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Consumers' Experience with Hospitality and Tourism Technologies: Measurement Development and Validation

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Research Highlights

- Conceptualized consumers' experience with hospitality and tourism technologies.
- Identified the nine dimensions of consumers' technology experience.
- Developed a set scale to measure the second-order construct of technology experience.
- Validated the developed scale for consumers' technology experience.
- Empirically investigated the consequences of technology experience.

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Abstract

As new and emerging technologies continue to transform hospitality and tourism operations and consumer environments, understanding consumers' experience with hospitality and tourism technologies has become an urgent issue. This study aimed to develop a theoretically sound conceptualization of consumers' experience with hospitality and tourism technologies. Employing a sequential exploratory approach and scale development procedures, this study theoretically defined and conceptualized consumers' technology experience as a second-order formative construct consisting of nine dimensions (sensorial, cognitive, pragmatic, emotional, relational, unique, familiar, controllable, and economical experiences). This study also developed a set of scales to measure consumers' experience with hospitality and tourism technologies, and empirically assessed and validated the developed scale. The results demonstrated that the developed scale exhibited robust psychometric properties. The developed scale is applicable to most hospitality and tourism technologies and various sectors of the hospitality and tourism industry.

Keywords: Hospitality and Tourism Technologies; Technology Experience; Scale Development; Scale Validation

1. Research Background

Among the many changes we have witnessed in the past few decades, technology has been one of the game changers in the transition of consumer behavior. Even though consumers' level of technology adoption might vary, it is obvious that all generations utilize technology in order to enhance their lives (Taylor, 2018). As consumer demand for and reliance on technology continue to grow, technology has become a necessity rather than an ancillary service in the hospitality and tourism industry as a means of enhancing customer experience (Mitel, 2019). Furthermore, the demand for technology is expected to constantly increase, as the Millennials have become the new frontier of the industry (BrainBoxol, 2017). In order to meet consumers' demand and enhance their experience, the hospitality and tourism industry has been actively adopting technology in the guest-facing areas, reshaping the landscape of the consumer experience in the industry (Law et al., 2009; Shin et al., 2021).

The prevalence of technology in the hospitality and tourism industry requires immediate and special attention to consumers' experience with technology-based services because of the industry's service-oriented and experiential nature of the business (Hwang & Seo, 2016; Kim, 2018). In the hospitality and tourism industry, consumer experience typically occurs through the direct and indirect interactions between consumers and service providers (Klaus & Maklan, 2012). Particularly, providing quality services through host-guest interactions has been a decisive way to create a positive consumer experience. However, the introduction of guest-facing technologies has changed one of the industry's key characteristics, human-to-human interactions, into guest-technology interactions. In particular, hotel guests are more likely to interact with technologies (e.g., artificial intelligence chatbot, service delivery robots) rather than a human concierge or door attendant (Attala, 2019; Shin & Jeong, 2020). For example, guests of Aloft Hotels have been served by service robots for delivering room amenities (Gaudin, 2015). In McDonald's, voice-recognition software assists consumers with their personalized orders (Resendes, 2020). In the tourism setting, mobile tour guide apps have replaced the traditional human travel guide (Vidal, 2019). For instance, travelers generate their own travel itineraries via Triplt (Rogers, 2018). As a substantial part of the hospitality and tourism products/services has been delivered by various technologies, technology has become a key contributor to consumer experience (Hall et al., 2000; Huang et al., 2017).

Although some cases (e.g., Henn Na Hotel Japan) showed that technology might not entirely replace human-to-human interactions (Hertzheld, 2019), it is apparent that the role of technology in the hospitality and tourism industry is considerable. Accordingly, much research has been conducted to understand consumer behavior toward technologies (Lee, Ahn, Shin, Kwon, & Back, 2021). However, most research has been devoted to investigating consumers' technology adoption and its consequences, leaving an important question unanswered. For example, studies (Jeong & Shin, 2020; Tussyadiah, Jung, & tom Dieck, 2018) focused on the effects of technologies on tourism experience, rather than travelers' experience with the technology itself. In other words, consumers' experience with hospitality and tourism technologies has often been neglected even though the concept of experience is one of the most important constructs in the industry (Prebensen et al., 2016). Thus, it is urgent and of utmost importance to define what consumers' technology experience is. Furthermore, the lack of solid conceptualization of technology experience inhibited the development of a corresponding measurement scale. Accordingly, the absence of a tool for empirical examination of technology experience has deterred the diagnosis of their performance in creating technology experience, making it challenging for industry professionals to evaluate their performance in terms of

technology implementation. Lastly, the impacts of consumers' technology experience on their overall experience, satisfaction, and future behavioral intention remain unknown. Accordingly, consumers' experience with hospitality and tourism technology needs immediate attention as it has become a primary issue in the technology-enabled environment.

Therefore, the purposes of this study are (1) to explore and understand a consumer's technology experience by developing a comprehensive conceptualization of technology experience, (2) to develop a reliable and valid set of scales that capture the nature of consumers' technology experience in the hospitality and tourism context, (3) to validate the developed technology experience scale, and (4) to explore the influence of technology experience on the overall experience, satisfaction, and future behavioral intention.

2. Literature Review

2.1. Consumer Experience with Hospitality and Tourism Technologies

In consumer behavior research, experience has been one of the most important constructs. Generally, consumer experience is defined as a consumer's interactions with products/services (Holbrook & Hirschman, 1982). Pine and Gilmore (1998; 1999) further emphasized the importance of consumer experience due to its notable impacts on the industry. Since the hospitality and tourism industry is one of the key generators of experience (Prebensen et al., 2016), experience has served as the key notion in hospitality and tourism research. Many researchers (e.g., Cohen, 1979; Otto & Ritchie, 1996) have conceptualized and defined experience in the context of hospitality and tourism. In 2007, Oh and his colleagues (Oh et al., 2007) defined tourism experience, whereas Hemmington (2007) defined hospitality experience. While the early research conceptualized hospitality and tourism experience from a broad point of view, recent studies offered a more contextualized understanding of experience such as memorable tourism experience (Kim et al., 2012) and heritage tourism experience (Chung et al., 2017). From a hospitality point of view, consumers' experience in a restaurant setting was examined (Cao et al., 2019), whereas Li and her colleagues (2021) compared Airbnb experience to hotel experience.

Although the experience has been studied in different contexts and from various perspectives, researchers have reached a common agreement on characterizing the experience (see Appendix A). First of all, researchers suggested that experience is generated from the interactions among consumers, service providers, and products/services (Verhoef et al., 2009). Second, experience involves a person at different levels (Kim et al., 2011). Finally, yet importantly, experience is a holistic and multi-dimensional concept that consists of multiple dimensions (Walls et al., 2011). Schmitt (1999) suggested that experience is composed of five dimensions: sensory, affective, cognitive, physical, and social-identity experiences. Other researchers (e.g., De Keyser et al., 2015; Gentile et al., 2007; Kandampully et al., 2018; Kim et al., 2011; Lemon & Verhoef, 2016; Verhoef et al., 2009; Walls et al., 2011) also advocated the multi-dimensionality of experience. Based on previous studies on experience (e.g., De Keyser, Verleye, Lemon, Keiningham, & Klaus, 2020; Kandampully et al., 2018), this study defined technology experience as a consumer's distinct type of experience from the interaction between the consumer and technology, and the consumer's holistic assessment of their interactions with the technology. While the dimensions of technology experience have not been fully discovered, the review of literature proposed the potential dimensions of technology experience: sensorial, emotional, pragmatic, cognitive, and relational experiences (see Appendix A). Therefore, these

five dimensions served as a steppingstone to fully uncover the dimensions of technology experience.

Technology experience was developed as a second-order formative construct for several reasons. Petter et al. (2007) claimed that reflective constructs require uni-dimensionality. As the second-order construct drives the first-order constructs, first-order constructs are highly correlated and measure fundamentally the same conceptual domain (Diamantopoulos & Winklhofer, 2001). However, in the conceptualization stage, technology experience was developed as a multi-dimensional construct in which various dimensions collectively portray the comprehensive technology experience construct. Formative constructs assume lower-order constructs to cause the higher-order construct (Diamantopoulos & Winklhofer, 2001). As various dimensions were expected to collectively form consumers' technology experience, technology experience was developed as a second-order formative construct to precisely reflect the nature of the concept. In addition, given the nature of social science, the dimensions of technology were not assumed to be independent of each other (Bandalos, 2018).

However, while the current research aims to focus on technology experience in hospitality and tourism settings in general, it should be noted that there are a number of hospitality and tourism technologies that might have distinctive characteristics. Thus, the dimensions of technology experience and their respective level of importance are likely to be affected by the type of technologies used in the hospitality and tourism industry. For example, if a consumer heavily used information-related hospitality and tourism technologies, such as mobile travel guide apps, the weight of the cognitive experience dimension of technology experience would be stronger than other dimensions. On the other hand, for consumers who used mobile apps for travel communities (e.g., Backpackr) (Stein, 2021), the relational experience dimension would be more critical compared to other dimensions, such as pragmatic experience.

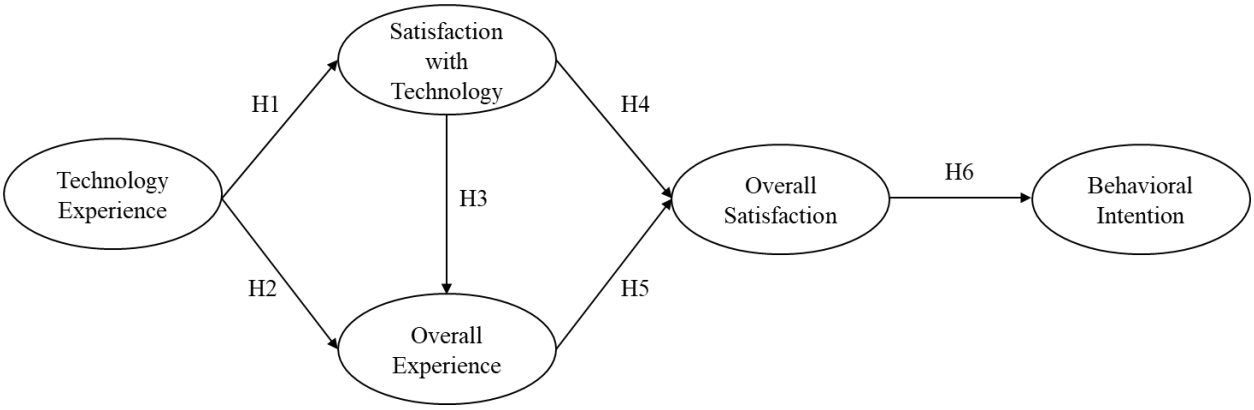
2.2. Consequences of Technology Experience

The hospitality and tourism industry is an umbrella industry that comprises many inter-related sectors, including lodging, food & beverage, and tourism, jointly serving consumers. Accordingly, diverse hospitality and tourism products/services from various sectors collectively create a consumer's overall experience. In other words, each experience affects a consumer's overall hospitality and tourism experience (Karamustafa & Ülker, 2020). Although technology is not a core product/service in the hospitality and tourism industry, consumers' experience with technology should not be neglected because technologies have been implemented to serve them, and consumer experience is generated by the interactions between consumers and service providers (Gursoy et al., 2017; Lin et al., 2019; Schmitt, 1999). Understanding the consequences of technology experience is also crucial since the relationships with the potential consequences are the evidence of nomological validity of the developed technology experience construct and its scale. Thus, potential consequences of technology experience were derived from literature review.

Previous literature has proposed that a consumer's experience is a key antecedent of his/her post-experience evaluation assessment and behaviors (e.g., satisfaction, behavioral intention). Satisfaction, defined as a consumer's positive evaluation of his/her experience, has been much recognized as a key outcome of experience (Jeong & Shin, 2020; Kim, 2018). Due to the holistic nature of satisfaction, studies (e.g., Chung et al., 2018; Zhao et al., 2012) further divided satisfaction into transaction-specific and cumulative satisfaction. Since this study distinguished consumers' technology experience and overall experience, satisfaction was also

divided into two categories: technology satisfaction and overall satisfaction. It is well-known that consumers' satisfaction positively influences their future behavioral intention because they tend to maintain consistent attitudes (Chung et al., 2018; Jeong & Shin, 2020; Shin et al., 2021; Wang et al., 2017). Based on the discussion above, the following research framework was developed to examine the effect of technology experience on its potential consequences.

Figure 1. Proposed Research Framework

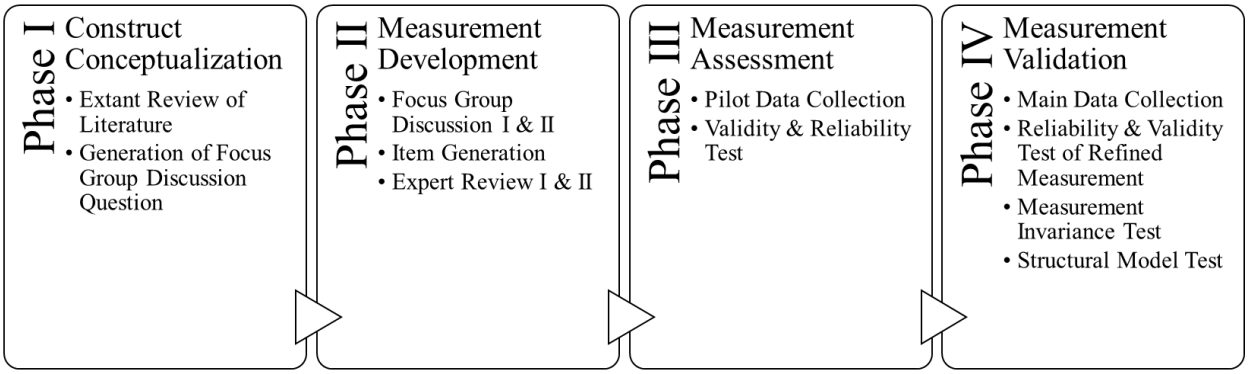


3. Research Design and Methodological Approach

This study used a sequential exploratory approach as the overall methodological guidance. In order to develop a comprehensive conceptualization and a set of reliable and valid scales, scale development procedures suggested by researchers (e.g., Churchill, 1979; Netemeyer et al., 2003; MacKenzie et al., 2011) were adopted. There were four phases in this study: construct conceptualization, measurement development, measurement assessment, and measurement validation (see Figure 2). In particular, in order to conceptualize technology experience and specify its domain, an extant review of literature was conducted. Although the review of literature provided the definition and potential dimensions of technology experience, two focus group discussions were performed to thoroughly represent every facet of technology experience. Based upon the findings from the literature review and focus group discussions, the initial items were generated, the items were assessed for their validity and reliability and refined through two rounds of expert reviews.

As MacKenzie et al. (2011) asserted, the developed technology experience scale was empirically evaluated through quantitative ways. In order to assess the *a priori* model, an online survey was conducted and the data were analyzed for the data quality, factor structure of technology experience, measurement adequacy test, and structural model test. Particularly, multiple methods were used to discover the underlying factor structure of technology experience and to increase the accuracy of results. The measurement model test was also performed by using two different statistical techniques to cross-validate the measurement adequacy. Based on the findings, another data collection was performed to validate the developed scale and to test the proposed research framework.

Figure 2. Study Procedures



4. Construct Conceptualization, Item Generation, and Expert Review

4.1. Focus Group Discussions

Even though previous research suggested the potential dimensions of technology experience, the proposed dimensions might not fully portray the dynamic nature of technology experience because technologies are relatively new compared to the prolonged history of the hospitality and tourism industry. Therefore, two focus group discussions were performed to uncover all facets of technology experience and to increase the comprehensiveness of the construct as well as face validity. The first focus group discussion was conducted to explore possible dimensions of technology experience and the second discussion was performed to ascertain that all dimensions were captured from the literature review and first discussion. To ensure discussants' qualifications, the consent form included the description and examples of hospitality and tourism technologies and asked the discussants to choose all technologies they used in 2019. To profoundly extract the discussants' perceptions toward their experience with hospitality and tourism technologies, a discussion protocol was developed based on McNamara (2009) and Turner (2010). By employing the laddering technique, the discussions were analyzed to identify the dimensions of technology experience (Jüttner et al., 2013). In particular, an iterative process of various codings (e.g., in vivo, descriptive, emotion, process, value, and versus codings) and a series of thematic analyses were conducted to detect salient themes (DeWalt & DeWalt, 2011; Saldaña, 2013). The identified themes were cross-checked by three other researchers to ensure content and face validities.

Eleven people who used hospitality and tourism technology participated in the focus group discussions. The sectors of the discussants' technology adoption included hotels, resorts, restaurants, bars, transportations, MICE-related, tourism attractions, and general tourism destinations. Specifically, about 91% of the respondents answered that they had used hospitality and tourism technologies in the restaurant setting, followed by 82% of general travel, and hotels (73%). They declared they were frequent users of hospitality and tourism technologies, and the most commonly used technology was mobile apps, such as brand apps for booking. Interestingly, some respondents (27%) indicated that they had used advanced technologies, such as VR and service robots. As shown in Table 1, the thematic analysis of the focus group discussions revealed that technology experience consisted of nine dimensions: sensorial, cognitive, pragmatic, emotional, relational, unique, familiar, controllable, and economical experience.

Table 1. Identified Dimensions of Technology Experience

Dimension	Definition	Discussion Statement
Sensorial Experience	An experience that the consumer appeals to his/her five senses (i.e., visual, aural, olfactory, gustatory, and tactile experiences).	With the app, I was able to see the pictures better. I think the visual made big differences. Being able to see them makes a big difference.
Cognitive Experience	An experience that the consumer is engaged in intellectual activities, such as information gathering, processing, and/or thinking.	Through the VR tour, I got to know more about the destination. Some were matched with what I knew and some were new, which made me curious about the destination. Because the app has all information about a restaurant.
Pragmatic Experience	An experience that the consumer has practical benefits from technology, such as efficiency and convenience.	It made my trips more efficient. So, everything was more efficient I got to skip the front desk, you know, checking into all that to the efficient. It helps me finding the best restaurants out there and not wasting your time.
Emotional Experience	An experience that the consumer appeals to his/her feelings, sentiments, and emotions.	First feeling for the service robot was kind of interesting. We've had those moments of amazement or wonder.
Relational Experience	An experience that the consumer has access to others and/or interacting with other people through the technology.	Just looking at those reviews was like a virtual talking with people that you have never known. The connections are not necessarily enhanced by technology, but it tends to help the access to others
Unique Experience	An experience that the consumer encounters something unique, distinctive, different from his/her daily life.	I didn't really expect to see it in real life. It was a very cool unique experience. I don't use any of that at home, so you know, I felt it was pretty unique to use it.
Familiar Experience	An experience that the consumer has or predicts in his/her daily routines.	Such experiences as using Yelp were not that different from what I would be doing at home. There is a little familiarity, and you know what you're going to expect.
Controllable Experience	An experience that the consumer chooses for his/her decision-making, thereby having more control over their travel.	We had more control over our own decisions at destinations. I can use Google or Apple Maps to get the information on what's the most rapid way to drive to the destination and then I can go on to the app for the San Diego Zoo and find out that the way to get in was three hours. So we canceled everything.
Economical Experience	An experience that the consumer saves costs, compared to performance of technology.	Sometimes it will save some money because like sometimes when we use the technology, they offer some discounts. It is just kind of saving some money. I can just use technologies, not spending extra money for tipping.

Sensorial experience, defined as consumers' experience generated from sensorial stimuli, occurs when hospitality and tourism technologies affect their senses. As technologies can provide sensory information (e.g., virtual reality, music, motion) (Phung & Buhalis, 2011), sensorial experience can be easily generated. Particularly, the emergence of virtual reality and augmented reality further increases consumers' involvement in sensorial stimuli.

Pragmatic experience refers to consumers' experience related to the practical benefits of using technologies. As technology is designed to provide efficiency and effectiveness in achieving purposes, pragmatic experience was frequently mentioned by the discussants. Particularly, all discussants mentioned that using technology was more efficient and saved time. Convenience was commonly identified as a pragmatic experience.

While technologies provide practical benefits, they also offer information and engage consumers in the conscious mental process. When consumers are engaged in the mental process, such as learning, cognitive experience takes place. Due to the intangibility of tourism and hospitality service offerings, many consumers seek information in order to reduce risk and enrich their experience. Accordingly, *cognitive experience* occurs when consumers process the information. In heritage sites, for instance, cognitive experience is generated when consumers are looking up historical information about the place.

As the industry is highly associated with hedonic consumption, emotional experience was easily found from the discussion. *Emotional experience* indicates consumer experience related to moods, sentiments, and feelings. Technologies help consumers deeply immerse into the context, thereby creating emotional experience. For example, consumers would feel very pleasant if an in-room tablet automatically set their rooms at their preference.

Consumers have relational experience when technologies help them interact with others or provide access to others. While technologies partially substitute human interactions, consumers were able to interact with or access others (e.g., other consumers and service providers) by using technologies, thereby creating *relational experience*. Furthermore, from a certain perspective, consumers had access to a broad range of other individuals due to the absence of barriers, such as time and place constraints. For example, travel apps, such as Eatwith and SoloTraveller, allow consumers to find local residents or other travelers with common interests so that they can experience various things at the destination (Bortz, 2019).

Unique experience occurs when consumers find the uniqueness that they do not involve in their daily lives. As various advanced technologies became available in the industry, some types of technologies were perceived as 'unique' because these technologies were at the early diffusion stage. Particularly, discussants mentioned that they did not expect to see such technologies because of the futuristic image of robots. Relevant comments included the following: "I didn't really expect to see it in real life. It was a very cool, unique experience."

Familiar experience refers to consumers' experience with technology that is familiar with their daily usage of technologies or something they can expect from their previous experience. As many hospitality and tourism technologies became universal, consumers were able to use the same or similar technologies in their daily lives and when they traveled. Particularly, if it was a franchised business, consumers were more likely to use the same technology across the globe, as highlighted in the following comments, "We were still using Yelp in Japan. Such experiences as using Yelp were not that different from what I would be doing at home."

With the real-time information and immediate responses from technologies, consumers were able to get more control over their plans, developing *controllable experience*. For instance, mobile food ordering apps provide consumers with expected time so that they can plan

accordingly. If a consumer were planning to visit an attraction but should wait in a line for a long time, he/she would change his/her plan based on the situation. Thus, with technologies, consumers have a higher level of flexibility.

Economical experience is associated with the economic benefits from using technologies, such as saving expenditure. Different from human services, consumers do not need to pay tips for services provided by technologies. Another example of economical experience was the promotional discounts only available from technologies. Discussants' comments included, "Sometimes when we use the technology, they offer some discounts."

Based upon the results of the focus group discussions, technology experience was developed as a second-order formative construct with nine dimensions of sensorial, cognitive, pragmatic, emotional, relational, unique, familiar, controllable, and economical experiences.

4.2. Initial Item Pool Generation

By following the suggestion of Netemeyer et al. (2003), an over-inclusive initial item pool was generated because of the strong dependency of the initial item pool on the complexity of the construct. Therefore, drawing upon the literature review and focus group discussion results, at least seven items per dimension were included in the initial item pool, totaling 120 items to measure technology experience. Once the initial items were generated, they were subject to further refinement in order to achieve higher readability before experts assessed them.

4.3. Expert Reviews

To ascertain the content and face validities and reliability of the initial items, two rounds of expert reviews were performed (Churchill, 1979; Netemeyer et al., 2003). Two researchers in the hospitality and tourism disciplines and four industry professionals in hospitality and tourism technology participated in the review process. For the first-round review, experts were provided with the definition of technology experience. Then, they were requested to group the initial items so that items in each group were conceptually related, and name the groups based on their perception. At the end of the first review, reviewers were asked to provide comments about the items, such as whether the items were well operationalized. Based on the reviewers' feedback, some items were modified and 14 items were eliminated from the initial item pool, resulting in 106 items.

While the first-round review did not provide any information about the dimensions of technology experience, the second-round review explained the definitions of the nine dimensions with corresponding items (Hardesty & Bearden, 2004). Therefore, the experts were requested to assess the extent to which each item represents the corresponding dimension on a 5-point Likert scale. Other than the item assessment, the reviewers were also provided a separate section to provide their feedback. For the second-round review, two major decision rules were applied. First, the average score should be greater than 'moderately representative' and the inter-rater reliability should meet substantial agreement. Therefore, after the second review, items of which average score was less than moderate representative, and items with the low inter-rater agreement were dropped, resulting in 83 items with .63 of Cohen's kappa. Despite the high representativeness and substantial inter-rater reliability, a few items were further eliminated to reduce item redundancy and collinearity. Eventually, the scale to measure technology experience was composed of 62 items.

5. Item Assessment

5.1. Data Collection and Instrument

An online survey was administered to examine the factor structure of technology experience, and to empirically evaluate the validity and reliability of the developed scale. The minimum sample size was determined based on multiple criteria to prevent potential issues associated with statistical conclusion validity. The sample size was determined by following the suggestions by Cattell (1978) suggestion and Netemeyer et al. (2003). Specifically, to ensure sufficient power, the sample size was decided at 400, in order to have the n/p ratio greater than 6. The survey was developed on Qualtrics, and respondents were recruited through Amazon Mechanical Turk (MTurk). The survey consisted of five sections. The first section explained the purpose of the study and asked for the respondents' consent. After describing and providing examples of hospitality and tourism technologies, the respondents were asked whether they had used any of them in 2019. The second section included questions asking more detailed information about the respondents' adoption of hospitality and tourism technologies. The developed 62 items for technology experience were in the third section, and the fourth section contained items that measure potential outcomes of technology experience to assess nomological validity. Specifically, overall experience, overall satisfaction, and future behavioral intention were measured with three items from Jeong and Shin (2020), whereas technology satisfaction was measured with three items from Lin and Hsieh (2007). The survey ended with a section asking about the respondents' socio-demographic information. The items from previous literature were modified to fit the context of this study. All items were measured on 7-point Likert or semantic differential scale. Quality commitment and attention check items were also included to increase data quality.

5.2. Data Analysis

The distribution of the obtained data was assessed to ensure that the necessary assumptions were met (e.g., normality). Then, a series of exploratory factor analyses (EFAs) were performed to discover the underlying factor structure of technology experience (Netemeyer et al., 2003). By following the suggestion of Bandalos (2019), EFA was performed with an oblique rotation (i.e., promax) for two primary reasons: (1) with rotation, items that are clearly assigned with a particular factor, allowing the researchers to easily interpret the factor structure, and (2) because of the nature of social science, the factors are likely to correlate each other. Rather than relying on EFA, multiple methods (i.e., principal component analysis (PCA), parallel analysis, simple structure) were employed to accurately identify the factor structure of technology experience. Also, the number of factors (dimensions) was decided based on K1 criterion, scree plot, parallel analysis, and simple structure. After comparing the identified factor structure, a series of confirmatory factor analyses (CFAs) were conducted to test the measurement model. All analyses were performed with R 3.6.2. with multiple packages (e.g., *tidyverse, psych, lavaan, seminr*).

5.3. Respondents' Profile

During the last week of January 2021, 401 complete responses were collected (see Table 2). About 52% of the respondents were female. As expected, the vast majority of the respondents (85%) were younger generations (i.e., Millennials and Generation Z). The sample well represented the U.S. population regarding their ethnicity and income level (Caucasian: 76%; annual household income below $70,000: 61%) (Backman, 2020; U.S. Census Bureau, 2020).

Approximately 60% of the respondents held at least a Bachelor's degree. About three-quarters of the respondents (75%) were employed. More than two-thirds of the respondents (71%) primarily traveled for leisure purposes. The respondents used technology most commonly in the food and beverage sector (65%), followed by lodging (60%) and travel (54%). More than 96% of the respondents used self-service technologies (e.g., self-service kiosks), booking/reservation mobile apps, travel information apps (e.g., mobile travel guide, restaurant waiting time check), and social platforms (e.g., social media). The respondents answered that they had various reasons to use technologies, such as convenience (81%) and entertainment (54%). However, the primary purpose of technology adoption was convenience (37%).

Table 2. Respondents' Profile

Demographic Information	Assessment (N = 401)		Validation (N = 777)	
	N	%	N	%
Gender				
Male	191	47.6%	383	49.3%
Female	210	52.4%	394	50.7%
Age Generation				
Generation Z	120	29.9%	72	9.3%
Generation Y	220	54.9%	475	61.1%
Generation X	40	10.0%	137	17.6%
Baby Boomers	21	5.2%	90	11.6%
Ethnicity				
Caucasian	304	75.8%	578	74.4%
African American	39	9.7%	77	9.9%
American Indian or Alaska Native	4	1.0%	7	0.9%
Asian	30	7.5%	79	10.2%
Others	24	6.0%	36	4.7%
Employment Status				
Employed full time	217	54.1%	545	70.1%
Employed part time	55	13.7%	77	9.9%
Self-employed or business owner	27	6.7%	7	0.9%
Unemployed or students	64	16.0%	79	10.2%
Retired	5	1.2%	2	0.3%
Others	33	8.2%	34	4.4%
Education Level				
Less than high school degree	3	0.7%	3	0.4%
High school	99	24.7%	102	13.1%
Associate degree	56	14.0%	112	14.4%
Bachelor's degree	159	39.7%	398	51.2%
Postgraduate degree	79	19.7%	154	19.8%
Others	5	1.2%	8	1.0%
Annual Household Income				
Less than $30,000	90	22.4%	112	14.4%

$30,000 to $50,000	86	21.4%	172	22.1%
$50,001 to $70,000	68	17.0%	160	20.6%
$70,001 to $90,000	52	13.0%	129	16.6%
$90,001 to $110,000	45	11.2%	66	8.5%
More than $110,000	60	15.0%	138	17.8%
Hospitality and Tourism Technologies Used				
Self-service Technology	387	96.5%	734	94.5%
Informative Mobile App	383	95.5%	728	93.7%
Booking/Planning Mobile App	385	96.0%	743	95.6%
Social Mobile App	383	95.5%	703	90.5%
AI Guest Service	300	74.8%	544	70.0%
AR/VR/Wearables	172	42.9%	327	42.1%
Gamification	231	57.6%	409	52.6%
Mobile RFID, NFC	295	73.6%	521	67.1%
Ubiquitous Wi-Fi, Public 5G	351	87.5%	644	82.9%
Others	97	24.2%	137	17.6%
Purpose of Technology Adoption				
Entertainment	216	53.9%	363	46.7%
Information Search	251	62.6%	465	59.8%
Convenience	326	81.3%	594	76.4%
Comfort	175	43.6%	325	41.8%
Networking & Communications	131	32.7%	244	31.4%
Safety & Security	114	28.4%	222	28.6%
Booking/Reservation	301	75.1%	565	72.7%
Others	5	1.2%	6	0.8%

5.4. Results of Factor Structure Investigation

The results of EFA, PCA, and simple structure suggested the number of technology experience dimensions was nine, consistent with *a priori* model developed from the focus group discussions. While the simple structure results proposed the number of factors between eight and 13, the sample-size adjusted BIC was the least with nine factors, supporting that technology experience as a second-order construct consists of nine dimensions. Once the factor structure of technology experience was found to be consistent with the *a priori* model, a series of measurement model tests were carried out. After eliminating 26 items due to their low factor loading and multicollinearity, the covariance-based measurement model test revealed that the overall model fit was good (χ^2 = 1201.76, df = 558, χ^2[558] = 2.15, CFI = .93, TLI = .93, RMSEA = .05, SRMR = .05) (Newsom, 2012). The average variance explained (AVE) for every dimension and construct was greater than .5, illustrating the shared variance was greater than the error variance (Fornell & Larcker, 1981). The standardized factor loading was equal to or greater than .71, demonstrating the measured variance was greater than the error variance (Gefen et al., 2000). Thus, convergent validity was established. The bivariate correlation between two constructs was smaller than the square root of AVE, showing sufficient discriminant validity

(Fornell & Larcker, 1981). There was sufficient internal consistency as Cronbach's alpha and composite reliability (CR) were greater than .7 (Nunnally, 1978).

When developing a set of scales, the data set is often divided into two sub-subsamples (i.e., confirmation and validation) to ensure reliability and validity (So, King, & Spark, 2014). However, in this study, the data were randomly split into two sub-samples to assess the equivalence of the developed scales' psychometric properties across the groups (Finney & Davis, 2003). In other words, the data were randomly divided into two groups ($N_{G1} = 200$, $N_{G2} = 201$) for the measurement invariance tested in a hierarchical manner to provide rigorous results: configural, metric, and scalar invariances. The chi-square difference tests showed that the developed technology experience scale was equivalent across the two groups. In particular, when the measurement model test was performed without any equality constraints, the model fit was good (CFI = .91, TLI = .90, RMSEA = .06, SRMR = .06), showing there was configural invariance. Also, metric ($\chi^2[27] = 35.54$, $p > .05$) and scalar ($\chi^2[27] = 22.06$, $p > .05$) invariances were also detected, allowing further analyses.

The component-based test results also confirmed the satisfactory internal consistency (CR ≥ .83), as well as convergent (significant bootstrapped factor loadings ≥ .74, AVE ≥ .62). The correlation between two constructs or dimensions was smaller than the square root of AVR, demonstrating sufficient discriminant validities (Fornell & Larker, 1981). HTMT also fell within the threshold (Henseler et al., 2014). The results demonstrated the hierarchical nature of technology experience (see Table 3). While they are all important dimensions of technology experience, emotional ($\beta = .78$, $t = 39.36$, $p < .001$), cognitive ($\beta = .70$, $t = 25.05$, $p < .001$), familiar ($\beta = .69$, $t = 20.83$, $p < .001$), and controllable ($\beta = .71$, $t = 19.32$, $p < .001$) were found to be the key dimensions. Lastly, due to the complicated nature of technology experience, the online survey had a large number of items. Therefore, common method bias was measured using Harman's single factor test, and the results indicated there is no evidence of common method bias because the proportion variance was less than .5 when all items were loaded on a single factor without any rotation (Eichhorn, 2014).

Figure 3. Identified Factor Structure of Technology Experience

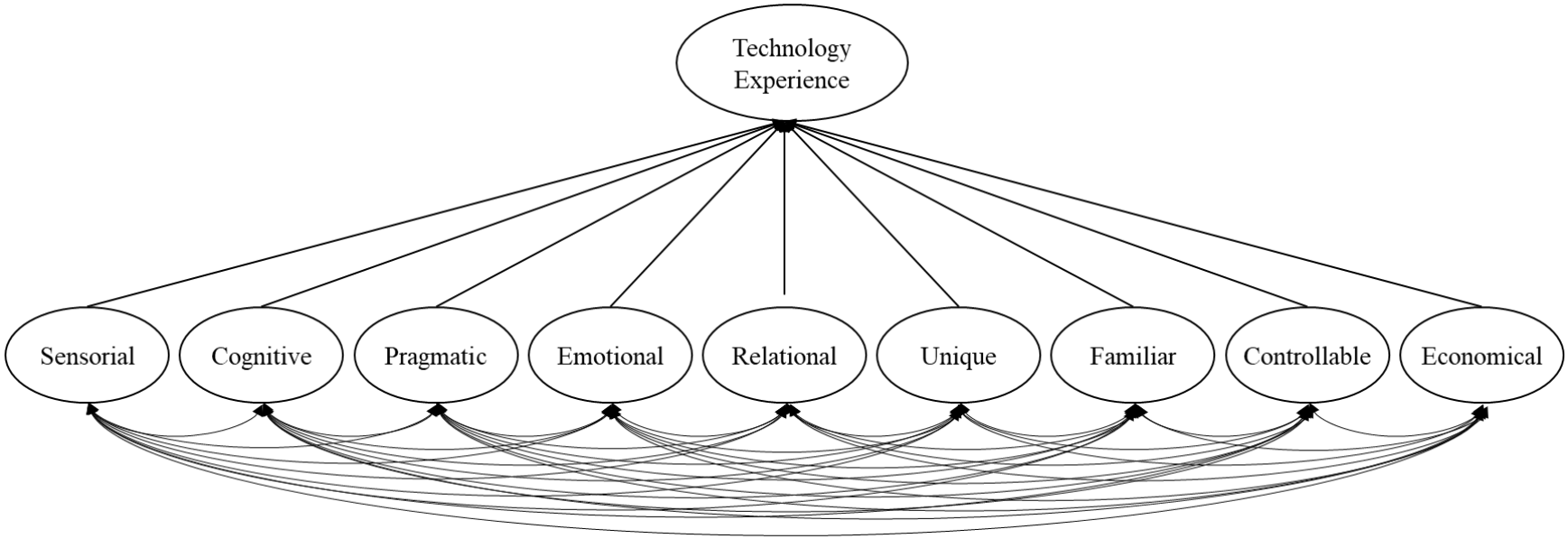


Table 3. Hierarchical Nature of Technology Experience (Assessment Sample)

Dimensions of Technology Experience			*est*	*se*	*t*	*p*	Results
Sensorial Experience	→	Technology Experience	0.63	0.04	16.40	< 0.001***	Supported
Cognitive Experience	→	Technology Experience	0.70	0.03	25.05	< 0.001***	Supported
Pragmatic Experience	→	Technology Experience	0.65	0.03	18.55	< 0.001***	Supported
Emotional Experience	→	Technology Experience	0.78	0.02	39.36	< 0.001***	Supported
Relational Experience	→	Technology Experience	0.64	0.04	17.62	< 0.001***	Supported
Unique Experience	→	Technology Experience	0.21	0.06	3.45	< 0.001***	Supported
Familiar Experience	→	Technology Experience	0.69	0.03	20.83	< 0.001***	Supported
Controllable Experience	→	Technology Experience	0.71	0.04	19.32	< 0.001***	Supported
Economical Experience	→	Technology Experience	0.59	0.04	16.06	< 0.001***	Supported

*Note. *** p-value < .001; ** p-value < .01; * p-value < .05.*

6. Item Validation

6.1. Data Collection and Instrument

Consistent with the item assessment phase, an online self-administered survey was developed on Qualtrics, and recruitment of the respondents was performed through MTurk. In order to reduce potential issues with the sample (e.g., unconscious misrepresentation), respondents who participated in the previous survey were excluded from data collection. While the minimum required sample size was about 370, this study set the desired sample size to 750, so that the sample can be divided into two groups to test measurement invariance. The composition of the online survey was identical with the previous survey, except that 36 of the 62 measurement items of the technology experience scale were retained for subsequent analysis.

6.2. Data Analysis

First of all, CFA was performed to ascertain that the underlying factor structure was identical to the *a priori* model. Then, the sample was randomly divided into two groups to further assess factor invariance ($N_{G1} = 388$, $N_{G2} = 389$). Then, a two-step approach was employed, following the suggestion of Anderson and Gerbing (1988). The measurement adequacy was tested by assessing the model convergence and significance of parameters. Specifically, partial least squares structural equation modeling (PLS-SEM) was used because technology experience scale was developed as a second-order formative construct and the exploratory nature of this study (Hair et al., 2011). Although the first-order constructs were developed as formative constructs toward the second-order construct of technology experience, items measuring the nine dimensions of technology experience were developed as reflective indicators. Thus, the bootstrapped loadings for the indicators were evaluated for their statistical significance and magnitude of the estimates. Furthermore, AVE was examined to ensure convergent validity. Also, discriminant validity was assessed. Cronbach's alpha and composite reliability were tested for internal consistency. Once the measurement model test indicated satisfactory results, the structural model was tested with the bootstrap sample size of 5000. The proposed relationships were tested for their path coefficients and significance. Furthermore, Cohen's f^2 were also assessed to see the effect size of each path ($f^2 \geq .35$: large effect; $f^2 \geq .15$: moderate effect, $f^2 \geq .1$: small effect) (Cohen, 1988; Selya et al., 2012). Also, R^2 for endogenous constructs was assessed to demonstrate the predictive accuracy of the developed research framework. Lastly, common method bias was also examined.

6.3. Respondents' Profile

During the second week of February, 2021, 777 complete responses were collected (see Table 2). The sample represented a balanced proportion in terms of gender (51% female). While the previous sample was composed of about 30% of Generation Z, more older generations participated in this study (Generation X or above: 29%; Generation Z: 9%). The respondents' employment status also reflected the older generations (full-time employment: 70%). Consistent with the previous data collection, about one-third of the respondents were Caucasian. Approximately 71% of the respondents held a Bachelor's degree or a higher degree. More than half of the respondents (59%) had an annual household income between $30,000 to $90,000. Most respondents answered that they used booking/planning mobile apps (96%), self-service technologies (95%), travel information mobile apps (94%), and mobile for social interactions (91%). The key purpose of their hospitality and tourism technology adoption was convenience (76%).

6.4. Measurement Model Testing

Although the technology experience scale was developed as a second-order formative construct, the decision to use a construct as formative or reflective is up to the researcher's theoretical interest (Petter, Straub, & Rai, 2007). Thus, CFA and factor invariance tests were performed to ensure that the technology experience scale could be applied in reflective manners. The results of the CFA and factor invariance test indicated that the measurement model was adequate and there were configural, metric ($\chi^2[27] = 34.65$, $p > .05$), and scalar invariances ($\chi^2[27] = 23.24$, $p > .05$). Then, the main measurement model test was performed using PLS-SEM approach. The measurement model test indicated that there was sufficient convergent validity. Standardized factor loading was equal to or greater than .73, except for one item for unique experience dimension (UE_2: .65). However, the item was not excluded from the further analyses because (1) the original estimate was greater than .71, and (2) the AVE for all constructs, including unique experience dimension, was greater than .65, illustrating that the shared variance was greater than the error variance (Fornell & Larcker, 1981). Cronbach's alpha and composite reliability were greater than .8, demonstrating sufficient internal consistency. The hierarchical nature of technology experience was confirmed, as all nine dimensions were found to be significant (see Table 5). As shown in Table 6, the bivariate correlation between any two constructs was less than the square root of AVE, illustrating sufficient discriminant validity (Fornell & Larcker, 1981). Furthermore, the HTMT indicated that there was sufficient discriminant validity for both first-order and second-order models (Henseler et al., 2014). Lastly, considering the length of the survey, common method bias was assessed using Harman's (1960) single factor test. The variance explained by a single factor without any type of rotation was less than .5, confirming that common method bias was not an issue (Eichhorn, 2014).

Table 4. Construct Descriptive Statistics (Validation Sample)

Constructs/Item	Mean	Std	Std. FL	CR	AVE
Technology Experience (TE)					
Sensorial Experience (SE)				0.93	0.82
Hospitality and tourism technologies were attractive to my senses (sight, sound, smell, taste, and touch).	5.18	1.29	0.91		
Hospitality and tourism technologies were pleasing to my senses (sight, sound, smell, taste, and touch).	5.16	1.30	0.92		
Hospitality and tourism technologies were engaging my senses (sight, sound, smell, taste, and touch).	5.26	1.30	0.89		
Cognitive Experience (CE)				0.94	0.77
By using hospitality and tourism technologies, I knew better about the hotel/restaurant/destination.	5.59	1.23	0.88		
By using hospitality and tourism technologies, I gained rich information about the hotel/restaurant/destination.	5.39	1.32	0.88		
By using hospitality and tourism technologies, I gathered more information about the hotel/restaurant/destination.	5.65	1.28	0.90		
By using hospitality and tourism technologies, I processed information about the hotel/restaurant/destination.	5.59	1.13	0.82		
Using hospitality and tourism technologies helped me understand more about the hotel/restaurant/destination.	5.58	1.19	0.91		
Pragmatic Experience (PE)				0.91	0.71
Using hospitality and tourism technologies was (1) difficult ... (7) easy.	6.20	0.98	0.85		
Using hospitality and tourism technologies was (1) complex ... (7) simple.	5.99	1.18	0.84		
Using hospitality and tourism technologies was (1) impractical ... (7) practical.	6.30	0.98	0.85		
Using hospitality and tourism technologies was (1) non-functional ... (7) functional.	6.32	0.96	0.85		
Emotional Experience (EE)				0.94	0.72
Using hospitality and tourism technologies made me feel (1) frustrated ... (7) relieved.	5.67	1.21	0.86		
Using hospitality and tourism technologies made me feel (1) unhappy ... (7) happy.	5.73	1.23	0.86		
Using hospitality and tourism technologies made me feel (1) anxious ... (7) relaxed.	5.82	1.22	0.85		
Using hospitality and tourism technologies was (1) unpleasant ... (7) pleasant.	5.95	1.13	0.88		
Using hospitality and tourism technologies was (1) uninteresting ... (7) interesting.	5.78	1.28	0.79		
Using hospitality and tourism technologies was (1) terrible ... (7) delightful.	5.68	1.14	0.83		
Relational Experience (RE)				0.96	0.87
I was able to connect with others through hospitality and tourism technologies.	4.58	1.61	0.94		
I felt connected with others by using hospitality and tourism technologies.	4.46	1.68	0.95		
Hospitality and tourism technologies were bridging me and others.	4.48	1.72	0.94		
Using hospitality and tourism technologies made me a part of the community.	4.36	1.73	0.91		

Unique Experience (UE)				0.88	0.71
My experience with hospitality and tourism technologies was new.	4.10	1.75	0.74		
My experience with hospitality and tourism technologies was something that I did not expect.	3.75	1.76	0.65		
My experience with hospitality and tourism technologies was novel.	4.28	1.59	0.94		
Familiar Experience (FE)				0.92	0.79
Hospitality and tourism technologies were connectable to my daily life.	5.26	1.26	0.84		
I felt something similar at the hotel/restaurant/destination by using hospitality and tourism technologies.	5.09	1.24	0.91		
I felt something familiar at the hotel/restaurant/destination by using hospitality and tourism technologies.	5.17	1.22	0.92		
Controllable Experience (CTE)				0.92	0.71
Using hospitality and tourism technologies allowed me to control my plans or activities.	5.86	1.04	0.84		
Using hospitality and tourism technologies helped me control my plans or activities.	5.85	1.05	0.87		
Using hospitality and tourism technologies assisted me in adjusting my plans or activities based on my situation.	5.75	1.13	0.85		
Using hospitality and tourism technologies helped me organize my plans or activities.	5.78	1.14	0.85		
By using hospitality and tourism technologies, I was able to alter my plans or activities.	5.56	1.22	0.78		
Economical Experience (ECE)				0.97	0.91
Using hospitality and tourism technologies made my experience with the hotel/restaurant/destination more affordable.	4.61	1.58	0.95		
Using hospitality and tourism technologies made my experience with the hotel/restaurant/destination more inexpensive.	4.48	1.59	0.94		
Using hospitality and tourism technologies made my experience with the hotel/restaurant/destination more economical.	4.65	1.61	0.96		
Technology Satisfaction (SAT_T)				0.89	0.74
Overall, I was satisfied with the hospitality and tourism technologies.	5.85	1.05	0.85		
The hospitality and tourism technologies exceeded my expectations.	5.90	0.98	0.84		
The hospitality and tourism technologies available were close to my ideal technologies.	4.98	1.45	0.74		
Overall Experience (OE)	5.25	1.33	0.80		
My experience at the hotel/restaurant/destination was enjoyable.				0.88	0.65
My experience at the hotel/restaurant/destination was good.	5.98	0.96	0.80		
My experience at the hotel/restaurant/destination was unforgettable.	5.28	1.31	0.87		
My experience at the hotel/restaurant/destination was memorable.	5.47	1.19	0.90		
Overall Satisfaction (SAT_O)				0.89	0.72
Overall, I was satisfied with my experience at the hotel/restaurant/destination.	5.94	0.94	0.80		

My experience at the hotel/restaurant/destination exceeded my expectations.	5.12	1.24	0.86		
My experience at the hotel/restaurant/destination was close to my ideal experience at the hotel/restaurant/destination.	5.34	1.18	0.89		
Behavioral Intention (INT)				0.94	0.83
I want to visit the hotel/restaurant/destination again.	5.82	1.08	0.90		
I would recommend the hotel/restaurant/destination to family and friends.	5.83	1.10	0.91		
I would say positive things about the hotel/restaurant/destination to other people.	5.88	1.10	0.92		

Note. Item-Total correlation ranged from .54 to .86.

Table 5. Hierarchical Nature of Technology Experience (Validation Sample)

Dimensions of Technology Experience			*β*	*se*	*t*	CI	*p*	Results
Sensorial Experience	→	Technology Experience	0.16	0.01	21.52	[0.14, 0.17]	< 0.001***	Confirmed
Cognitive Experience	→	Technology Experience	0.19	0.01	23.72	[0.18, 0.21]	< 0.001***	Confirmed
Pragmatic Experience	→	Technology Experience	0.17	0.01	23.90	[0.16, 0.19]	< 0.001***	Confirmed
Emotional Experience	→	Technology Experience	0.21	0.01	29.42	[0.20, 0.23]	< 0.001***	Confirmed
Relational Experience	→	Technology Experience	0.13	0.01	16.37	[0.12, 0.15]	< 0.001***	Confirmed
Unique Experience	→	Technology Experience	0.04	0.01	3.03	[0.03, 0.07]	< 0.05*	Confirmed
Familiar Experience	→	Technology Experience	0.19	0.01	24.68	[0.17, 0.20]	< 0.001***	Confirmed
Controllable Experience	→	Technology Experience	0.20	0.01	27.54	[0.18, 0.21]	< 0.001***	Confirmed
Economical Experience	→	Technology Experience	0.11	0.01	12.69	[0.09, .013]	< 0.001***	Confirmed

*Note. *** p-value < .001; ** p-value < .01; * p-value < .05.*

As technology experience was a second-order formative construct, bootstrapped weights (β) were specified.

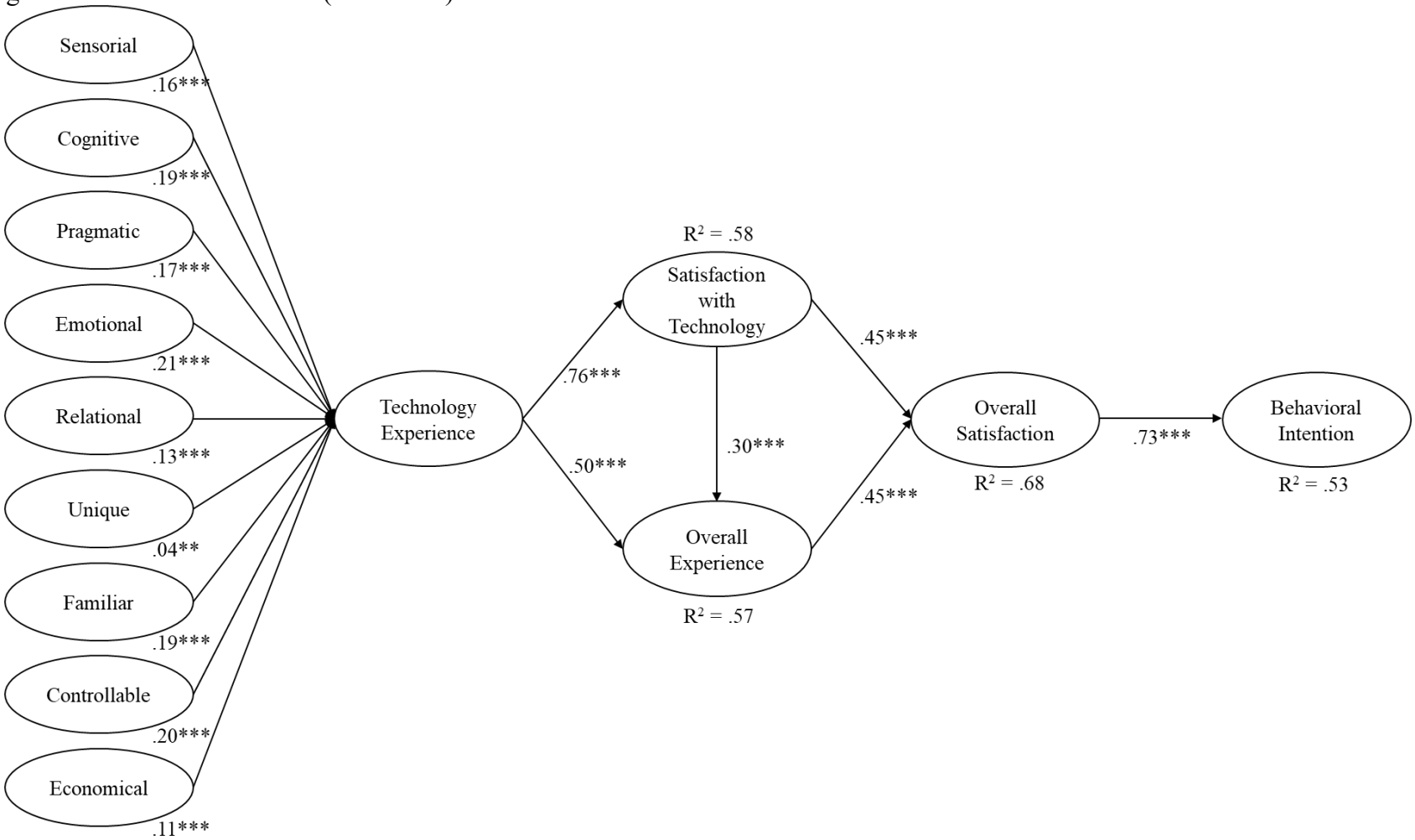
Table 6. Discriminant Validity based on Fornell and Larker's (1981) Criterion

	SE	CE	PE	EE	RE	UE	FE	CTE	ECE	SAT_T	OE	SAT_O	INT
Sensorial Experience	0.91												
Cognitive Experience	0.46	0.88											
Pragmatic Experience	0.30	0.43	0.85										
Emotional Experience	0.50	0.55	0.63	0.85									
Relational Experience	0.45	0.40	0.13	0.46	0.93								
Unique Experience	0.22	0.02	-0.13	0.10	0.34	0.84							
Familiar Experience	0.49	0.57	0.38	0.54	0.55	0.15	0.89						
Controllable Experience	0.44	0.69	0.57	0.55	0.29	-0.08	0.56	0.84					
Economical Experience	0.32	0.38	0.14	0.38	0.48	0.15	0.39	0.31	0.95				
Technology Satisfaction	0.50	0.56	0.56	0.69	0.43	0.16	0.57	0.60	0.36	0.86			
Overall Experience	0.48	0.61	0.50	0.62	0.39	0.10	0.57	0.63	0.32	0.69	0.81		
Overall Satisfaction	0.48	0.52	0.49	0.62	0.39	0.17	0.53	0.55	0.32	0.76	0.76	0.85	
Intention	0.47	0.58	0.54	0.58	0.25	0.02	0.49	0.63	0.21	0.66	0.73	0.73	0.91

6.5. Structural Model Testing

The adjusted R^2 for the endogenous constructs showed that there was a substantial predictive accuracy in the proposed research framework ($R^2_{TechnologySatisfaction} = .58$, $R^2_{OverallExperience} = .57$, $R^2_{OverallSatisfaction} = .68$, $R^2_{BehavioralIntention} = .53$). As illustrated in Table 7, all hypotheses were supported. Consumers' experience with hospitality and tourism technologies had a very strong positive impact ($\beta = .76$, $t = 39.93$, $p < .001$, $f^2 = 1.37$) on their satisfaction with technologies (please refer to Selya et al., 2012, for detailed explanation for the effect size). Consumers' technology experience positively influenced ($\beta = .50$, $t = 10.91$, $p < .001$) their overall experience at hotels/restaurants/destinations, with medium large effect size ($f^2 = .25$). Thus, the positive impacts of technology experience on technology satisfaction (H1) and overall experience (H2) were supported. When consumers were satisfied with hospitality and tourism technology, they had a positive overall experience at hotels/restaurants/destinations ($\beta = .30$, $t = 6.09$, $p < .001$, $f^2 = .09$), supporting H3. The results indicated that consumers' satisfaction with hospitality and tourism technologies was a significant antecedent of their overall satisfaction with hotels/restaurants/destinations ($\beta = .45$, $t = 10.43$, $p < .001$), and the effect size ($f^2 = .32$) was remarkable. Therefore, H4 was supported. As expected, consumers' overall satisfaction with hotels/restaurants/destinations was positively affected by their overall experience at hotels/restaurants/destinations ($\beta = .45$, $t = 11.57$, $p < .001$, $f^2 = .33$), supporting H5. When consumers were satisfied with hotels/restaurants/destinations, they were more likely to build positive future behavioral intention ($\beta = .73$, $t = 32.69$, $p < .001$, $f^2 = 1.11$).

Figure 4. Research Framework (Validation)



*Note. *** p-value < .001; ** p-value < .01; * p-value < .05;*

Table 7. Structural Model Test (Validation Sample)

Hypothesis				*β*	*se*	*t*	*p*	Results
H1	Technology Experience	→	Technology Satisfaction	0.76	0.02	39.93	< 0.001***	Supported
H2	Technology Experience	→	Overall Experience	0.50	0.05	10.91	< 0.001***	Supported
H3	Technology Satisfaction	→	Overall Experience	0.30	0.05	5.99	< 0.001***	Supported
H4	Technology Satisfaction	→	Overall Satisfaction	0.45	0.04	10.37	< 0.001***	Supported
H5	Overall Experience	→	Overall Satisfaction	0.45	0.04	11.56	< 0.001***	Supported
H6	Overall Satisfaction	→	Behavioral Intention	0.73	0.02	32.70	< 0.001***	Supported

*Note. *** p-value < .001; ** p-value < .01; * p-value < .05.*

7. Discussion and Conclusions

7.1. Discussion

Employing a sequential exploratory approach and scale development procedures, this study developed a comprehensive conceptualization of consumers' experience with hospitality and tourism technologies and a set of corresponding scales. The results of qualitative inquiries suggested that technology experience can be defined as a component of a consumer's overall experience, a unique type of experience generated from his/her interactions with hospitality and tourism technologies. In particular, a consumer's technology experience is a second-order formative construct consisting of nine distinctive dimensions: sensorial, cognitive, pragmatic, emotional, relational, unique, familiar, controllable, and economical experiences. Out of the nine dimensions, cognitive, emotional, familiar, and controllable experiences had notable impacts on consumers' overall experience. In particular, the positive impact of cognitive experience on overall experience might be explained by the fact that consumers could use information obtained using hospitality and tourism technologies, such as mobile travel guide apps, to become deeply immersed in their experience. The significant effect of emotional experience on overall experience would be explained by that consumer experience is strongly associated with emotional responses (Holbrook and Hirschman, 1982). On the other hand, consumers' self-efficacy from their perceptual fluency (Fang *et al*., 2007) would explain why familiar experience positively affected consumers' overall experience. As the hospitality and tourism industry is severely affected by external factors, consumers' controllable experience had a positive impact on their overall experience.

As extant literature suggested, technology experience was a significant antecedent of consumers' satisfaction with technology. Among the nine dimensions, sensorial, pragmatic, emotional, unique, familiar, and controllable experiences had notable influences on technology satisfaction. Although technology is not a core product/service in the hospitality and tourism industry, the predictive accuracy of the proposed research framework and the substantial effect size demonstrated that technology experience was indeed a component of overall experience. Interestingly, cognitive, emotional, familiar, and controllable experiences positively influenced consumers' overall experience, which might be attributed to the utilitarian and hedonic benefits that technologies provide. Consistent with the previous literature, the positive relationships among overall experience, overall satisfaction, and future behavioral intention were detected.

7.2. Theoretical Implications

This study contributes to the hospitality and tourism literature. First and foremost, this study conceptualizes consumers' experience with hospitality and tourism technologies. The conceptualization of technology is critical since more and more hospitality and tourism organizations have been implementing diverse technologies to accommodate consumers' demands for technology as well as to achieve service efficiency (Shin & Jeong, 2020). Particularly, as more consumers have used contactless services provided by technologies due to COVID-19, understanding consumers' technology experience has become imperative (Kwok, 2020). Given the experiential nature of the hospitality and tourism industry (Prebensen et al., 2016), this study establishes a foundation for future research to further understand how technologies shape consumer experience. Moreover, not limited to the conceptualization, this study laid the groundwork for future research by developing and validating a set of scales to measure consumers' technology experience.

Second, this study considers technology experience as a part of consumers' overall experience at hotels/restaurants/destinations. Due to the experiential nature of the industry, hospitality and tourism research has been devoted to understanding consumers' experience with the core products (e.g., lodging, food & beverages), neglecting the fact that consumers' experience is shaped by the interplay of different hospitality and tourism products/services. Instead of focusing on the core products, this study focuses on the augmented/supporting products of the hospitality and tourism industry (i.e., technologies), thereby demonstrating the role of such products as hospitality and tourism technologies in enhancing consumers' overall experience. By identifying the significant impact of technology experience on consumers' overall experience, this study provides further support to the previous literature suggesting how diverse products are integrated and how they create consumer experience. Furthermore, the findings of significant relationships among experience, satisfaction, and behavioral intention offer corroborative support to the theoretical backgrounds of this study.

This study uses a sequential exploratory approach to achieve the research objectives. Qualitative data were used to conceptualize consumers' technology experience and to develop corresponding measurements, and quantitative techniques were employed to follow up the results of qualitative inquiries by empirically assessing and validating the developed measurements. By including multiple data sources (i.e., literature, focus group discussions, expert reviews, online surveys), this study provides a more rigorous understanding of consumers' technology experience.

7.3. Practical Implications

The findings of this study also offer practical benefits to the hospitality and tourism industry. As we have witnessed, the landscape of the hospitality and tourism industry has shifted from human-to-human interactions with subordinate elements of technologies to contactless services via technologies. In other words, most of the industry's services have been provided by technology platforms. As consumers are expected to be accustomed to contactless services powered by technologies (Kwok, 2020), understanding consumers' technology experience is of paramount importance for the industry to meet consumers' expectations for technology services. By developing a robust conceptualization of technology experience, this study sheds light on the industry's clear understanding of consumers' technology experience and its dimensions in a timely manner.

Second, this study develops a set of scales to empirically measure technology experience, allowing the industry to diagnose its current performance in creating technology experience. Specifically, this study designs technology experience as a second-order formative construct that consists of nine dimensions and develops the measurement items for each dimension. Thus, the industry can easily implement the developed scale to explore specific dimensions applicable to its own business, and to identify their strengths and weaknesses in shaping technology experience. In doing so, the industry will be able to efficiently allocate its existing resources to specific dimensions that need further attention. Lastly, the findings of this study show the positive relationships among technology experience, overall experience, satisfaction, and future behavioral intention, offering empirical support for the necessity to invest in technologies to enhance consumer experience. Therefore, the industry would understand the importance of creating positive technology experience to generate favorable behavioral intention.

7.4. Limitations and Suggestions for Future Research

There are several limitations of this study, which call for future studies that address the issues in this study. First of all, this study considered all types of hospitality and tourism technologies as an effort to understand consumers' technology experience in general. Rather than looking at the differences among various technologies, this study examined consumers' experience with diverse hospitality and tourism technologies as a whole. Specifically, the respondents in this study were given all technologies they used. Thus, the differences among various technologies were not taken into consideration. For example, the answers from the respondents who selected advanced hospitality and tourism technologies, such as artificial intelligence, were aggregated with the answers from the respondents who only used self-service technologies. Hence, future studies are highly recommended to distinguish various types of technologies to examine whether consumers' technology experiences vary by different types of technologies. Furthermore, future research is suggested to investigate whether there are any significant differences in consumers' technology experience among different sectors of the hospitality and tourism industry, resulted from their adoption patterns of various technologies. In addition, it would be beneficial to investigate how different dimensions of technology experience affect consumers' overall experience.

The second limitation lies in the online survey data collection. Due to the complicated nature of technology experience, the length of the survey was long, perhaps resulting in survey fatigue and negatively influencing the data quality (Adams & Umbach, 2012; Crawford et al., 2001). However, the authors were aware of this issue prior to data collections, and used several methods (e.g., forced answer to reduce non-response bias, attention check items, and survey duration check for the data quality) to control the quality of data during the design phase. Thus, the quality of the online survey data was not compromised. However, given that the law of parsimony is crucial in establishing psychological models, future studies are proposed to achieve further parsimony in the developed scale. The survey included different scale types (i.e., Likert, semantic differential), and some were using antonyms, which might have affected the structure of technology experience. Future studies may want to use a consistent type of scale. Furthermore, the population of interest in this study was adults living in the United States and those who used hospitality and tourism technologies. Hence, future studies are recommended to increase the external validity of the developed technology experience scale by conducting cross-cultural study.

Given that the focus group discussants were relatively young (Generations X and Y), the technology experience of older generations might not be well-reflected. Thus, future studies are recommended to recruit older generations not to overlook their technology experiences. The survey asked the respondents to recall their experience with hospitality and tourism technologies more than a year ago due to the COVID-19 pandemic, restricting consumers' use of hospitality and tourism services. Hence, there might be potential for recall bias. Furthermore, consumers' perception of hospitality and tourism technologies might have changed when the pandemic is over. Thus, future studies are highly recommended to replicate this study to increase time-specific external validity.

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Appendix

Appendix A. Potential Dimensions of Technology Experience

Author(s), Year	Definition of Experience	Dimensions of Experience				
		Sensorial	Cognitive	Pragmatic/ Behavioral	Emotional	Relational
Hirschman & Holbrook (1982)	The experiential view considers consumption a predominantly subjective state of consciousness related to multi-sensory, fantasies, and emotional responses.	Y			Y	
Schmitt (1999, 2003)	Experience as a multi-dimensional concept consists of five types of experiences: sensory (sense), affective (feel), cognitive (think), physical (act), and social-identity (relate) experiences.	Y	Y	Y	Y	Y
Gentile et al. (2007)	Experience occurs from a set of interactions between a customer and the product/service, and/or the provider. Experience is multi-dimensional and consists of sensorial, affective, cognitive, lifestyle, pragmatic, and relational experiences.	Y	Y	Y	Y	Y
Verhoef et al. (2009)	Experience is a multi-dimensional construct that is holistic and includes individuals' cognitive, affective, emotional, social, and physical responses to the product/service provider.		Y	Y	Y	Y
De Keyser et al. (2015)	Experience is multi-dimensional by nature and encompasses cognitive, emotional, physical, sensorial, spiritual, and social elements from the interactions between the customer and provider.	Y	Y	Y	Y	Y
Lemon & Verhoef (2016)	Experience is a multi-dimensional construct that concentrates on cognitive, emotional, behavioral, sensorial, and social responses to the provider during the entire consumption process.	Y	Y	Y	Y	Y
Kandampully et al. (2018)	Experience is holistic and contains cognitive, affective, emotional, social, and physical (behavioral) responses.		Y	Y	Y	Y