OS}=.66, adj-R^2_{BI}=.39). TE positively influenced OE (β=.83, t=52.47, p<.001, f^2=2.21), supporting H2. Specifically, OE was positively impacted by SE (β=.09, t=2.77, p<.01), CE (β=.16, t=3.64, p<.001), EE (β=.32, t=6.70, p<.001), RE (β=.10, t=2.26, p<.05), FE (β=.13, t=2.63, p<.01), CTE (β=.14, t=3.13, p<.001), and ECE (β=.14, t=4.37, p<.001). However, PE (β=-.04, t=-1.21, p>.05) and UE (β=.02, t=.83, p>.05) had no significant impacts on OE. Consistent with the findings of Studies 1 and 2, the positive effect of OE on OS (β=.81, t=46.53, p<.001, f^2=1.90) and the positive impact of OS on BI (β=.62, t=17.08, p<.001, f^2=.63) were found (Table 4), supporting H3 and H4.

Contrast and Comparison

As a prerequisite for MGA, MICOM was tested (Henseler *et al.*, 2016). The *p* values were adjusted using the Bonferroni approach, as the three sectors were compared pairwise. The MICOM results indicated that compositional invariance was established. However, the means and variances were not invariant, indicating that only partial measurement invariance was established (Henseler *et al.*, 2016). The divergent means and variance suggested that the composites of TE not be identical across the sectors, although the formative dimensions of TE were the same. The variant means and variances serve as evidence supporting H5. Although the data could not be pooled since full measurement invariance was not established, the standardized coefficients could be compared across the three sectors, as partial measurement invariance was established. However, given these different means and variances, PLS-MGA might not fully explain the differences. Therefore, further comparisons (H5) were made based on separate path analyses when comparing accommodation and F&B sectors with tourism sector.

All nine dimensions were significant dimensions of TE in every sector (p<.001). Therefore, the composition of TE was further validated. Consumers' usage patterns of technologies were empirically investigated (Figure 3). Consumers' most frequently used technologies varied by sector (χ^2=275.49, *df*=18, p<0.001). In the accommodations sector, approximately 45% of the respondents indicated that they used booking/reservation/planning mobile apps most frequently, whereas self-service technologies (40%) in the F&B sector and informative mobile apps (e.g., travel guides) (34%) in the tourism sector were the most frequently used. Please refer Appendix B for detailed description.

[Figure 3]

Given the divergent technology adoption aspects in the three sectors, a series of ANOVA and post hoc analyses were conducted to determine if consumers' evaluations of TE dimensions were distinct. The ANOVA results indicated that consumers' evaluations of the nine TE dimensions were significantly different across the sectors for all dimensions (p<.001), except UE (p<.01). SE was significantly higher in tourism ($M_{Tourism}$=5.28) than in F&B ($M_{F\&B}$=4.97) (adj-p<.001), which might be explained by that VR/VR technologies were most commonly used in the tourism. F&B consumers' CE ($M_{F\&B}$=5.43) was significantly lower (adj-p<.001) than that of consumers in accommodations ($M_{Accommodation}$=5.73) and tourism ($M_{Tourism}$=5.83), possibly because consumers can obtain information about hotel facilities and/or tourism destinations using mobile apps. PE was the lowest for F&B consumers (adj-$p_{Accommodation\text{-}F\&B}$ < .001, adjusted-$p_{Tourism\text{-}F\&B}$ < .01; $M_{Accommodation}$=6.13, $M_{F\&B}$=5.82; $M_{Tourism}$= 6.02). Similarly, accommodations (M=5.96) and tourism (M=5.92) consumers had higher EE (adj-p<.001) than F&B consumers (M=5.66). Consumers in tourism (M=4.94, adj-p<.001) had higher RE than accommodations (M=4.64) and F&B consumers (M=4.64), which might be attributed to online travel review communities. Accommodation consumers' UE (M=4.03) was lower than that of tourism consumers (M=4.35, adj-p<.01) but not different from that of F&B consumers (M=4.17, adj-p>.05). It might be explained by that more consumers in the tourism used such technologies as AI, VR/AR, and gamifications. Tourism consumers had higher FEs (M=5.40, adj-p<.001) than consumers in accommodations (M=5.14) and F&B (M=5.09). As consumers can change their itineraries based on real-time information (e.g., traffic), CTE was highest in tourism (M=5.96, adj-$p_{tourism\text{-}accommodation/F\&B}$<.001), followed by accommodations (M=5.74), where consumers can ask for guest services using technologies at their convenience, and F&B (M=5.56, adj-

$p_{\text{accommodation-F\&B}}$<.01). Consumers in tourism (M=5.02) and accommodations (M=4.94) had higher ECE than those in F&B (M=4.61, adj-p<.001), possibly because of discounts offered in booking/reservation/planning mobile apps.

To better understand the differences among the different sectors, the bootstrap results were compared. TE (second-order) had a significantly positive impact on OE in all three sectors, demonstrating the importance of creating a positive TE, regardless of sector. SE positively influenced accommodations experience (p<.01), F&B experience (p<.01), and tourism experience (p<.01). Tourism consumers' SE was significantly higher than that of F&B consumers (adj-p<.001), which might be attributed by that more tourism consumers used technologies related to senses (e.g., AR/VR). The positive effect of CE on accommodation experience (p<.01), F&B experience (p<.01), and tourism experience (p<.001) was found.

PE had a significant impact only on accommodations experience (p<.05). EE positively influenced accommodations experience (p<.001), F&B experience (p<.001), and tourism experience (p<.001). The effects of EE on OE approached moderate ($f^2_{Accommodation}$=.12, $f^2_{F\&B}$=.10, $f^2_{Tourism}$=.13). RE positively influenced accommodations experience (p<.01), F&B experience (p<.05), and tourism experience (p<.05). UE was found to have a differential effect on OE across sectors. Specifically, accommodations experience (p<.001) and F&B experience (p<.01) were positively influenced by UE, whereas UE had no significant impact on tourism experience (p>.05).

When consumers had an FE, they were likely to have a positive accommodations experience (p<.001), F&B experience (p<.001), and tourism experience (p<.01). CTE positively influenced accommodations experience (p<.01) and tourism experience (p<.001) but not their F&B experience (p>.05). The positive effect of ECE on OE was found in all sectors ($p_{Accommodation}$<.05, $p_{F\&B}$<.001, $p_{Tourism}$<.001). OE positively influenced OS ($p_{Accommodation}$<.001, $p_{F\&B}$<.001, $p_{Tourism}$<.001). OS positively affected BI ($p_{Accommodation}$<.001, $p_{F\&B}$<.001, $p_{Tourism}$<.001).

Conclusions

Recognizing the increasing importance of TE, this research aimed to cross-validate the TE scale (Shin *et al.*, 2022) and to explore if there are any differences in TE among the accommodations, F&B, and tourism sectors in the H&T industry. The findings of this research provide evidence that TE is a hierarchical construct collectively represented by nine dimensions. The results indicated that while the factor structure of TE was identical across the three sectors in the H&T industry, the effect of each TE dimension on consumer OE was different by sector. Specifically, EE has the strongest impact on OE regardless of sector. However, the impacts of other dimensions on OE were different. For instance, PE significantly influenced OE, but only in the accommodations sector. Furthermore, the findings showed that consumers had divergent patterns of using technologies by sector. Therefore, the findings of this research further demonstrate that the sectors in the H&T industry shared commonalities, such as the composing dimensions of TE and the positive impact of TE on OE. However, the sectors in the industry also had notable and distinct characteristics (e.g., different weights of TE dimensions and different effect sizes on OE), which drove consumers' disparate adoption of technologies as well as the divergent impacts of TE dimensions on OE.

Theoretical Implications

The present research offers numerous unique and valuable theoretical contributions to the consumer experience and H&T literature. Applying the scale to different population samples provides further evidence of construct validity (Picot-Coupey *et al.*, 2021). First, this research re-affirms the TE scale (Shin *et al.*, 2022) by evaluating the psychometric properties with new samples (MacKenzie *et al.*, 2011). In other words, this research has further established the reliability and validity of the TE scale by cross-validating it. Specifically, this research confirmed that TE is a multi-dimensional concept consisting of nine dimensions. Furthermore, the dimensions of TE were identical in the three focal sectors in the H&T industry (i.e., accommodations, F&B, and tourism), cross-validating that these nine dimensions collectively represented TE regardless of sector, thereby extending the generalizability of the TE scale across multiple H&T service settings. This research consistently demonstrated the sound psychometric properties of the TE scale across various contextual settings through a multi-study approach.

Karamustafa and Ülker (2020) have suggested that consumers' H&T experiences include multiple experiences, such as lodging experiences and dining experiences, proposing that consumers' experiences with technology can also be part of the overall experience. Furthermore, recent studies (e.g., Buhalis *et al*., 2023; Flavián *et al*., 2019; Qiu *et al*., 2020) presented that technologies play a significant role in creating consumer experience. Particularly, Flavián *et al*. (2019) suggested that technologies enrich consumer experience as they serve as channels mediating the interactions between consumer and service providers. The findings of this research support the significant impact of TE on OE and thus provide further empirical support for recent conceptual studies (e.g., Hoyer *et al*., 2020) highlighting the crucial role of technologies in shaping consumer experiences. In particular, given the strong impact of TE on OE ($f^2_{Accommodation}$=1.86, $f^2_{F\&B}$= 1.64, $f^2_{Tourism}$=2.21), the importance of TE in creating a positive OE should not be neglected despite that technologies are not generally considered the core products/services in the H&T industry.

Although the sectors of the H&T industry are closely related, each sector has distinctive characteristics due to the nature of their products/services provided (Abbasi, 2022; Ottenbacher *et al.*, 2009; Pizam, 2009; Singal, 2015). However, the TE scale was developed and validated in a general H&T context without considering each sector's characteristics. Considering the unique characteristics of each sector, adoption of technologies might vary, leading to heterogeneous TE. Recognizing the importance of understanding the distinct characteristics of each sector, this research has investigated the potential differences therein across three different sectors in the H&T industry. Specifically, this research cross-validated the TE scale in three sectors of the H&T industry (i.e., accommodations, F&B, and tourism) and conducted sector-wise contrast and comparison to better understand consumers' TE in distinct but inter-related contexts. The findings indicated that the dimensions consisting of TE were identical in all three sectors. However, as the weights of TE dimensions were divergent across the sectors, full measurement invariance was not established (Henseler *et al.*, 2016), indicating that TE was formed differently across the various sectors in the H&T industry. By identifying the differences in consumers' usage patterns of technologies in the different sectors, the research suggests that consumers' divergent TE in each sector is likely to be attributed to the different purposes and patterns of using technologies. Furthermore, by running separate analyses for each sector, the results indicated that the impacts of TE dimensions were also not identical. In other words, this research demonstrated that the sectors in the H&T industry were distinct even though they shared

commonalities, thereby further supporting the importance of adopting a context-dependent approach to understand TE (Ottenbacher *et al.*, 2009).

Practical Implications

The findings of this research offer practical implications for the H&T industry. First, this research showed the important role of TE in creating OE. Thus, the H&T industry needs to pay special attention to technologies to ensure consumers can have positive TEs, thereby enriching their OEs. While TE had a substantial impact on OE, it might be difficult for industry practitioners to invest in every dimension of TE, given their limited resources. Thus, the industry should focus more on the dimensions with significant impacts on OE. For example, given the significant impacts of CE on OE, the tourism sector may pay more attention to enriching CE. Thus, when considering the implementation of technologies in the tourism context, the depth and richness of information that a technology provides should be the priority. Furthermore, the results indicate that booking/reservation/planning apps were popular among tourism consumers and that the impact of ECE on OE was notable. Hence, when the tourism industry promotes products/services, it may utilize discount coupons on mobile apps to develop ECE, thereby creating positive OE. The accommodation and F&B sectors might try to improve FEs as OEs can be enriched when they find familiarity from using technologies. However, industry practitioners should bear in mind that EE is critical in creating a positive OE regardless of sector.

Furthermore, the findings indicate that consumers' usage patterns of technology vary by sector. Accordingly, the industry is recommended to focus on the specific types of technologies that are most frequently used to foster the particular dimension that has a positive effect on OE. The accommodations sector might want to invest more in the booking/reservation/planning mobile apps that are primarily used by accommodations consumers. Furthermore, PE, which was highly associated with the usability and usefulness of booking/reservation/planning mobile apps, positively influenced consumers' OE. Thus, developing booking/reservation/planning mobile apps with user-friendly interfaces and useful functions would be desirable. Informative mobile apps were the most frequently used in the tourism sector, and CE positively affected OE. Furthermore, booking/reservation/planning mobile apps were most commonly used by tourism consumers, which related to CTE. Therefore, the tourism industry should develop mobile apps that can provide rich and accurate information with functions allowing consumers to control their travel itinerary.

Limitations and Future Studies

This research has several limitations. First, although this research contrasted and compared TE across the three sectors in the H&T industry, various technologies were considered rather than a specific technology due to the different penetration rates of technologies. Consumer with a specific type of technology (e.g., AI), was not examined. Therefore, future studies are encouraged to identify various technologies and investigate experience with a particular technology to deepen the current understanding of consumer TE. Second, this research did not consider consumers' purpose of using technologies. Although consumers use the same technology, their TE might be different if their primary purposes of using the technology are different. If a consumer, for instance, used AR apps in museums to display the background stories about Van Gogh's portraits, he/she would have a strong CE, whereas RE might be limited. If consumers used AR apps to see an artwork in art galleries in different lights, their SE

would be a key dimension of their TE. Hence, future studies are recommended to consider consumers' primary purposes of using a specific technology. Consistent with prior scale development research (e.g., Hosany *et al*., 2015; Kim *et al*., 2012; So *et al*., 2014), this research relied on the use of consumer surveys for respondents to self-report their past experiences. The reliance on consumers' recall via a survey may be a limitation. Thus, the findings may need additional validation in future studies. Last, the sample was limited to adults who live in the U.S. and have used technologies in the past 12 months. Researchers might therefore conduct a cross-cultural study to increase the external validity of the TE scale.

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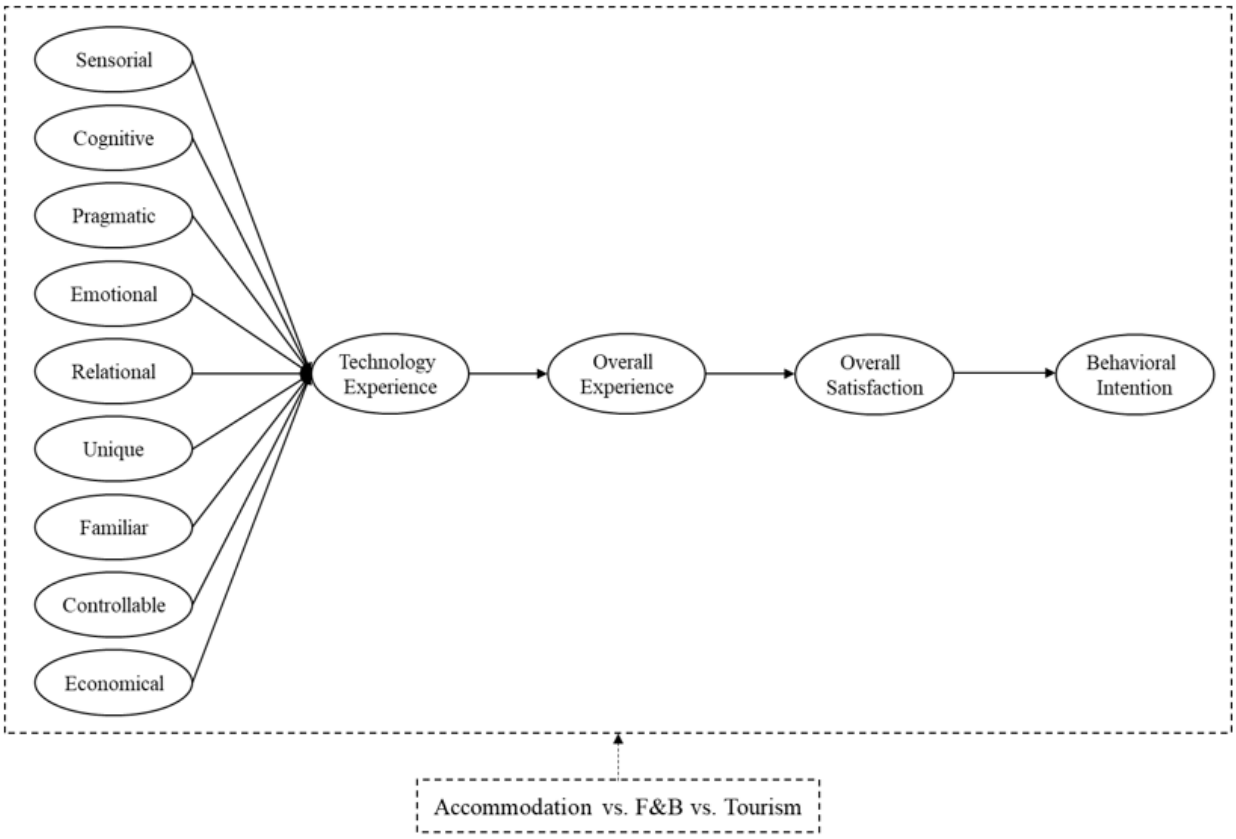
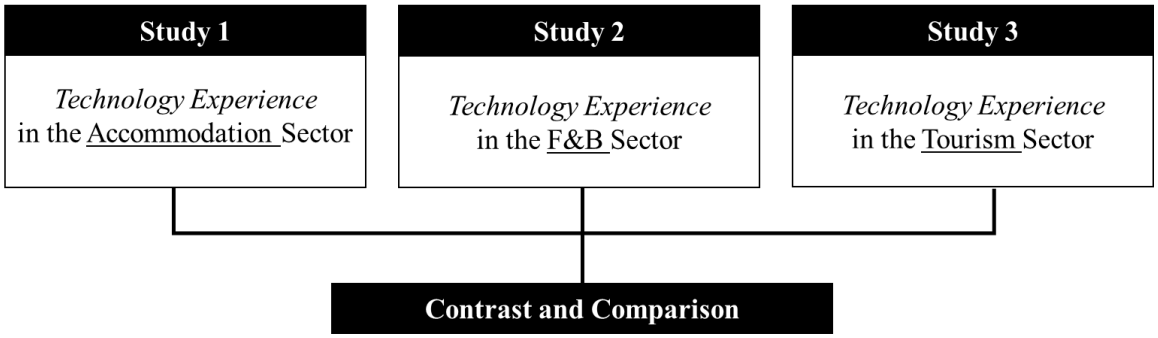
Figures

Figure 1. Research Model



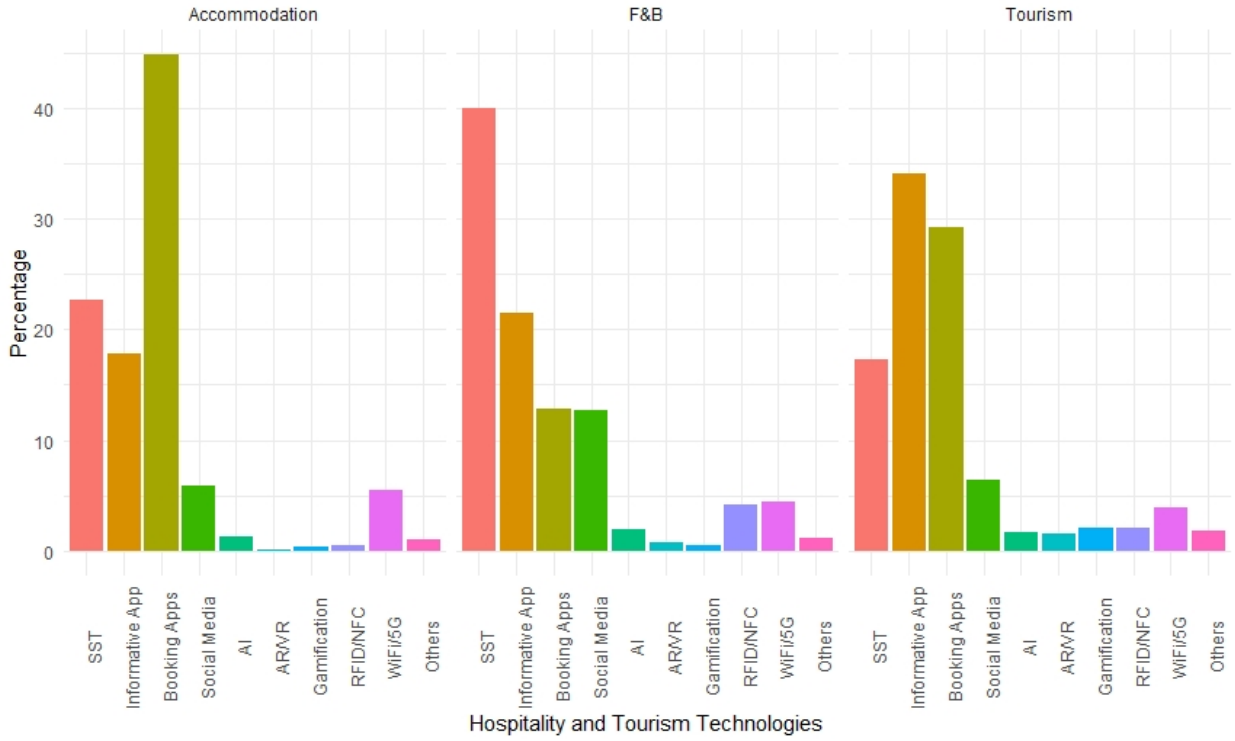
Source: Created by the authors.

Figure 2. Overall Research Procedure



Source: Created by the authors.

Figure 3. Consumers' Usage Patterns of Technologies



Source: Created by the authors.

Tables

Table 1. Constructs Descriptive Statistics

Construct	Accommodation						F&B						Tourism					
	Mean	Std	FL	α	CR	AVE	Mean	Std	FL	α	CR	AVE	Mean	Std	FL	α	CR	AVE
SE				0.90	0.94	0.84				0.88	0.93	0.81				0.88	0.92	0.80
	5.13	1.45	0.90				4.97	1.46	0.88				5.37	1.33	0.88			
	5.12	1.39	0.94				4.93	1.35	0.91				5.20	1.31	0.92			
	5.09	1.40	0.91				5.00	1.36	0.91				5.27	1.37	0.89			
CE				0.92	0.94	0.75				0.94	0.95	0.80				0.91	0.94	0.74
	5.73	1.18	0.84				5.42	1.37	0.89				5.84	1.16	0.86			
	5.59	1.21	0.87				5.27	1.42	0.90				5.66	1.26	0.87			
	5.78	1.16	0.87				5.47	1.36	0.90				5.91	1.13	0.89			
	5.77	1.10	0.86				5.46	1.26	0.88				5.81	1.13	0.84			
	5.80	1.08	0.87				5.55	1.27	0.91				5.92	1.08	0.84			
PE				0.85	0.90	0.69				0.87	0.91	0.71				0.81	0.87	0.63
	6.16	1.24	0.85				5.88	1.45	0.88				6.12	1.10	0.81			
	5.86	1.36	0.80				5.64	1.54	0.84				5.76	1.38	0.81			
	6.22	1.17	0.81				5.79	1.50	0.82				6.02	1.36	0.79			
	6.28	1.14	0.86				5.99	1.37	0.84				6.18	1.16	0.77			
EE				0.92	0.94	0.72				0.93	0.94	0.74				0.91	0.93	0.70
	5.95	1.21	0.84				5.54	1.44	0.86				5.91	1.23	0.85			
	6.13	1.10	0.87				5.81	1.38	0.86				6.05	1.17	0.85			
	5.91	1.29	0.85				5.53	1.49	0.84				5.86	1.34	0.77			
	6.06	1.20	0.86				5.81	1.40	0.90				5.97	1.26	0.89			
	5.79	1.35	0.82				5.65	1.43	0.81				5.86	1.28	0.79			
	5.92	1.15	0.85				5.60	1.36	0.88				5.85	1.29	0.85			
RE				0.94	0.96	0.85				0.94	0.96	0.85				0.94	0.96	0.85
	4.80	1.58	0.91				4.49	1.64	0.91				4.99	1.56	0.91			
	4.70	1.63	0.94				4.46	1.66	0.94				4.96	1.57	0.95			
	4.60	1.62	0.93				4.46	1.61	0.93				4.90	1.60	0.92			

	4.45	1.68	0.91				4.43	1.68	0.90				4.92	1.62	0.91			
UE				0.87	0.92	0.79				0.85	0.90	0.75				0.86	0.91	0.78
	4.05	1.82	0.88				4.15	1.82	0.84				4.32	1.96	0.88			
	3.77	1.78	0.89				3.93	1.79	0.85				4.06	1.86	0.86			
	4.28	1.66	0.89				4.44	1.53	0.91				4.66	1.71	0.90			
FE				0.89	0.93	0.82				0.87	0.92	0.79				0.83	0.90	0.75
	5.13	1.40	0.87				5.10	1.41	0.84				5.51	1.26	0.83			
	5.11	1.28	0.92				5.04	1.32	0.91				5.29	1.26	0.88			
	5.19	1.30	0.91				5.12	1.33	0.91				5.41	1.28	0.88			
CTE				0.90	0.93	0.72				0.92	0.94	0.76				0.89	0.92	0.70
	5.90	1.06	0.86				5.69	1.25	0.88				6.05	1.00	0.88			
	5.87	1.06	0.89				5.67	1.24	0.90				6.03	1.01	0.89			
	5.70	1.17	0.87				5.44	1.33	0.88				5.91	1.13	0.83			
	5.80	1.13	0.85				5.61	1.23	0.87				6.05	1.05	0.86			
	5.44	1.33	0.77				5.39	1.27	0.83				5.78	1.17	0.72			
ECE				0.94	0.96	0.89				0.94	0.96	0.89				0.92	0.95	0.87
	5.06	1.48	0.94				4.65	1.55	0.95				5.14	1.55	0.94			
	4.80	1.56	0.94				4.47	1.56	0.94				4.87	1.61	0.93			
	4.95	1.51	0.95				4.70	1.55	0.94				5.06	1.48	0.93			
OE				0.86	0.90	0.70				0.84	0.89	0.67				0.86	0.90	0.70
	5.79	1.11	0.87				5.65	1.19	0.88				5.93	1.12	0.87			
	5.88	1.01	0.83				5.76	1.12	0.86				5.95	1.12	0.84			
	5.03	1.44	0.81				4.73	1.47	0.74				5.23	1.41	0.84			
	5.24	1.37	0.84				5.00	1.41	0.80				5.50	1.31	0.80			
OS				0.87	0.92	0.79				0.87	0.92	0.79				0.86	0.91	0.78
	6.00	0.95	0.87				5.81	1.14	0.89				6.03	1.05	0.86			
	5.19	1.34	0.89				5.01	1.40	0.90				5.38	1.41	0.89			
	5.26	1.37	0.92				5.20	1.35	0.88				5.36	1.36	0.90			
BI				0.93	0.96	0.88				0.91	0.94	0.85				0.88	0.92	0.80
	5.90	1.12	0.92				5.87	1.08	0.92				6.11	1.05	0.87			
	5.91	1.14	0.95				5.80	1.20	0.92				6.18	0.96	0.92			

5.96	1.03	0.95	5.82	1.17	0.92	6.25	0.91	0.90

Source: Created by the authors.

Table 2. Discriminant Validity

	SE	CE	PE	EE	RE	UE	FE	CTE	ECE	OE	OS	BI
	0.92											
SE	0.90											
	0.90											
	0.51	0.86										
CE	0.52	0.90										
	0.52	0.86										
	0.26	0.35	0.83									
PE	0.42	0.46	0.84									
	0.38	0.43	0.79									
	0.46	0.52	0.63	0.85								
EE	0.54	0.57	0.72	0.86								
	0.50	0.53	0.72	0.83								
	0.55	0.47	0.10	0.37	0.92							
RE	0.45	0.52	0.23	0.44	0.92							
	0.60	0.47	0.30	0.43	0.92							
	0.31	0.14	-0.11	0.11	0.44	0.89						
UE	0.35	0.23	0.01	0.16	0.46	0.87						
	0.36	0.24	0.05	0.20	0.52	0.88						
	0.59	0.57	0.30	0.47	0.64	0.30	0.90					
FE	0.61	0.63	0.42	0.61	0.58	0.35	0.89					
	0.65	0.56	0.44	0.58	0.68	0.40	0.86					
	0.48	0.69	0.40	0.55	0.43	0.15	0.59	0.85				
CTE	0.48	0.74	0.43	0.58	0.48	0.21	0.65	0.87				
	0.50	0.67	0.46	0.58	0.48	0.21	0.65	0.84				
	0.39	0.51	0.28	0.47	0.47	0.30	0.51	0.50	0.94			
ECE	0.48	0.56	0.26	0.46	0.63	0.37	0.54	0.50	0.94			
	0.47	0.41	0.33	0.49	0.57	0.44	0.55	0.45	0.93			
	0.58	0.61	0.43	0.67	0.56	0.33	0.66	0.62	0.55	0.84		
OE	0.59	0.62	0.44	0.67	0.57	0.36	0.67	0.60	0.59	0.82		
	0.61	0.64	0.49	0.70	0.61	0.36	0.70	0.67	0.60	0.84		
	0.56	0.62	0.45	0.68	0.51	0.31	0.63	0.63	0.60	0.80	0.89	
OSAT	0.60	0.63	0.50	0.69	0.56	0.33	0.69	0.63	0.56	0.82	0.89	
	0.57	0.58	0.50	0.67	0.56	0.36	0.69	0.65	0.59	0.81	0.88	
	0.46	0.56	0.40	0.54	0.45	0.20	0.57	0.56	0.44	0.68	0.69	0.94
BI	0.50	0.57	0.44	0.58	0.43	0.18	0.61	0.60	0.42	0.69	0.75	0.92
	0.47	0.59	0.43	0.56	0.42	0.23	0.55	0.61	0.38	0.64	0.62	0.89

Note. For each construct: first row (accommodation), second row (F&B), third row (tourism).

Source: Created by the authors.

Table 3. Higher Order Construct

First→Second	Accommodation			F&B			Tourism		
	Weight	*t*	*p*	*Weight*	*t*	*p*	*Weight*	*t*	*p*
SE→TE	0.16	22.42	p<0.001***	0.15	20.75	p<0.001***	0.15	24.98	p<0.001***
CE→TE	0.17	25.53	p<0.001***	0.16	25.73	p<0.001***	0.16	21.80	p<0.001***
PE→TE	0.12	12.65	p<0.001***	0.12	13.83	p<0.001***	0.12	17.68	p<0.001***
EE→TE	0.19	25.68	p<0.001***	0.18	24.60	p<0.001***	0.18	27.79	p<0.001***
RE→TE	0.16	22.48	p<0.001***	0.15	20.32	p<0.001***	0.15	22.85	p<0.001***
UE→TE	0.09	9.61	p<0.001***	0.09	10.99	p<0.001***	0.09	10.86	p<0.001***
FE→TE	0.18	28.25	p<0.001***	0.18	29.78	p<0.001***	0.18	26.50	p<0.001***
CTE→TE	0.17	26.59	p<0.001***	0.16	24.86	p<0.001***	0.17	25.85	p<0.001***
ECE→TE	0.15	20.19	p<0.001***	0.16	24.13	p<0.001***	0.15	22.56	p<0.001***

*Note. *:p<0.05; **:p<0.01; ***:p<0.001.*

Source: Created by the authors.

Table 4. Structural Model Test Results

Hypothesis	Accommodation			F&B			Tourism		
	β	*t*	*p*	*β*	*t*	*p*	*β*	*t*	*p*
TE→OE	0.81	49.49	p<0.001***	0.79	26.46	p<0.001***	0.83	52.47	p<0.001***
SE→OE	0.09	2.52	p<0.01**	0.10	2.84	p<0.01**	0.09	2.77	p<0.01**
CE→OE	0.10	2.36	p<0.01**	0.11	2.49	p<0.01**	0.16	3.64	p<0.001***
PE→OE	0.06	1.72	p<0.05*	-0.04	-1.00	p>0.05	-0.04	-1.21	p>0.05
EE→OE	0.30	7.24	p<0.001***	0.33	6.89	p<0.001***	0.32	6.70	p<0.001***
RE→OE	0.09	2.54	p<0.01**	0.08	2.02	p<0.05*	0.10	2.26	p<0.05*
UE→OE	0.12	4.70	p<0.001***	0.09	2.70	p<0.01**	0.02	0.83	p>0.05
FE→OE	0.19	4.73	p<0.001***	0.17	3.71	p<0.001***	0.13	2.63	p<0.01**
CTE→OE	0.11	2.75	p<0.01**	0.06	1.35	p>0.05	0.14	3.13	p<0.001***
ECE→OE	0.07	1.95	p<0.05*	0.13	3.60	p<0.001***	0.14	4.37	p<0.001***
OE→OS	0.80	41.93	p<0.001***	0.82	50.47	p<0.001***	0.81	46.53	p<0.001***
OS→BI	0.69	23.42	p<0.001***	0.75	27.41	p<0.001***	0.62	17.08	p<0.001***

*Note. *:p<0.05; **:p<0.01; ***:p<0.001.*

Source: Created by the authors.

Web Appendices

Appendix A. Respondents' Socio-Demographic Profile

Sociodemographic	Accommodation (n=640)		F&B (n=615)		Tourism (n=592)	
	n	%	n	%	n	%
Gender						
Male	284	44.4%	248	40.3%	261	44.1%
Female	356	55.6%	367	59.7%	329	55.6%
Age						
Generation Z	54	8.4%	89	14.5%	65	11.0%
Late Millennials	73	11.4%	122	19.8%	116	19.6%
Early Millennials	91	14.2%	94	15.3%	137	23.1%
Generation X	163	25.5%	138	22.4%	113	19.1%
Baby Boomers	236	36.9%	156	25.4%	154	26.0%
The Silent	23	3.6%	16	2.6%	7	1.2%
Household Income						
$30,000 or less	112	17.5%	113	18.4%	90	15.2%
$30,001 to $50,000	112	17.5%	118	19.2%	94	15.9%
$50,001 to $70,000	116	18.1%	127	20.7%	106	17.9%
$70,001 to $90,000	95	14.8%	80	13.0%	92	15.5%
$90,001 to $110,000	64	10.0%	74	12.0%	70	11.8%
More than $110,000	131	20.5%	103	16.7%	140	23.6%
Ethnicity						
Caucasian	550	85.9%	501	81.5%	490	82.8%
African American	59	9.2%	59	9.6%	54	9.1%
Asian	13	2.0%	20	3.3%	16	2.7%
Others	18	2.9%	35	5.8%	32	5.4%
Education						
High school graduate or less	196	30.6%	205	33.3%	156	26.4%
Associate degree	127	19.8%	116	18.9%	82	13.9%
Bachelor's degree	165	25.8%	161	26.2%	172	29.1%
Postgraduate degree	137	21.4%	116	18.9%	161	27.2%
Others	15	2.3%	17	2.8%	21	3.5%
Employment						
Full-time	303	47.3%	298	48.5%	338	57.1%
Part-time	65	10.2%	75	12.2%	67	11.3%
Unemployed or students	51	8.0%	78	12.7%	61	10.3%
Retired	192	30.0%	128	20.8%	103	17.4%
Others	29	4.5%	36	5.9%	23	3.9%

Source: Created by the authors.

Appendix B. Consumers' Technology Usage

Technology	Accommodation (n=640)	F&B (n=640)	Tourism (n=615)	χ^2	Potential reasons
Self-service technologies	360(56.3%)	440(71.5%)	374(63.2%)	31.73***	Consumers' usage of self-service technologies was most common in the F&B sector, which might be explained by the prevalence of self-service kiosks in restaurants.
Informative mobile apps	306(47.8%)	326(53.0%)	393(66.4%)	45.26***	Informative mobile app was most popular in the tourism sector as consumers in the tourism sector commonly use mobile travel guide apps.
Booking/reservation/planning mobile apps	502(78.4%)	286(46.5%)	414(69.9%)	149.79***	When consumers plan their travel, they often used online travel agencies apps (e.g., Expedia) and sharing accommodation apps (e.g., Airbnb) to book their accommodations and other travel-related products/services (e.g., flight tickets). The respondents indicated that they used phone calls to book a table at a restaurant.
Social media	206(32.2%)	278(45.2%)	247(41.7%)	23.90***	Consumers' use of social media was more prevalent in the F&B and tourism sectors than in the accommodations sector, which might be closely associated with consumers' social media posts about foods and their pictures in their destinations.
AI/Robotics	82(12.8%)	84(13.7%)	111(18.8%)	9.80**	Robots were implemented in hotels and restaurants for service deliveries, whereas virtual assistants were much used in the tourism sector.
AR/VR/Wearables	35(5.5%)	35(5.7%)	78(13.2%)	31.53***	AR/VR was relatively more popular in the tourism sector (e.g., virtual trips) due to the travel restrictions resulted from COVID-19 pandemic.
Gamification	35(5.5%)	43(7%)	81(13.7%)	29.43***	Many tourism attractions introduced gamification for visit engagement, such as interactive museum games.
Mobile RFID and NFC	88(13.8%)	132(21.5%)	142(24.0%)	22.48***	While front desk agents help consumers with payment in the accommodations sector, consumers are more likely to use RFID/NFC (e.g., Apple Pay) in the F&B (e.g., kiosks) and tourism (e.g., parking kiosks) sectors.
Ubiquitous Wi-Fi	138(21.4%)	138(22.4%)	146(24.7%)	1.92	Complimentary Wi-Fi is prevalent in all three sectors.

Source: Created by the authors.