Tourism Management and the Use of Technology to Enhance the Visitor Experience

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Abstract

Cutting-edge technology implementation has improved the tourism experience in increased tourist destinations. The present study intended to provide a complete picture of the impacts of technology on the tourism experience in Smart settings by synthesizing the previous research findings on the topic. The meta-analysis makes it possible to investigate this question transparently, objectively, and repeatable by providing consolidated data of previous studies addressing comparable research topics. For the investigation of the study, the model used for random-effects meta-analysis using the process of limited maximum likelihood. The study results demonstrate a clear association between Smart technology and the quality of the tourism experience, with the characteristics of delivering information and encouraging interaction being the attentive variables to consider. In addition, there is an inverse association between concerns regarding privacy and security. Therefore, the study aims to give destination managers an in-depth understanding of the potential Smart technology for boosting the quality of the tourist experience. Additionally, it will help the development of methods that foster the visitor's enjoyment and create loyalty.

Key Words: *Tourism Management, Smart Technology, Tourist Experience, Security/Privacy Concern, Smart Tourism Destinations*

1. Introduction

Smart labeling utilization has been more prevalent in several domains, such as technology, design, urban planning, and tourism. In the past few years, this particular classification of labels has garnered significant attention and interest. In the Smart destinations or paradigm context, Smart labeling represents a new ecosystem (Boes, Buhalis, & Inversini, 2016; Gretzel, Werthner, Koo, & Lamsfus, 2015). The development of this idea undertaken by Boes et al. (2016) is that Smart destinations are tourist attractions that utilize state-of-the-art technology to provide a forward-thinking and conveniently accessible experience. The previous idea contributes to the region's endeavor to promote

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sustainable development. Accordingly, the Smart tourism destinations' objective is to improve the standard of living for locals and visitors alike via superior facilities provision and services.

Creating smart destinations necessitates a diverse range use of state-of-the-art technological tools, which facilitates the collaboration between demand and supply to mutually generate value and enhance visitors' experience (Ballina, Valdés, & Del Valle, 2019) that lead to favorable outcomes and advantages for both organizations and destinations (Boes, Buhalis, & Inversini, 2015). In addition, Ayeh (2018) stated that Smart tourism technologies (STTs) have significantly transformed how passengers perceive and engage with various destinations. Neuhofer, Buhalis, and Ladkin (2015) argue that the widespread use of the Internet, mobile devices, and social media has facilitated unprecedented connectivity between businesses and consumers. Further, the connectivity enables engagement in creating novel experiences and the sharing of these experiences among individuals (Shoval & Birenboim, 2019). Furthermore, tourists increasingly customize their consumption patterns as they engage with the destination using portable and widely accessible technology advancements.

Information and communication technologies (ICTs) are crucial for improving the tourism experience in recent studies (Neuhofer, Buhalis, & Ladkin, 2012; Tussyadiah & Fesenmaier, 2009; Wang, Park, & Fesenmaier, 2012). Egger, Lei, and Wassler (2020) stated the majority of the research focuses on these technologies' advantages. Nevertheless, recent research has highlighted the potential for unforeseen outcomes, including worries about privacy and exclusion (Buhalis, 2019), the existence of a digital divide (Sigala, 2020), distractions (Ayeh, 2018), and even negative emotions like alienation and diminished authenticity (Tribe & Mkono, 2017). Therefore, to accurately reflect the influence full-amount of that sensory visitor technology has on molding the visitor experience, a consistent result is crucial.

This study's primary objective is to provide a thorough summary of the results by compiling the research findings on how technology affects the tourist experience in Smart places. The designed research objectives investigate how technology affects traveler experiences in Smart locations. A thorough study was carried out to synthesize the quantitative results of several scientific investigations on this topic in an understandable, objective, and repeatable way (Borenstein, Hedges, Higgins, & Rothstein, 2009). In addition, accurate estimations produced due to the synthesis of multiple previous investigations (Higgins et al., 2019; Lipsey & Wilson, 2001) reinforce the results' statistical significance and practical usefulness. This study explores the relationship between safety, trustworthiness, and privacy, besides how it affects travel experience. Additionally, the research delves into several qualitative moderator characteristics, including the earlier studies' duration, the studies' geographic location, and the nation's degree of ICT readiness that may affect these variables.

This research provides a thorough and exact assessment of the impact of Smart technology on the travel experience, marking it as the first endeavor of its kind. Consequently, this work has increased the current information base. Furthermore, it can provide valuable direction for making evidence-based decisions and directing future research endeavors.

2. The Conceptual Framework of the Study and the Generation of Hypotheses

The notions of a Smart destination and a Smart city are closely related, according to authors Ivars-Baidal and Vera-Rebollo (2019), which calls for an updated urban planning method and administration. This strategy aims to transform city infrastructures and services by leveraging information and communication technologies (ICTs) in critical domains such as economics, environment, mobility, and governance (Bakc, Almirall, & Wareham, 2013). The integration of technology in smart cities holds great promise for improving the overall well-being of individuals.

Likewise, destinations in the tourism industry are working towards improving the overall travel experience for tourists while also boosting their competitiveness by evolving into Smart tourism destinations, according to Buhalis and Amaranggana (2013). Consequently, in the context of Smart destinations, it is vital to establish the parameters of experience and technology.

2.1 Enhanced Tourism Experience

Neuhofer et al. (2012) and Uriely (2005) asserted that a prominent concept in the tourist sector is delivering customers' notions with a gratifying experience. Tung and Ritchie (2011) defined the word tourism experience as a collection of subjective perceptions, emotions, and sentiments personally encountered and perceived by visitors. In addition, Pine and Gilmore (1998) defined experience as consisting of four distinct categories: instructive, escapist, aesthetic, and entertaining. While, Oh, Fiore, and Jeoung (2007) found that visitors often passively enjoy the entertainment and visually pleasant features of a venue, whereas actively participating is necessary for experiencing the informative and escapist elements. Further, the experience encompasses not only the duration spent at the destination but also the period leading up to, during, and after the trip (Xiang, Wang, O'Leary, and Fesenmaier (2015); Wang et al. (2012); Buhalis and Amaranggana (2015)). Accordingly, travelers evaluate their experiences and purposefully create moments they will remember (Tung & Ritchie, 2011), which are then remembered and recollected favorably following the event occurrence in question. Thus, its noteworthy encounters encompass hedonism, rejuvenation, indigenous customs, significance, erudition, engagement, and originality (Kim, Ritchie, & McCormick, 2012). Therefore, these encounters exert a substantial influence on the behaviors of tourists, including their inclination to revisit the place, and they also mold destination marketing techniques (Hosseini, Cortes Macias, & Almeida Garcia, 2021).

The study by Neuhofer et al. (2012) revealed that two changes have impacted the people experience things. At first, buyers have enthusiastically embraced the opportunity to shape their experiences. In addition, Smart technology and tourism (STT) integration have become an increasingly important factor in enhancing experiences and offering additional benefits to clients (Gretzel, Sigala, et al., 2015). The concept of Smart tourism experience refers to the use of advanced digital technology to improve the overall quality of the trip and allow for greater customization. Hence, this entails tailoring tourism services to the unique interests and individual visitors' needs to create a more fulfilling experience for them. In addition, the procedure utilizes current data to enhance decision-making and encourage engagement with the tourism environment via digital tools and mobile devices (Buhalis & Amaranggana, 2015). Therefore, the main goal of using technology is to enhance the visitor experience by making it more engaging, streamlined, and tailored to their needs. Consequently, the distinguishing characteristics of the modern tourist experience vary from the conventional experience (Lee & Jan 2022), particularly in the visual appeal field, virtual or augmented reality, practicality, ease of use, enjoyment, dependability, and the educational element.

Most likely, research ignored negative experiences (Hosany, Sthapit, & Bjork, 2022). Definitely, technology-enabled visitor encounters are always favorable (Neuhofer et al., 2015). However, research by Neuhofer (2016) and Tanti and Buhalis (2016) indicated that over-dependence on technology might diminish the overall quality of the travel experience. Thus, when users connect with online platforms, unforeseen repercussions might arise, such as disturbances to the desired state of escapism and temporary disengagement of the user's mind. Soares and Storm (2018) and Tamir, Templeton, Ward, and Zaki (2018) suggested that the need for visitors to document their experiences using mobile devices might hinder their ability to remember the event. In addition, Barasch, Zauberman, and Diehl (2018) presented that excessive connectivity levels, sharing acts, and experiences might negatively impact visitor happiness. Additionally, Highly astute travelers face the potential danger of

encountering sensations of seclusion (Tribe & Mkono, 2017), which might result in their overlooking chances that could otherwise enhance the significance of their journeys. Of course, emerging concepts in this field include technostress, which refers to the stress caused by technology (Dickinson, Hibbert, & Filimonau, 2016; Neuhofer & Ladkin, 2017), as well as the need for digital detox and disengagement (Meuter, Ostrom, Bitner, & Roundtree, 2003). Reino, Koo, Gretzel, and Kopera (2015) identified many adverse emotions, including the possibility of experiencing cognitive overload.

2.2. Technologies for the Facilitation of Smart Tourism

Recently, the internet's and information and communication technologies (ICTs) explosive growth influenced travel, tourism, and how visitors engage with various experiences (Xiang et al., 2015). To deliver timely and pertinent data, the authors of a recent study (Soliman, Cardoso, Almeida, Arajo, & Arajo Vila, 2021) stressed the significance of STTs as essential infrastructure that integrates several components such as hardware, software, networks, travel services, and ICTs. Notable, this facilitates more Smart and well-informed decision-making by destination stakeholders. Of course, one of the various technologies included in the solutions is the Internet of Things like cloud computing, artificial intelligence, mobile devices and apps, big data, Wi-Fi, wearable technology, chatbots, QR codes, near-field communication (NFC), radio frequency identification (RFID), social networks, and beacons are some examples of the Internet of Things. According to Neuhofer et al. (2015), Smart Tourism Technologies (STTs) have diverse application ranges that can improve tourist experiences and offer additional benefits. As per the research conducted by Gretzel Werthner et al. (2015), Speech-to-Text (STT) technology potentially improves a traveler's experience. Hence, it can provide more extensive coverage, deliver valuable information, offer increased flexibility, and aid decision-making. Therefore, the previous discussion proposes the following hypothesis:

Hypothesis 1: *Speech-to-text technology has a beneficial impact on the overall tourism experience in Smart destinations.*

Several writers (No & Kim, 2015; Lee, Lee, Chung, & Koo, 2018; Jeong & Shin, 2020; Huang, Goo, Nam, & Yoo, 2017)) view STT as a complex concept. The evaluation of STT for destinations is based on four key characteristics: accessibility, informativeness, interaction, and customization. In their study, Um and Chung (2021) provided a definition of accessibility that focuses on the ability of travelers to access and use internet-based tourism information. As per Buhalis and Amaranggana (2013), STT impacted the collaborative development of visitor experiences. The study conducted by Pai, Liu, Kang, and Dai (2020) found that accessibility played a crucial role in influencing the overall happiness of travelers and their sightseeing experience.   In their study, Lee et al. (2018) presented a definition of informativeness that encompasses the measurable characteristics of information, including its quantity, frequency, truthfulness, and precision. Mostly, the formulation of this term derived from the findings made during their research. A recent study by Pai et al. (2020) discovered that improving the informativeness level can significantly decrease the time and effort needed for information retrieval. In Addition, this enhancement also leads to higher visitor satisfaction levels with their overall experience. In their study, Huang et al. (2017) provided a definition of interactivity that focuses on the ability of Smart technology to deliver real-time information to website visitors. According to the research conducted by Gretzel, Sigala, et al. (2015), this feature enables two-way communication among users, brings all users together, encourages tourists to explore their surroundings further, and ultimately improves the overall quality of their vacation experience. In their research, Buhalis and Amaranggana (2015) highlight the importance of customization in providing personalized recommendations to visitors, considering their individual requirements. Thus, Smart destinations personalize the information they provide, besides enhancing the quality of the tourism experience (Jeong & Shin, 2020). Therefore, the discussion analysis suggests the following hypotheses:

Hypotheses 2: *2A: Speech-to-text (STT) features exert a beneficial impact on the tourism encounter in Smart destinations.*

A2: The tourism experience in Smart destinations is favorably influenced by four factors: accessibility, informativeness, interaction, and customization.

Pai et al. (2020) found that tourists frequently opt to utilize Secure Transaction Technology (STT) when they perceive a high level of protection for their personal information.   Huang et al. (2017) define security as the act of protecting an individual's personal data when using STTs. Several scholars, such as González-Reverté, Dáz-Luque, Gomis-López, and Morales-Pérez (2018), Huang et al. (2017), and Xiang et al. (2015), caution against the possible threats to individual privacy associated with the disclosure of personal information. Jeong and Shin's 2020 study suggests that these hazards can impede the adoption of smart technology and the ability of a place to attract tourists. Therefore, the subsequent hypothesis is proposed to elucidate the data:

Hypothesis 3: *Security and privacy issues have a detrimental effect on the visitor experience in Smart destinations.*

Furthermore, further moderating factors identified by Borenstein et al. (2009) might elucidate the variations in the extent of the observed effects among the different studies that the characteristics include the publication year of the research, the geographical location of the study, and the level of preparedness of the nation for the use of ICT. Consequently, the investigation's results indicate the following hypotheses:

Hypothesis 4: *The year study conduct influences the link between Smart tourism technologies (STT) and the overall tourism experience in Smart places.*

Hypothesis 5: *The geographic location of the research has a moderating influence on the correlation between Smart tourism technologies (STT) and the overall tourism experience in Smart destinations.*

Hypothesis 6: *The level of preparedness in information and communication technology (ICT) has a moderating impact on the connection between Smart tourism technologies (STT) and the overall tourism experience in Smart locations (see Fig. 1).*
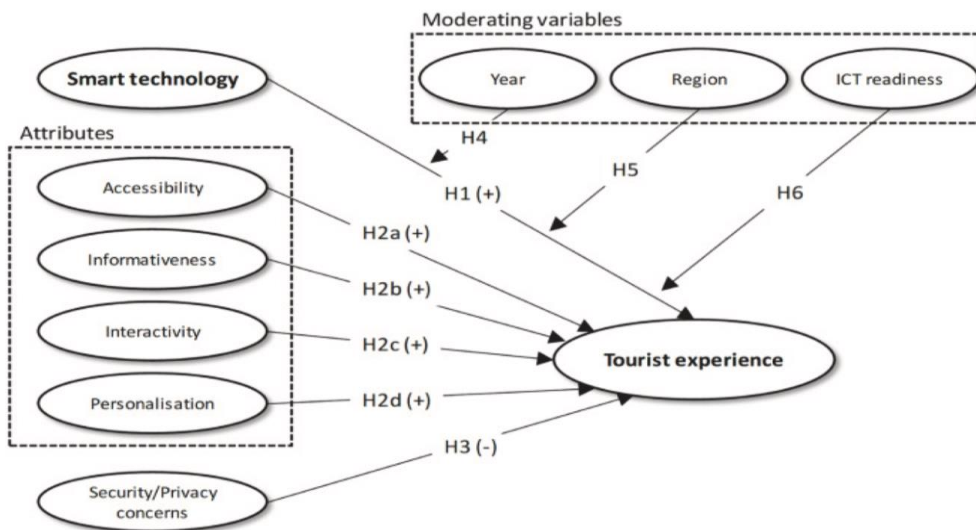
Fig. 1: Research Framework.

3. Methodology

The existence of several studies that investigate the same research inquiries, potentially yielding varying outcomes in terms of impact magnitudes or even directions, necessitates the development of a cohesive conclusion to comprehend the findings. As per Glass's 1976 description, the primary objective of meta-analysis is to quantitatively combine data from several research studies to evaluate the total effect size and statistical significance. This objective was achieved by amalgamating the discoveries of the many investigations.

3.1. Requirements for the Study Selection Criteria

An extensive examination was Scopus and the Web of Science, adhering to the principles outlined in the PRISMA statement (Page et al., 2021), to ascertain the most significant publications about smart destinations, Smart tourism technology (STT), and visitor experience. The research utilized Scopus and the Web of Science as data sources. The search technique uses the query string "smart city" OR "smart tourism" OR "smart destination" AND ("app" OR "artificial intelligence" OR "augmented reality" OR "beacon" OR "big data" OR "chatbot" OR "cloud" OR "connectivity" OR "device" OR "digital" OR "gamification" OR "ICT" OR "information and communication technology") Not Articles were collected until the search date of April 24, 2023, without any specified time frame. Upon examining the titles and abstracts, the search narrowed down for data retrieval only to Smart Tourism Technologies (STT) information and the visitor experience in Smart regions. The investigation carefully considers possible discrepancies in the notion of a destination. Further, for research to be suitable for consideration, it must satisfy the following supplementary inclusion criteria (Higgins et al., 2019):

(1) The study was derived from preexisting scholarly sources, including journal articles, book chapters, and conference proceedings,
(2) Only papers prepared in English and Spanish taken into consideration,
(3) The selection method was restricted to empirical studies that included published correlation or regression coefficients and the study sample size.
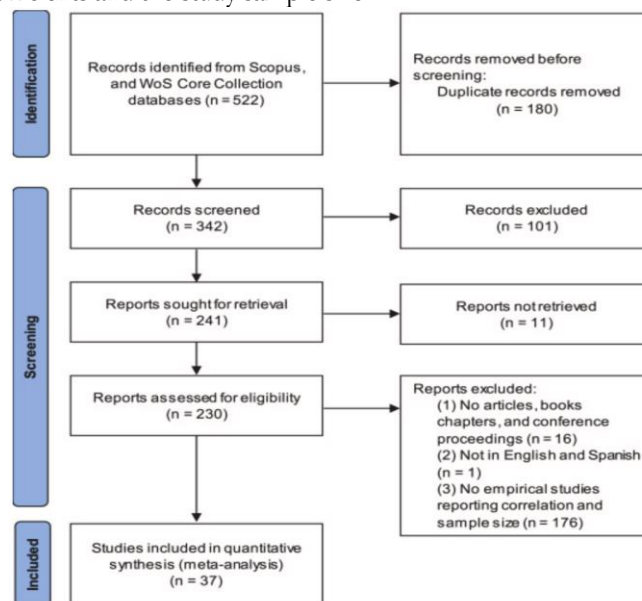

Fig. 2: Literature Search Flow Diagram.

Ultimately, 37 distinct studies were selected to incorporate into the meta-analysis following a rigorous selection procedure. The papers located in Appendix B contain data obtained from a collective of 14,276 surveys conducted across 14 distinct countries. The analyzed articles had varying sample sizes, ranging from 112 (Zadel, Honovic, & Badurina, 2020) to 1052 (Ranasinghe, Danthanarayana, Ranaweera, & Idroos, 2020), with an average sample size of 386. Figure 2 provides a complete method comprehensive depiction presenting a thorough portrayal.

3.2. Determining the Magnitude of the Effect and doing Statistical Analysis

It is crucial to establish an effect size and its corresponding standard error to accurately represent the quantitative findings of a collection of research studies in a standardized manner. It will enable a thorough comparison and interpretation (Lipsey & Wilson, 2001). In this current context, we are examining studies that present findings regarding the relationship between two numerical variables. The effect size index falls under the category of r, which is especially well-suited for correlational research (Botella & Gambara, 2006). Therefore, it was determined to use the t-value, p-value, Pearson's correlation coefficient, standardized regression coefficients, and standardized structural estimates as metric variables to measure the impact.

This study used a web-based calculator developed by David Wilson to calculate the effect size values and their variations. Hence, when multiple effect sizes were obtained for a specific construct within a single study, Lipsey and Wilson (2001) suggested calculating the average of these effect sizes. Using the method outlined by Borenstein et al. (2009), the r-value of each study was transformed using Fisher's z-transformation for statistical analysis. The transformed values were reverted to their original scale using the inverse z transformation approach, as proposed by Hedges and Olkin (1985) and Lipsey and Wilson (2001), for facilitating the presentation and examination of the results,

The study suggests two main factors contributing to the variation in the primary studies; the first factor is the sampling error, which refers to the variance within each study, and the second factor is the distinct parametric effect that each study assesses, resulting in variance between studies (Field, 2003; Schmidt, Oh, & Hayes, 2009). Eventually, the study used a random effects model concerning all sources of variability (Borenstein et al., 2009).

The values of $\tau 1$ were assumed to be predetermined, whereas $\tau 2$ was derived from the sample of effect sizes.

The mean effect size estimate was computed by obtaining the weighted average of the impact sizes from each study, giving more importance to the findings of more precise studies. Alternative approaches exist for estimating the weights wj. Nevertheless, the prevailing is to assign weights in random effects models based on the inverse relationship with the total variance, where $wj = 1/(+ \tau 2)$. This work utilized the limited maximum likelihood approach (REML) (Raudenbush, 2009) to estimate $\tau 2$, assuming a normal distribution of random effects (see Appendix A). This approach produces an impartial and non-negative estimate of $\tau 2$. Finally, the study used Stata 16.1 to perform the analysis.

4. Result

The meta-analysis results presented in Figure 3 represented a forest plot that visually displayed the findings (Lewis & Clarke, 2001). The information includes individual effect sizes, mean effect sizes, confidence intervals, and various heterogeneity statistics. The figure has a vertical line labeled 'no impact' that starts at 0, a vertical dashed red line that depicts the mean effect size, and both lines are oriented vertically.
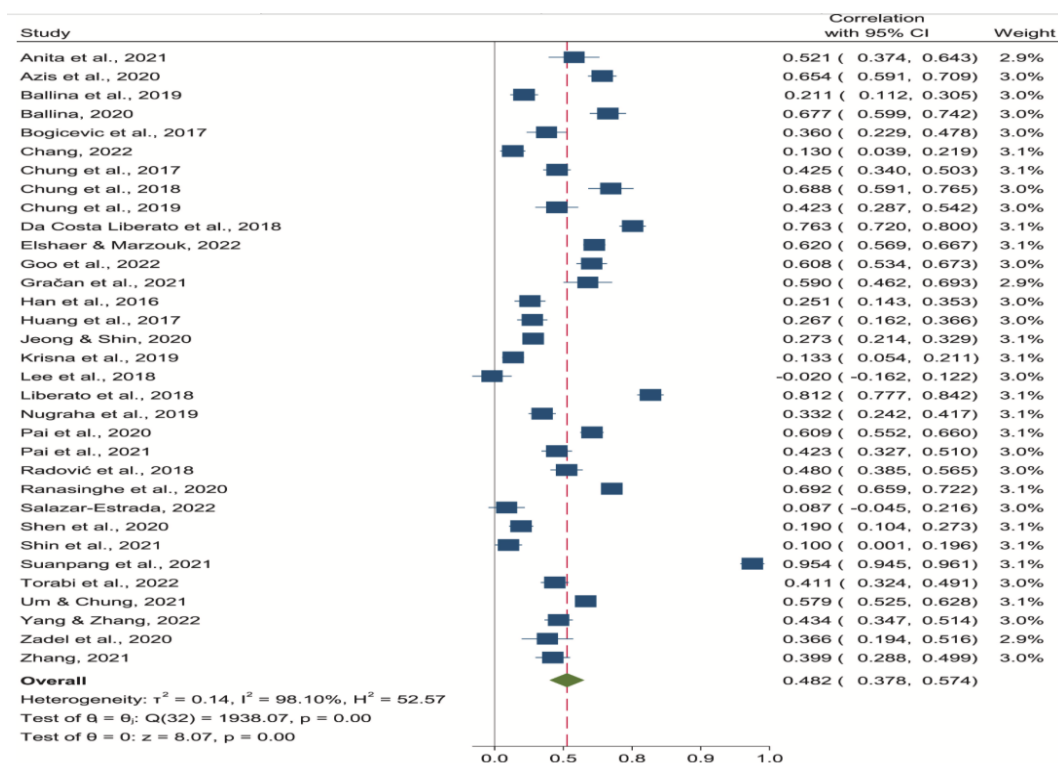
Fig. 3: Meta-Analysis Forest Plot. Random-Effects REML Model.

Since the confidence range for the mean impact did not include the value 0 (representing any effect), we may infer that STTs impact the tourism experience in Smart places, hence verifying Hypothesis 1. In other words, by employing the contrast statistic z = 8.07 at a significance level of 0.000, we may reject the null hypothesis that the common parametric influence of the research is 0. To what extent does STT exert a substantial influence? The 95% confidence interval for the impact size spans from 0.378 to 0.574, with the average effect size being r = 0.482. According to Cohen (1988), the values of 0.10, 0.30, and 0.50 should evaluated successively as low, medium, and high for the indices of the r family assessing the magnitude of the effect sizes. Consequently, the Speech-to-Text (STT) technology has a limited influence on the tourism experience.

The data presented on heterogeneity strongly supports the hypothesis that there is a significant variation level in the impact sizes observed in each study (I2 = 98.10%). The value of 2 is approximately 0.137, which signifies the difference observed in the various investigations. The test for homogeneity of specific effect sizes, which evaluates the consistency of the effect sizes across the studies, is rejected based on Cochran's Q statistic Q(32) = 1938.07 (p = 0.000). This test evaluates whether the effect sizes demonstrate consistency across all research.

In addition, the study performed a meta-analysis on the effect sizes found in the original studies regarding the characteristics of speech-to-text technology and concerns surrounding security and privacy. The study's conduct is to assess the overall significance of the findings. In addition, it performed a subgroup meta-analysis considering the year of publication, geographical location, and the level of preparedness for information and communications technology (using the nation's classifications provided by the World Economic Forum, 2022).

The findings are summarized and presented in Tables 1 and 2, arranged in descending order of impact magnitude (the corresponding forest plot in Appendix C), and the variability statistics among the groups in Table 3.

Table 1: Meta-Analysis Summary.

Group	Effect size and 95% interval					Test of null	
	K	N	r	CI_L	CI_U	z-value	p-value
Overall	33	12694	0.482	0.378	0.574	8.07	0.000
Attributes							
Informativeness	11	5430	0.214	0.085	0.336	3.22	0.001
Interactivity	13	5994	0.199	0.077	0.316	3.16	0.002
Accessibility	11	5430	0.182	0.073	0.286	3.25	0.001
Personalization	11	5430	0.174	0.077	0.269	3.48	0.001
Security/privacy concerns	7	3180	−0.127	-0.161	-0.093	-7.19	0.000
Year							
≥ 2020	20	8480	0.513	0.374	0.630	6.40	0.000
<2020	13	4214	0.431	0.268	0.569	4.86	0.000
Region							
Europe and Eurasia	7	1970	0.593	0.409	0.731	5.39	0.000
Middle East and North Africa	2	992	0.525	0.292	0.699	4.04	0.000
Asia-Pacific	21	8084	0.468	0.322	0.593	5.73	0.000
The Americas	4	1648	0.214	0.090	0.332	3.35	0.001
ICT readiness							
Medium-high	12	4768	0.550	0.340	0.707	4.58	0.000
High	22	7926	0.428	0.316	0.528	6.90	0.000

Table 2: Heterogeneity Summary.

Group	df(Q)	Q-value	P > Q	τ2	% I2	H2
Overall	32	1938.07	0.000	0.137	98.10	52.57
Attributes						
Informativeness	10	253.88	0.000	0.047	95.76	23.59
Interactivity	12	396.40	0.000	0.050	95.74	23.45
Accessibility	10	188.92	0.000	0.033	93.93	16.47
Personalisation	10	192.36	0.000	0.026	92.43	85.08
Security/privacy concerns	6	4.92	0.554	0.000	0.02	1.00
Year						
≥ 2020	19	1395.01	0.000	0.154	98.45	64.47
<2020	12	496.28	0.000	0.113	97.29	36.84
Region						
Europe and Eurasia	6	226.40	0.000	0.108	96.67	30.01
Middle East and North Africa	1	19.34	0.000	0.039	94.83	19.34
Asia-Pacific	20	1499.15	0.000	0.162	98.38	61.90
The Americas	3	13.46	0.004	0.013	80.53	5.14
ICT readiness						
Medium-high	11	1083.23	0.000	0.214	98.78	82.06
High	21	698.64	0.000	0.093	97.04	33.78

Table 3: Tests of Group Differences.

Group	Df	Q_b	$P > Q_b$
Year	1	0.67	0.411
Region	3	15.89	0.001
ICT readiness	1	1.15	0.284

The attribution of hypotheses validation of 2a, 2b, 2c, and 2d were to the positive impact of STT on the generation of the tourism experience. In comparison to the influence of accessibility (r = 0.182) and customization (r = 0.174), the significance of informativeness (r = 0.214) and interactivity (r = 0.2199) on the tourism experience at the location seems to be considerably greater. When considered individually, the characteristics of the STT have minimal influence on the overall quality of the visitor's experience. The statistics provide additional evidence for the validity of Hypothesis 3, suggesting that worries about privacy and security have a negative relationship with the overall satisfaction of visitors. In this particular instance, the impact is insignificant (r = -0.127).

Although the p-value for the group comparison test is 0.411, suggesting no significant variation in the data depending on the year, Hypothesis 4 was rejected. Worthy, research conducted after 2020 demonstrates a notable correlation (r = 0.513) between STT and visitor experience compared with those conducted before 2020 (r = 0.431). By analyzing the data based on location, we can confirm Hypothesis 5. The association between STT and tourist experience varies considerably across different groups (p = 0.001). Specifically, in Europe and Eurasia, the correlation is notable (r = 0.593), followed by the Asia-Pacific area (r = 0.468), while in the Americas, the link is comparatively weaker (r = 0.214). The Middle East and North Africa subgroup has just two states, resulting in an R-value of 0.525. The test findings for group differences suggested to reject Hypothesis 6 of the p-value is 0.284. Research done in nations with a medium-high degree of ICT readiness (r = 0.550) shows a stronger favorable correlation with tourist experience compared to studies conducted in nations with high-level readiness (r = 0.428).

The Cochran's Q statistic yielded significant results in all of the conducted meta-analyses, except for the case involving security and privacy concerns (Table 2). These findings suggested that variation in impact sizes among studies is over expectations due to random sampling error alone (Cooper, 2016). The observed results for I2 and H2 heterogeneity statistics offer more evidence to corroborate this hypothesis. The only subgroup study considered geography a significant predictor of heterogeneity among groups, as seen in Table 3 of the subgroup meta-analysis.

5.Discussion and Conclusions

The study's findings suggest that the technology incorporation enhances the holiday experience for tourists visiting Smart destinations. The present study adopted a thorough analysis of multiple research studies and evident strong positive correlation between the study's parameters. Connectively, the study findings are in line with the well-regarded research by Neuhofer et al. (2012), Tussyadiah and Fesenmaier (2009), and Wang et al. (2012). Unlike wise, two studies by (Lee et al., 2018) and (Salazar-Estrada, 2022) have indicated no statistically significant correlation between the analyzed variables. Additionally, eight other scholarly articles (Chang, 2022; Gao & Pan, 2022; Huang et al., 2017; Jeong & Shin, 2020; Kim, Koo, & Chung, 2021; Lee et al., 2018; Pai et al., 2021; Shin, Jeong, & Cho, 2021) have also discovered that there is at least one effect where no statistically significant association in a publication by Coca-Stefaniak in 2019.

Neurological research has provided scientific evidence of the negative impact of STT on the processing of emotions, memory, and the retention of events. According to Yetimolu (2022), mobile

applications have crucial roles in enhancing visitors' experiences and influencing their behaviors while on vacation. In addition, these factors potentially affect the mental well-being of the tourists. The source citation is Choi, Hickerson, Lee, Lee, and Choe (2022).

The limited impact of STT on visitor experiences implies that technology's significance in shaping experiences may exaggerated or potentially delivering exceptional tourism experiences may not be fully in realization. The conclusion aligns with the results of a study conducted by Molinillo, Anaya-Sánchez, Morrison, and Coca-Stefaniak (2019), which demonstrated that smart cities are not effectively harnessing the capabilities of social media to enhance the experiences of both visitors and residents. This conclusion is consistent with the research conducted by Molinillo, Anaya-Sánchez, Morrison, and Coca-Stefaniak (2019).

Based on the research conducted by Azis, Amin, Chan, and Aprilia (2020) and Shin et al. (2021), the factor that impacted visitors' long-lasting memories of their trips was the informativeness level. This result aligns with the findings made by Shin et al. (2021) and Pai et al. (2020), which stated that the accessibility of information enables tourists to engage in a wide range of activities and events. Interactivity is an essential attribute that enhances the overall experience of travelers (Leung et al., 2022). Thus, such achievement is by allowing smart destinations to collect up-to-date tourism data and offering personalized services that are more appealing (Jeong & Shin, 2020). The apprehensions of travelers over the potential compromise of security or infringement of privacy resulting from the Smart technology utilization adversely impact their whole holiday experience. Based on the research conducted by Huang et al. (2017), Krisna, Handayani, and Azzahro (2019), and Shin et al. (2021), the impact of this component is relatively insignificant when compared to other variables.

Recent research suggests a significant impact, although the year of publication does not explain the differences found in the studies. With the increasing prevalence of technology in our modern society, it is becoming increasingly common for tourists to participate in online activities even while they are away from home (Pearce, 2011). On the other hand, there are notable differences between the areas. The influence of Short-Term Tourism (STT) on the tourism experience varies across different regions. Notable, in the Asia-Pacific region, it has a moderate impact, and in America, the significance is comparatively lower. However, the link between STT and tourism experiences is more noticeable in Europe and Eurasia. The reason for this result could be due to the increasing academic interest in smart destinations in various countries, including South Korea and Italy (Mehraliyev, Choi, & Koseoglu, 2019), as well as the support from institutions in Spain (Segittur, 2015) and China (Wang et al., 2013). The timing of implementing new technologies is of utmost importance and relies on both the duration since their inception and the current state of technological readiness. However, the differences observed in different studies cannot be attributed to variations in ICT readiness because investigations conducted in countries with moderate to high technological preparedness levels show larger effect sizes.

5.1. Potential Implications based on Theory

This study makes several contributions to the current body of knowledge. This study is the first analysis of the existing empirical evidence about the impact of STT on the tourist experience. It employs a rigorous and comprehensive approach to evaluate this effect for the first time. Our evaluation considers a diverse range of research, which may vary in sample characteristics, contexts, and techniques. Implementing this approach mitigates prejudice and enhances the research's statistical robustness. This research examines the average impact of Short-Term Rentals (STT) on the overall tourism experience. Furthermore, it acknowledges crucial aspects, such as the level of engagement and the information amount provided. Further, it elucidates the potential moderating factors that

affect the correlation between STT and visitors' experiences. Consequently, the variables that contribute to disparities in the results of various investigations and evaluate the impact of these disparities on the findings.

5.2. Repercussions for Organizational Management

The findings of this study have several ramifications that managers should consider. The tourism enhancement of experience and the visitors' satisfaction with the destination and their inclination to revisit relies on STT, an acronym for service quality, tourist satisfaction, and tourist loyalty. Businesses, marketing organizations, and other private entities operating in Smart destinations could seek technology solutions to enhance the visitor experience and maybe gain a competitive edge. Various businesses, like airports, hotels, and museums, may utilize technology to create distinctive customer and service encounters. Further, not all facets of speech-to-text translation exert an equal influence on a memorable experience creation. Hence, the primary objective for designing apps and websites, social network communication, and speech-to-text technologies utilization in their many manifestations should be to enhance the qualities of being informative and participatory.

Moreover, in a technologically driven setting, the disregard for safety and privacy regulations at a tourist destination might influence the probability of people visiting that particular spot (Jeong & Shin, 2020). Therefore, it is imperative to prioritize safeguarding and personal data security as a critical element in maintaining a favorable image and attracting visitors.

5.3. Implications and Potential Areas for more Investigation

Several limitations encounter this research, and despite much research that was accessed, only a tiny fraction of those studies produce quantitative data incorporated into a meta-analysis. In addition, some of the studies lack information on the features of STT and concerns regarding security and privacy. As a result, findings are unable to be extrapolated to a more general setting. Another big problem is the existence of prejudice in the media. In addition, research findings that revealed poor outcomes or lacked statistical significance have a decreased possibility of getting published (Borenstein et al., 2009; Lipsey & Wilson, 2001). Also, the computation of the average effect size displays a large amount of variability that highlights the significance of approaching the interpretation of the data with caution. Therefore, it is essential to perform further empirical research employing standardized methods to establish or reject the agreement on the positive influence that technology has had on boosting the quality of the experience that tourists have when visiting a location. In addition, it is also vital to investigate innovative moderating variables to shed light on variances in results.

6. Authors' Contribution

Dr. Farah presented the research idea with the assistance of Dr. Sarah and Dr. Mamoun. In addition, Dr. Farah, Dr. Yasser, and Dr. Reda developed and conceptualized the idea. Additionally, Dr. Farah wrote the first draft together with Dr. Yasser, Dr. Sara, and Dr. Mamoun. Notable, Dr. Farah, Dr. Reda and Dr. Sara invited Dr. Lemya and Dr. Falah to join the proposal group and participate in the first draft discussion. Additionally, all authors surveyed the literature to develop the theoretical model. Also, Dr. Farah, Dr. Reda, and Dr. Lemya developed the methodology and research design plan verified by Dr. Yasser, Dr. Sara, and Dr. Mamoun. Worth noting, Dr. Mamoun, Dr. Reda, Dr. Falah, and Dr. Sara administrated the field study of the project to collect and enter data using SPSS. Again, Dr. Farah, Dr. Lemya, and Dr. Reda performed the formal analysis and interpretation. Eventually, all authors discussed the results and suggested improvements. Dr. Farah, Dr. Yasser, and Dr. Sara wrote the first version of the manuscript with the consultation and assistance of all authors. Eventually, all

authors reviewed and edited the final manuscript of the project.

7. Conflict of Interest

8. Funding

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Appendix

A.Normal Q-Q Plot
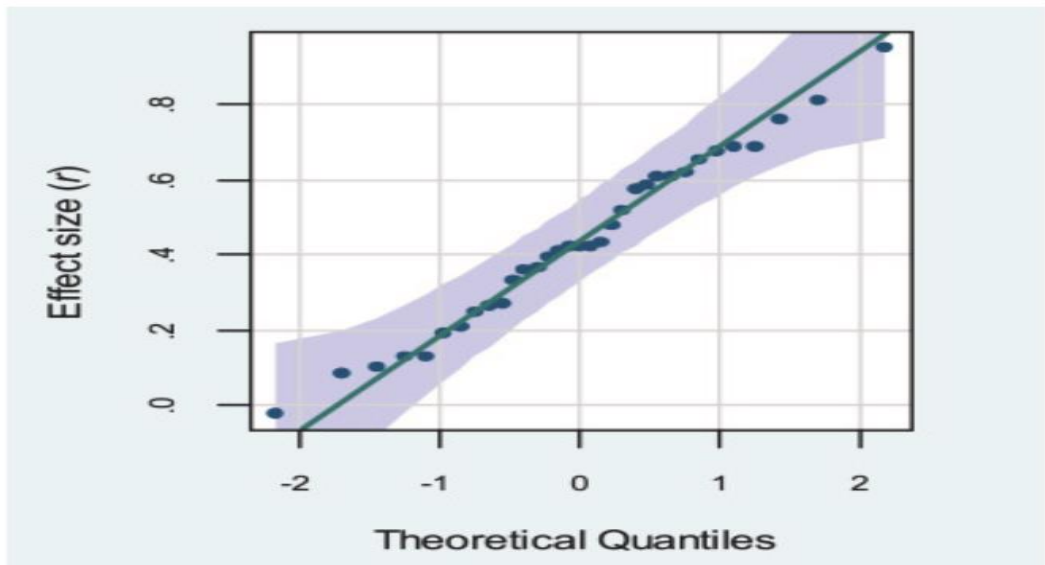
B. Studies Included in the Meta-Analysis

Authors (year)	Research objective	Ove	Acc	Inf	Int	Per	Sec	Sample Size	Country
Anita, Wijaya, Sarastiani, Kusumo, and Santi (2021)	Examine the variables that impact the level of public approval towards virtual tour technology in museums and evaluate its impact on smart tourism and smart experience.	✓	✗	✗	✗	✗	✗	115	Indonesia
Azis et al. (2020)	Examine the impact of Short-Term Tourist (STT) activities and unique tourism experiences on tourist satisfaction and their loyalty towards a particular place.	✓	✓	✓	✓	✓	✗	360	Indonesia
Ballina et al. (2019)	Examine the disparity between the concept of smart tourism places and the emerging phygital visitor experiences.	✓	✗	✗	✗	✗	✗	377	Spain
Ballina (2020)	Examine the perspectives and preferences of rural visitors about technological applications.	✓	✗	✗	✗	✗	✗	226	Spain
Bogicevic et al. (2017)	Analyze the correlation between airport technology and the levels of confidence, enjoyment, and satisfaction experienced by travelers.	✓	✗	✗	✗	✗	✗	189	United States
Chang (2022)	Assess the impact of Speech-to-Text (STT) technology on the perception of a travel location through memorable tourist experiences.	✓	✓	✓	✓	✓	✗	456	Taiwan
Chung, Tyan, and Chung (2017)	Bridge the knowledge gap on the correlation between the utilization of social networking sites and the level of contentment derived from the travel experience.	✓	✗	✗	✗	✗	✗	387	South Korea
Chung, Lee, Kim, and Koo (2018)	Determine if the level of pleasure with augmented reality impacts individuals' attitude towards and intention to visit tourism locations.	✓	✗	✗	✗	✗	✗	145	South Korea
Chung, Tyan, and Lee (2019)	Analyze the impact of technology-driven ecological innovation on the emotions of visitors and their intents to engage in word-of-mouth communication.	✓	✗	✗	✗	✗	✗	161	South Korea
da Costa Liberato, Alén-González, and de Azevedo Liberato (2018)	Analyze the impact of technology components utilized in smart tourism sites on enhancing travelers' experiences.	✓	✗	✗	✗	✗	✗	423	Portugal
Elshaer and Marzouk (2022)	Examine the impact of Service, Technology, and Tourism (STT) on the creation of memorable visitor experiences, with a focus on how hotel innovations play a mediating role.	✓	✗	✗	✗	✗	✗	612	Egypt
Gao and Pan (2022)	Investigate the many elements that impact travelers' experiences using a smart tour guide system in four Chinese smart tourism locations.	✗	✗	✗	✓	✗	✗	248	China
González-Reverté et al. (2018)	Examine the impact of privacy vulnerability on happiness in the tourist experience that includes the utilization of cellphones.	✗	✗	✗	✗	✗	✓	532	Spain
Goo, Huang, Yoo, and Koo (2022)	Analyze the ways in which travelers improve the quality of their journeys by utilizing Smart Travel Technology (STT).	✓	✓	✓	✓	✓	✗	319	South Korea
Gračan, Zadel, and Pavlović (2021)	Examine the significance and involvement of mobile applications in enhancing the visiting experience.	✓	✗	✗	✗	✗	✗	125	Croatia
Han, Park, Chung, and Lee (2016)	Analyze the factors that influence the desire to reuse NFC technology and loyalty towards Expo events in connection to the usage of NFC technology.	✓	✗	✗	✗	✗	✗	309	South Korea

Authors (year)	Research objective	Ove	Acc	Inf	Int	Per	Sec	Sample Size	Country
Huang et al. (2017)	Analyze the process by which travelers utilize travel-related websites, social media platforms, and cellphones to augment their level of happiness throughout their travels.	✓	✓	✓	✓	✓	✓	319	South Korea
Jeong and Shin (2020)	Evaluate the impact of STT utilization on the entire travel experience and the intention to revisit in the future.	✓	✓	✓	✓	✓	✗	1010	United States
Kim et al. (2021)	Analyze the impact of mobility applications on creating memorable tourism experiences via the lens of the stress-coping hypothesis.	✗	✗	✗	✓	✗	✗	316	South Kore
Krisna et al. (2019)	Investigate the correlation between the utilization of Instagram features and the impact on travel experiences, expectations, confirmation, and satisfaction throughout trip itineraries.	✓	✗	✗	✗	✗	✓	606	Indonesia
Lee et al. (2018)	Suggest a comprehensive model that combines features of sustainable tourism development (STT) and destination values, which have a significant impact on the overall life satisfaction of visitors.	✓	✓	✓	✓	✓	✗	191	South Korea
Liberato et al. (2018)	Analyze the impact of utilizing technology before to, during, and after the visit on the overall visitor experience.	✓	✗	✗	✗	✗	✗	423	Portuga
Nugraha, Wibowo, Disman, and Hurriyati (2019)	Determine the association among smart tourism experience, perceived value, memorable tourist experience, and revisit intention.	✓	✗	✗	✗	✗	✗	400	Indonesia
Pai et al. (2020)	Examine the influence of short-term travel (STT) experiences on the level of satisfaction and likelihood of returning among tourists.	✓	✓	✓	✓	✓	✓	527	Macao
Pai et al. (2021)	Analyze the correlations between the reported satisfaction with the short-term travel (STT) experience, the overall travel experience, and the desire to revisit.	✓	✓	✓	✓	✓	✓	312	Macao
Radović, Marković, and Varičak (2018)	Emphasize the pivotal role and profound relevance of information technology in shaping and crafting the visitor experience.	✓	✗	✗	✗	✗	✗	284	Croatia
Ranasinghe et al. (2020)	Determine the impact of intelligent functionalities on the investigation of smart tourism, the exploitation of smart tourism, and the happiness of travel experiences.	✓	✓	✓	✓	✓	✗	1052	Sri Lanka
Salazar-Estrada (2022)	Understand the impact of the utilization of information and communication technology (ICT) by visitors on their overall travel experience.	✓	✗	✗	✗	✗	✗	224	Mexico
Shen et al. (2020)	Examine the impact of Speech-to-Text (STT) technology on travelers' overall visit experience.	✓	✗	✗	✗	✗	✗	503	China
Shin et al. (2021)	Analyze the impact of self-service technology (STT) and the level of technological preparedness of travelers on their satisfaction and intention to engage in future behaviors.	✓	✓	✓	✓	✓	✓	398	United States & South Korea
Suanpang, Netwong, and Chunhapataragul (2021)	Examine the influence of smart tourist sites on the likelihood of people returning to visit again during the COVID-19 epidemic.	✓	✗	✗	✗	✗	✗	498	Thailand
Torabi et al. (2022)	Examine a comprehensive framework that explains the level of excellence in memorable experiences and how it influences visitors' pleasure and likelihood to visit again using STTs.	✓	✗	✗	✗	✗	✗	380	Iran

C. Attributes, Security/Privacy Concerns and Subgroup Analysis Forest Plots. Random-Effects Reml Model

Study	K	Correlation with 95% CI	P-value
Attributes			
Informativeness	11	0.214 (0.085, 0.336)	0.001
Interactivity	13	0.199 (0.077, 0.316)	0.002
Accessibility	11	0.182 (0.073, 0.286)	0.001
Personalisation	11	0.174 (0.077, 0.269)	0.000
Security/privacy concerns	7	-0.127 (-0.161, -0.093)	0.000
Year			
>= 2020	20	0.513 (0.374, 0.630)	0.000
< 2020	13	0.431 (0.268, 0.569)	0.000
Test of group differences: $Q_b(1) = 0.67$, p = 0.41			
Region			
Europe and Eurasia	7	0.593 (0.409, 0.731)	0.000
Middle East and North Africa	2	0.525 (0.292, 0.699)	0.000
Asia-Pacific	21	0.468 (0.322, 0.593)	0.000
The Americas	4	0.214 (0.090, 0.332)	0.001
Test of group differences: $Q_b(3) = 15.89$, p = 0.00			
ICT readiness			
Medium-high	12	0.550 (0.340, 0.707)	0.000
High	22	0.428 (0.316, 0.528)	0.000
Test of group differences: $Q_b(1) = 1.15$, p = 0.28			
Overall		0.482 (0.378, 0.574)	0.000
Heterogeneity: $\tau^2 = 0.14$, $I^2 = 98.10\%$, $H^2 = 52.57$			
Test of $\theta_i = \theta_j$: Q(32) = 1938.07, p = 0.00			

-0.2 0.0   0.5   0.8